Trade Patterns and Determinants in Selected Trade Deficit Categories in Australia: 1990 - 2006

Samuel Belicka

Bachelor of Business - International Trade/ Retail Management „*B Bus (Int Trade/ Retail Mgt)*', Victoria University
Master of Business - Business Economics „*M Bus (Econ)*', Victoria University
Graduate Certificate in Tertiary Education „*Grad Cert Edu (Tert)*', Victoria University

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School of Economics and Finance
Victoria University

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ABSTRACT

The Australian Trade Deficit (TD) has been increasing in the past 50 years, and this deficit has become more significant in the last few decades. This rising TD level in Australia has brought the national debt level to a new height, making this country one of the world's highest debt-ridden countries. The most alarming fact associated with these trends is that Australia's ability to service the increasing debt levels in the future has been diminishing since the increasing debt levels in Australia have been predominantly used for Consumption (C) rather than for gross capital formation. The diminishing ability to service the increasing debt levels in Australia is due to the fact that the TD level is increasing as a proportion of the Australian Gross Domestic Product (GDP), while the Australian gross capital formation as a proportion of the Australian debt is one of the lowest amongst the major debtor countries in the world.

These trends undoubtedly warrant further investigation and this is further reinforced by the absence of a systematic, intensive and in-depth research of the Australian trade flows from an Australian TD perspective. The existing studies tend to be sporadic or selective in their focus on industries and countries, and there is a lack of research on Australia's TD that investigates the major TD categories and countries. In order to fill this gap in the literature, this thesis adopts an inclusive approach, that uses a robust selection criteria for TD categories and countries, investigates the trade patterns and identifies the trade flows determinants in these selected TD categories between Australia and the selected TD countries. This approach addresses the current conceptual and methodological limitations in the literature, and constitutes a significant contribution to research on the Australian TD.

Empirical data for analysis in this thesis are from the period between 1990 and 2006, in which all trade flows between Australia and all the countries in the world are taken into account. The overall analysis in this research is mainly observed and analyzed from the following perspectives: the Long-Term (LT) - the Period between 1990 and 2006 and Short-Term (ST) - the Period between the 2000 and 2006 perspective, while the trade volumes have been observed and analyzed from both the monetary and Quantity (QTY) values perspective.

Based on an overview of the international trading environment and the Australian macroeconomic environment, it has been established that countries that are more engaged in international trade have historically achieved higher economic growth compared to countries that are relatively less engaged in international trade. However, an unbalanced trade that is associated with an increasing TD as a proportion of the GDP represents growing liabilities with the Rest of the World (RoW). Furthermore, these increasing liabilities can have negative macroeconomic consequences for the countries in question, if growing TD levels are not managed well.

This thesis identifies the service sector as the highest value added and fastest growing industry in Australia, while the manufacturing industry accounts for the smallest proportion of all industries and is decreasing in relative significance overtime. Furthermore, it has been established that the C is the main driver of economic growth in Australia, while the overall Net Export (NX) has a negative contribution to economic growth in Australia for the entire period between 1990 and 2006.

According to the Net International Investment Position (NIIP) which measures stock of international liabilities, Australia's debt levels are growing approximately three times faster than the levels of Australia's GDP during this period, while these trends are more pronounced in recent times. Additionally, the TD, Current Account Deficit (CRAD) and C levels as a percentage of the GDP are increasing overtime, whereas Investment (I) to GDP levels is decreasing over this period. This is even more disconcerting when overall trends reveal that the TD and CRAD are significantly increasing despite the Australian Terms of Trade (TOT) being at historically high levels.

The selection protocol formulated and applied in this thesis identified 11 TD categories (4 goods categories based on HS-2[1], 1 service category based on ANZSIC-1[2], 5 goods categories based on HS-4[3] and 1 service category based on ANZSIC-2[4] level of aggregation) and the 8 TD countries that warrant an in-depth examination.

The 11 selected TD categories and 8 selected TD countries that are examined in this thesis are:

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[1] Harmonized Commodity Description and Coding System - Second Level of Aggregation.
[2] Australian and New Zealand Standard Industrial Classification - Main Divisional Level of Aggregation
[3] Harmonized Commodity Description and Coding System - Fourth Level of Aggregation
[4] Australian and New Zealand Standard Industrial Classification - First Sub-divisional Level of Aggregation.

CATEGORIES

- ***Category 30 (HS-2):*** *- Pharmaceutical Products*

- ***Category 84 (HS-2):*** *- Nuclear Reactors, Boilers, Machinery and Mechanical Appliances; Parts Thereof*

- ***Category 85 (HS-2):*** *- Electrical Machinery and Equipment and Parts Thereof; Sound Recorders and Producers, Television Image and Sound Recorders and Reproducers, and Parts and Accessories of Such Articles*

- ***Category 87 (HS-2):*** *- Vehicles Other Than Railway or Tramway Rolling-Stock, and Parts and Accessories Thereof*

- ***Category 1 (ANZSIC-1):*** *- Transportation Services*

- ***Category 3004 (HS-4):*** *- Medicaments (Excluding Goods of 3002, 3005 or 3006) Consisting of Mixed or Unmixed Products for Therapeutic or Prophylactic Uses, Put Up in Measured Doses or in Forms or Packagings for Retail Sale*

- ***Category 8471 (HS-4):*** *- Automatic Data Processing Machines and Units Thereof; Magnetic or Optical Readers, Machines for Transcribing Data onto Data Media in Coded Form and Machines for Processing Such Data, Not Elsewhere Specified or Included*

- ***Category 8473 (HS-4):*** *- Parts and Accessories (Other Than Covers, Carrying Cases and the Like) Suitable for Use Solely or Principally with Office Machines*

- ***Category 8517 (HS-4):*** *- Electrical Apparatus for Line Telephony or Line Telegraphy, Including Line Telephone Sets with Cordless Handsets and Telecommunication Apparatus for Carrier-Current Line Systems or for Digital Line Systems; Videophones*

- ***Category 8703 (HS-4):*** *- Motor Cars and Other Motor Vehicles Principally Designed for the Transport of Persons (Other Than Public Transport Type), Including Station Wagons and Racing Cars*

- ***Category 1.2 (ANZSIC-2):*** *- Freight Transports*

COUNTRIES

- ***China***
- ***France***
- ***Germany***
- ***Malaysia***
- ***Singapore***

- ***Thailand***
- ***The United Kingdom***
- ***The United States of America***

Based on Comparative Advantage (CA) computed in this thesis, Australia records a Revealed Comparative Disadvantage (RCD) in all selected categories based on both HS-2 and HS-4 level of aggregation, except Category 3004, in which a Revealed Comparative Advantage (RCA) exists since the year 1999. Furthermore, Australia records a Revealed Export Advantage (RXA) in all categories, while based on Vollrath Revealed Trade Advantage Index (VRTAI) and Vollrath Revealed Competitive Advantage Index (VRCAI), Australia records a RCD in all goods categories analyzed. According to the trade performance indices, the Trade Specialization Index (TSI) revealed that Australia possesses a RCD in all categories. Based on the Export Propensity Index (XPI), there is evidence that the Australian X in all categories, except for category 1.2, is increasing overtime as a proportion of domestic output. Furthermore, based on Import Penetration Index (MPI), the M competition for the Australian producers in all categories is increasing, which shows an increasing international competitive pressure in all of the selected TD categories. Finally, the trade performance index Export/ Import Ratio (XMR) shows that the Australian X as a proportion of the M in the selected TD categories is increasing in all categories, except in categories 85, 1, 8517 and 1.2, where this proportion is decreasing.

The analysis of Intra-Industry Trade (IIT) based on an unadjusted Grubel & Lloyd Index (GLI) revealed that the calculated median values of the extent of the IIT in all selected TD categories between Australia and the selected TD countries is relatively high based on both levels of aggregation. However, the extent of IIT has been significantly decreasing overtime in almost all of the selected TD categories and countries at both levels of aggregation. These decreasing trends are more pronounced in the ST than in the LT, while the only exception to this finding is the extent of the IIT for The United Kingdom, where the extent of the IIT based on HS-4 level of aggregation is moderately increasing. Furthermore, the Horizontal Intra-Industry Trade (HIIT) is increasing for all categories and countries on an overall basis. This finding also suggests that the simultaneous X and M between Australia and the selected TD countries is increasing in the products of similar quality and the selected

TD categories and corresponding industries are becoming more internationally competitive.

The review of the current literature and the econometric methodology has identified suitable models for the X supply, M demand and NX models. The X supply models have been estimated as a function of relative price, real income, capacity utilization and the dummy variable for the Goods and Services Tax (GST) (before the introduction of the GST - prior July 2000 is '0' and post this period is '1'), while all independent variables are positively associated with the levels of the X supply. Based on the models that have met the expected priori signs and have satisfactory passed all diagnostic tests, the most significant variables in the determination of the X supply is a relative price, followed closely by real income. Furthermore, the X supply is non-responsive (inelastic) to changes in the relative price, however, the X supply is responsive (elastic) to changes in income. Finally, inconclusive evidence exists that capacity utilization increases the X supply, while the dummy variables indicate that since the introduction of the GST in July 2000, the overall X supply has significantly increased in most of the categories.

The M demand models have been estimated as a function of relative price, real income and 3 quarterly dummy variables (June, September and December quarters), while an independent variable relative price is negatively associated with the M demand and real income is positively associated with the M demand. Based on the models that have met the expected priori signs and have satisfactory passed all diagnostic tests, the most significant variables in the determination of the M demand is a relative price, while the significance of the real income variable is inconclusive. Furthermore, the M demand is non-responsive (inelastic) to changes in the relative price; however, the M demand is responsive (elastic) to changes in income. Finally, the dummy variables in the M demand models indicates in overall, that the M demand for the June, September and December quarters is lower compared to the March quarter in average.

Finally, the NX models have been estimated as a function of relative income, exchange rates, relative money supply, relative interest rates and relative savings rates. Independent variables, relative income, exchange rates and relative money supply are negatively related to the NX levels, while relative interest rates and relative savings rates are positively related to the NX levels. Based on the models that have met the expected priori signs and have satisfactory passed all diagnostic tests, the most significant variables in the determination of the NX is relative income and the exchange rates; followed by relative money supply and interest rates, while the relative savings rates variable proved to be the least significant. Furthermore, the most responsive (elastic) variables to the level of the NX are the exchange rates, followed by relative money supply, income and interest rates, while the relative savings rates is the least responsive (inelastic) variable.

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This thesis is dedicated to my lovely and beautiful wife Veronika Belicka, my beautiful, precious and only daughter Isabella Belicka, my treasured mother Zuzana Belicka in Israel and my deceased father Samuel Belicka, who is greatly missed. Thank you all for your unconditional love, support and encouragement and without you all, this work would never have seen the light of the day. You all mean the world to me and may God guide and bless you all, as he done for me throughout my life.

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Above all, I would like to express my gratitude to two of the most precious and beautiful girls in my life. From the depths of my heart, I would like to say thank you to my wife Veronika for your generous support and vision. You have a perceptive soul and it was you who first discovered my academic potential and placed me on my academic path and for that I am immeasurably grateful.

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Samuel Belicka

[redacted]

October, 2010

DECLARATION

I, Samuel Belicka, declare that the PhD thesis entitled „Trade Patterns and Determinants in Selected Trade Deficit Categories in Australia: 1990 - 2006' is no more than 100,000 words in length including quotes and exclusive of tables, figures, appendices, bibliography, references and footnotes. This thesis contains no material that has been submitted previously, in whole or in part, for the award of any other academic degree or diploma. Except where otherwise indicated, this thesis is my own work.

Samuel Belicka

October, 2010

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LIST OF ABBREVIATIONS

„000s	Thousands
AA	Absolute Advantage
ABS	Australian Bureau of Statistics
ADFT	Augmented Dickey-Fuller Test
Adj-GLI	Adjusted Grubel & Lloyd Index
AEGT	Augmented Engle-Granger Test
AEI	Azhar & Elliott Index
AIG	Australian Industry Group
ANZCERTA	Australia New Zealand Closer Economic Relations Trade Agreement
ANZSIC	Australian and New Zealand Standard Industrial Classification
ANZSIC-1	Australian and New Zealand Standard Industrial Classification - Main Divisional Level of Aggregation
ANZSIC-2	Australian and New Zealand Standard Industrial Classification - First Sub-divisional Level of Aggregation
APEC	Asia-Pacific Economic Cooperation
AQI	Aquino Index
AR(1)	First-order Autoregressive
ARIMA	Autoregressive Integrated Moving Averages
ASEAN	Association of Southeast Asian Nations
AUD	Australian Dollar Currency
AUV	Average Unit Value
BAI	Balassa Index
BEI	Bergstrand Index
BLUE	Best Linear Unbiased Estimators

BOE	Bank of England
BOF	Bank of France
BoP	Balance of Payment
BOT	Bank of Thailand
BRCAI	Balassa Revealed Comparative Advantage Index
BRI	Brülhart Index
BUE	Best Unbiased Estimators
C	Consumption
CA	Comparative Advantage
CD	Comparative Disadvantage
CDWT	Cointegrating Durbin-Watson Test
CEDA	Committee for Economic Development of Australia
CEO	Chief Executive Officer
CPA	Capital Account
CPAD	Capital Account Deficit
CPAS	Capital Account Surplus
CRA	Current Account
CRAD	Current Account Deficit
CRAS	Current Account Surplus
DDLG	Domestic Demand Led Growth
DFAT	The Australian Department of Foreign Affairs and Trade
DFT	Dickey-Fuller Test
DITR	Department of Industry, Tourism and Resources

DOSM	Department of Statistics Malaysia
DPT	Dickey-Pantula Test
ECM	Error Correction Model
EEC	European Economic Community
EGT	Engle-Granger Test
ELG	Export Led Growth Hypothesis
ETM	Elaborately Transformed Manufactures
EU	European Union
EUR	European Currency Euro
EXR	Exchange Rates
FA	Filtering Analysis
FDI	Foreign Direct Investment
FOB	Free on Board
FTA	Free Trade Agreement
G	Government Expenditure
GATT	General Agreement of Tariff and Trade
GDP	Gross Domestic Product
GLI	Grubel & Lloyd Index
GMI	Greenway-Milner Index
GNP	Gross National Product
GST	Goods and Services Tax
HIIT	Horizontal Intra-Industry Trade
HO-theory	Heckscher-Ohlin Theory

HS	Harmonized Commodity Description and Coding System
HS-2	Harmonized Commodity Description and Coding System - Second Level of Aggregation
HS-4	Harmonized Commodity Description and Coding System - Fourth Level of Aggregation
I	Investment
IBRD	International Bank for Reconstruction and Development
IIT	Intra-Industry Trade
IMF	International Monetary Fund
IR	Interest Rates
IS-LM	Investment-Saving and Liquidity Preference-Money Supply Model
ITO	International Trade Organization
JMLP	Johansen Maximum Likelihood Procedure
K	Capital
L	Labour
LSE	London School of Economics
LT	Long-Term, Period between 1990 and 2006
M	Import
MAS	Monetary Authority of Singapore
MFN	Most Favoured Nation principle
MIIT	Marginal Intra-Industry Trade
MPI	Import Penetration Index
MS	Money Supply
NESDB	Thailand National Economic and Social Development Board
NIC	Newly Industrialized Countries

NIIP	Net International Investment Position
NT	Net Trade
NX	Net Export
OAPEC	Organization of Arab Petrol Exporting Countries
OECD	Organization for Economic Cooperation and Development
OLS	Ordinary Least Squares
OPEC	Organization of the Petrol Exporting Countries
PPT	Phillips-Perron Test
QTY	Quantity
R&D	Research and Development
RBA	Reserve Bank of Australia
RCA	Revealed Comparative Advantage
RCD	Revealed Comparative Disadvantage
RGDP	Real Gross Domestic Product
RoW	Rest of the World
RP	Relative Price
R-square	Coefficient Of Determination
RTA	Regional Trade Agreements
RXA	Revealed Export Advantage
S	Saving
SCE	Separate Custom Entities
SITC	Standard Industrial Trade Classification
SITC-2	2-digit Standard Industrial Trade Classification

SITC-3	3-digit Standard Industrial Trade Classification
SLRM	Simple Linear Regression Model
SME	Small and Medium Enterprises
ST	Short-Term, Period between 2000 and 2006
STM	Simply Transformed Manufacturers
SVR	Savings Rates
T	Government Tax
TA	Trend Analysis
TCF	Textile, Clothing and Footwear Industry
TD	Trade Deficit
TDI	Trade Data International
TMI	Thom & McDowell Index
TOT	Terms of Trade
TS	Trade Surplus
TSI	Trade Specialization Index
TT	Total Trade
TTR	Triangular Trade Relationship
TWI	Trade-Weighted Index
UECM	Unrestricted Error Correction Model
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
USD	The United States of America Dollar Currency
VARM	Vector Autoregression Model

VEI	Verdoorn’s Index
VIIT	Vertical Intra-Industry Trade
VRCAI	Vollrath Revealed Competitive Advantage Index
VRMAI	Vollrath Revealed Import Advantage Index
VRTAI	Vollrath Revealed Trade Advantage Index
VRXAI	Vollrath Revealed Export Advantage Index
WB	World Bank
WCO	World Custom Organization
WST	Wholesale Sales Tax
WTO	World Trade Organization
X	Export
XMR	Export/ Import Ratio
XPI	Export Propensity Index

CHAPTER 1

1. PREAMBLE AND RESEARCH PROBLEM DEFINITION

1.1 BACKGROUND INFORMATION

According to the United Nation Conference on Trade and Development (UNCTAD), The United Nations (UN) and the Australian Bureau of Statistics (ABS), the Australian Trade Deficit (TD) in overall has significantly increased in the past 50 years, while an ongoing increase in the TD levels in Australia is more pronounced in the last 30 years (UNCTAD, 2007; UN, 2008a; ABS, 2008b). In addition, according to UNCTAD (2007) and UN (2008a), Australia is amongst the world's Top 20 debtor countries. Furthermore, this debt level is closely associated with an increasing TD level in Australia, as the Australian TD is the fourth largest in the world (Access Economics, 2008).

The most disconcerting facts associated with these trends are twofold. Firstly, the Australian TD level is increasing as a proportion of the Australian Gross Domestic Product (GDP) and secondly, Australia's gross capital formation as a percentage of Australia's debt levels are one of the lowest amongst all of the worlds' top debtor countries (UNCTAD, 2007; UN, 2008a). Overall, these two facts suggest that Australia's ability to service an increasing debt level in the future is diminishing, and that increasing debt levels in Australia are predominantly used for Consumption (C) rather than for gross capital formation. These facts are not encouraging news for the Australian economy, thus undoubtedly warrants further investigation.

1.2 JUSTIFICATION OF RESEARCH

The neoclassical trade theory's main assumption is that trade between countries are balanced, which is a prerequisite to realize overall gains from trade (Skarstein, 2007). Dernburg (1989), Krugman (1993) and Blanchard (1997) suggest that trade imbalances will self-correct in the long-run without government intervention[5]; however, empirical evidence does not support this claim. Skarstein (2007) argues that there is no reason that market forces alone will balance trade in the long-run and in support of his argument, he gave examples for The United States of America which has accumulated a TD since 1976 and Japan, which historically has accumulated a

[5] This proposition is valid if the EXR is flexible.

massive Trade Surplus (TS), while these imbalances are continuously escalating overtime for both countries.

Cline (2007) argues that a growing external debt undermines foreign investors' confidence, while Stein (2004) suggests that countries that are experiencing an increasing TD, should examine their levels of international competitiveness. Furthermore, according to Stein (2004), the countries that are experiencing a growing TD and associated debt levels, should develop adequate policies to deal with this problem, since an increasing TD are financed by selling off of assets and/or by further increasing the national debt levels. Pattillo *et al*. (2004) suggests that doubling the debt level for any highly indebted country will reduce the GDP growth by approximately 1 percent in overall. Additionally, according to Obstfeld & Rogoff (2001) and International Monetary Fund (IMF) (IMF, 2005), the debtor countries are likely to have higher real interest rates between 0.2 and 0.3 percent for each 1 percent of debt to GDP levels.

According to Moon (2001) and Morici (2006), the growing TD is a tax on economic growth, while debt associated with a growing TD according to Becker (2005) and Moon (2005) represents a financial burden on working families. Furthermore, Moon (2005) argues that the raising debt levels associated with a growing TD level generates increasing economic uncertainty as it makes the country more vulnerable to external factors beyond the control of domestic government. In addition, Reisen (1998), Erturk (2003), and Pattillo *et al*. (2004) advocate that a growing debt level makes it more likely for a financial crisis to occur.

Despite the fact that growing TD levels can generate significant concerns in the modern economic landscape, there is an inadequate frame to interpret the TD, since this area has not been investigated sufficiently (Moon, 2005). The growing TD has been historically viewed as a „consequence' of other macroeconomic variables rather than an independent causal agent for economic policy concern. According to Moon (2005; 2006), Morici (2006; 2007), Dorman (2007) Scott (2007) and Tonelson & Petrucci (2007), a growing TD is a causal factor rather than the consequence of other macroeconomic variables.

Moon (2006) argues that the TD is not a cyclical and short-lived phenomena, but a long and protracted occurrence, while the growing TD levels can cause mounting liabilities and slowing down economic growth. The liabilities that are a result of the TD, continues over a long period of time which are not easily rectified by future trade surpluses. Further, according to Moon (2007), the TD can have serious economic consequence if not managed well.

The ABS (2008b) figures show that the Australian TD since the 1950's began to deteriorate, while this negative trend continues to the present day. By observing the long-run trend, it is apparent that the TD is likely to continue to widen into the future. According to ABS (2008e), the Australian Current Account Deficit (CRAD) and the TD between the March 2000 quarter and March 2008 quarter, increased by 152 and 178 percent respectively. These statistics show that the Australian TD as a proportion of the CRAD has increased from 37.3 percent to 41 percent during this period. These trends are likely responsible for the slower economic growth in Australia during this period than otherwise would be the case. As Beardow (1993) has noted, Australia's GDP per capita was 17 percent higher than the Organization for Economic Cooperation and Development's (OECD) average in 1960; however, in 1990 it plummeted to just 0.7 percent above the OECD average. Furthermore, Access Economics (2008) findings suggest that it is very surprising that the Australian TD is the fourth largest in the world despite the fact that the Australian Terms of Trade (TOT) are at historically high levels.

Tonelson & Petrucci (2007) argues that the TD represents productivity problems and a loss in international competitiveness viewed from a microeconomic perspective, while from a macroeconomic perspective, it represents a debt burden on current and future generations. The growing TD in Australia increases foreign liabilities to the Rest of the World (RoW), which has doubled in the past ten years, while the Australian liabilities to the RoW are increasing at an annual average rate of more than 7 percent (ABS, 2008f). As a result, an increasing level of GDP has been used for servicing the national debt associated with the growing TD, while the long-run debt levels in Australia is growing approximately three times faster than the level of GDP (ABS, 2008e; 2008f). According to Mann (2002), such trends are unlikely to be sustainable because as the debt level/GDP rises, the financial payments may eventually cut into the C and Investment (I) levels, thus contracting the growth of an economy.

The Australian government has acknowledged the seriousness of this situation, since a recent senate inquiry in Australia concluded that the recent trends in Australia are worrying. As a result, the committee has recommended that the Australian government must develop strategies in order to improve the TD and the CRAD (Stephens *et al.* 2005). These recommendations suggest that as the TD in Australia reaches an unprecedented level, it could bring negative and protracted macroeconomic consequences if it is not managed well.

By observing all the existing empirical studies in international trade from Australia's perspective in various categories and countries, it is apparent that some categories and countries are more intensively examined, while for others, insufficient examination is noticeable. Furthermore, the existing studies tend to be sporadic or selective in their focus on industries and countries, and there has not been an investigation of Australia's TD that examines the major TD categories and countries.

Based on this review, there is strong evidence that a systematic, comprehensive and in-depth research of Australia's trade flows has not been undertaken from the point of the Australian TD. An inclusive approach, which encompasses the selection criteria for TD categories and TD countries, needs to be developed in order to better explain the growing TD in Australia. Thus, this research aims is to develop a more robust selection framework for the TD categories and TD countries and subsequently to reveal the patterns and determinants in those categories. As a result, this approach is likely to overcome the current conceptual and methodological limitations existing in the current literature.

1.3 RESEARCH OBJECTIVES

The key objective of this research is to establish patterns and determinants of the selected TD categories between Australia and the selected TD countries. This objective will be achieved by addressing the following 7 sub-objectives:

1. An overview of the Australian trading and macroeconomic environment.
2. A review of the existing empirical studies that examines the trade flows between Australia and the RoW.
3. Develop a selection framework for the TD categories and TD countries.
4. Determine the Comparative Advantage (CA) and the trade competitiveness in the selected TD categories between Australia and the selected TD countries.

5. Develop and estimate econometric models to determine the significant variables that are influencing the Export (X) supply and Import (M) demand in the selected TD categories between Australia and the selected TD countries.
6. Measure the extent of the Intra-Industry Trade (IIT) in the selected TD categories between Australia and the selected TD countries.
7. Develop and estimate an econometric model to determine the significant variables that are influencing the Net Export (NX) in the selected TD categories between Australia and the selected TD countries.

1.4 RESEARCH SIGNIFICANCE

This research is likely to overcome the limitations in the current literature by developing selection procedure for TD categories and TD countries and conducting an in-depth analysis of the X and M patterns and determinants in those categories. The expected contribution of this research includes the following:

1. Provide an insight of the international trading environment.
2. Highlight the significance of trade imbalances.
3. Develop a formal selection procedure for the TD categories and TD countries.
4. Reveal the patterns and determinants of the trade flows in the selected TD categories between Australia and the selected TD countries.
5. Estimate which variables are statistically significant in explaining the X supply, the M demand and the NX in the selected TD categories between Australia and the selected TD countries.
6. Assist policy makers and various industry leaders in the development of suitable trade policies and the production decisions in the selected TD categories between Australia and the selected TD countries.
7. Perform a comparative analysis of the patterns and determinants of the trade flows in the selected TD categories between Australia and the selected TD countries between monetary and Quantity (QTY) values.

1.6 THE THESIS OUTLINE

This thesis consists of 9 chapters which includes this chapter, Chapter 1 „Preamble and Research Problem Definition'.

Chapter 2 provides an overview of the international trade environment and the relationship between economic growth and international trade. Furthermore, this chapter also establishes which variables according to economic theories are significant in the X and M determination, implication of the trade imbalances and their association with the national accounts, since the trade flows and financial markets are interrelated.

Chapter 3 provides an overview of the Australian macroeconomic environment and trading environment, followed by a review of existing empirical studies. A review of the overall macroeconomic environment in Australia includes a list of the major industries and GDP composition, followed by a review of the overall trading environment between Australia and the RoW. Furthermore, this chapter comments on the Australian X and M patterns, identifies the major Australian trading partners and lists the existing trading blocks. In addition, this chapter also provides an overview of the Australian TD levels within the national accounts. Finally, Chapter 3 reviews the major empirical studies associated with the X, M and TD from an Australian perspective, in order to establish to what extent the TD levels in Australia has been examined. This approach provides direction for this research, and identifies the main areas that require further empirical investigation of the growing TD in Australia.

Chapter 4 shows the overall summaries and trends analysis in the Australian trading position in respect to the X, M and NX in all categories. This chapter also contains the selection protocol diagrams of the major TD categories and TD countries that have been developed. The final part of Chapter 4 shows the TD categories, the TD countries, and their associated statistical summaries that are selected for further investigation in this research.

Chapter 5 consists of the underlying theoretical framework relevant to the CA and empirical testing of the selected TD categories and the TD countries. It contains the calculated Balassa Revealed Comparative Advantage Index (BRCAI), the Vollrath Revealed Export Advantage Index (VRXAI), the Vollrath Revealed Import Advantage Index (VRMAI), the Vollrath Revealed Trade Advantage Index (VRTAI) and the Vollrath Revealed Competitive Advantage Index (VRCAI). In addition to these indices, the trade performance indices calculated and interpreted in this chapter are Trade Specialization Index (TSI), Export Propensity Index (XPI), Import Penetration Index (MPI) and Export/ Import Ratio (XMR).

Chapter 6 comments on the econometric methodology associated with the time series data used in the estimation of the X supply and M demand models between Australia and the selected TD countries in the selected TD categories. This chapter, after identifying a suitable model structure uses empirical data and estimates the coefficients for both the X supply and M demand models based on both monetary and QTY values.

Chapter 7 consists of calculated values of the extent of the IIT between Australia and the selected TD countries in the selected TD categories based on both monetary and QTY values using empirical data.

Chapter 8 comments on the econometric methodology associated with the time series data used in the estimation of the NX models between Australia and the selected TD countries in the selected TD categories using empirical data. This chapter, after identifying a suitable model structure estimates the coefficients for the NX based on both the monetary and QTY values.

Finally, Chapter 9 summarise the research contribution, limitations and recommendation for future research in this area of the trade flow analysis in the selected TD categories between Australia and the selected TD countries.

CHAPTER 2

2. INTERNATIONAL TRADE THEORY: AN OVERVIEW

2.1 INTRODUCTION

From ancient to the most recent times, the movement and exchange of goods and services from one geographical location to another has evolved significantly. The exchange of goods and services between people, businesses and the governmental institutions amongst different countries is known as international trade. Attempts to explain the benefits of international trade and to identify the determinants of such flows has generated vast literature in the last 300 years. One of the earliest theories recorded in international trade is known as a Mercantilism, which has been prevalent throughout the period between the 15th to the 18th century. Under Mercantilism, Export (X) was viewed desirable for the countries' economic prosperity, as the X generated an inflow of wealth; while the Import (M) was viewed undesirable, as the M caused an outflow of the countries' wealth (Magnusson, 1996; Mayall, 2001). Numerous scholars have disputed the Mercantilist view, such as David Hume (1758) and Adam Smith (1776), followed by the development of the Comparative Advantage (CA[6]) theory by David Ricardo (1917) and Heckscher-Ohlin Theory (HO-theory) by Heckscher (1919) and Ohlin (1933). All post-Mercantilist theories have demonstrated that both the X and the M are beneficial for the countries that are engaged in international trade and ultimately invalidated the Mercantilist doctrine that promoted the X only.

Furthermore, these classical trade theories have been further evolved by the development of new trade theory which is associated with product differentiation, imperfectly competitive markets and the economies of scale (Krugman, 1979a, 1980; Helpman, 1981; Helpman & Krugman, 1985). This new trade theory is known as Intra-Industry Trade (IIT[7]), while IIT can also be explained from the point of the consumer theory (Lancaster, 1966, 1980; Krugman, 1981).

The aim of this chapter is to overview the recent development in the international trade environment; to examine the major trade patterns; to establish the connection between trade and economic growth; to identify the trade flows determinants; to

[6] More detailed theoretical review of CA theory is presented in Chapter 5
[7] More detailed theoretical review of IIT is presented in Chapter 7.

establish the X and M flows effect on the national accounts and to identify the main scholarly contribution in this area. Since the literature in this area is vast, a detailed examination of all scholarly material is not feasible; however, every attempt is made to include some of the major scholarly contribution in this area.

The structure of this chapter is divided into 4 distinct sections - Section 2.2, international trade environment and economic growth; Section 2.3, patterns in international trade; Section 2.4, trade flows determinants, trade imbalances and national accounts, followed by Section 2.5, conclusion. Section 2.2 establishes the recent developments in the international trade environment and their association with economic growth, while Section 2.3 identifies and comments on the international trade patterns. Section 2.4 comments on the X and M determinants, trade imbalances and their association with the national accounts, since the trade flows and financial markets are interrelated. Furthermore, this section also includes some relevant national accounting fundamentals and the Trade Deficit (TD) economic implication. Finally, Section 2.5 will conclude with the major areas of the findings.

2.2 INTERNATIONAL TRADE ENVIRONMENT AND ECONOMIC GROWTH

By observing the events which took place in the development of the international trade theory, the major starting point was when David Hume (1758) opposed the Mercantilist views and vigorously argued that mutual benefits exists for both the exporting and importing countries in international trade. This view was further strengthened by significant work published by Adam Smith (1776) in his book *Wealth of Nations*[8], which created the roots of the current international trade theory. Furthermore, Adam Smith (1776) initiated the concept of free trade, which means that the X and M between countries should be laissez-faire and being free of government interference, which will consequently raise the overall wellbeing for all participants.

Since Adam Smith's (1776) proposal of the associated benefits from free trade, this concept has been endorsed by a vast number of scholars, which includes the more recent work by Krugman (1996) and Bhagwati (2002). However, according to Williamson (2006), the protectionist policies have historically been politically more

[8] Adam Smith (1776) developed a theory of „Absolute Advantage', which stipulates that any country can benefit from trade if they possess the ability to produce product/s more efficiently than any other country. However, the theory of „Absolute Advantage' stops short of explaining the benefits from trade for the countries that are unable to produce any product/s more efficiently than other countries.

popular amongst the voters than the free trade policies. Consequently, the free trade policies are frequently compromised by the protectionist policies that are applied by the governments, due to their popularity amongst voters (Grossman & Helpman, 1994; McGillivray *et al*., 2001).

Traditionally, protectionist policies implemented by the countries' governments were predominantly in the forms of tariffs[9]. Before World War I, high tariff rates between nations followed the Stolper-Samuelson principles, which were motivated by the strategic tariff barriers such as the infant industry argument and tariff revenues (Williamson, 2006). According to Stolper-Samuelson (1941), the country scarce factor is a justified case for the protectionist policies; while the country abundant factor should endorse and favour the free trade policies. Historically, the tariff rates have fluctuated – they were high prior to World War I, fell sharply between 1914-1919 and increased considerably during the 1920s, with further significant increases in the 1930s. The period during the 1930 was known as the „aggressive beggar-my-neighbour policies[10]' (Williamson, 2006) and this period was historically known for being the highest tariff protectionist period between countries, which was likely one of the contributors to the exacerbating „Great Depression' in the 1930s.

High protectionist tariff rates amongst the world economies were evident during the 1930s. One such example was when The United States of America passed through the „Smoot-Hawley' tariff, which was as high as 60 percent on all imports, however, in retaliation, other countries followed suit (Trebilcock, 1999). These events of the high protectionist policies which restricted imports lead to the collapse of most of the world economies. After realizing that high protection caused significant harm to the economies, one of the first initiative was to reduce the trade barriers, which was initiated by The United States of America with the „Reciprocal Trade Agreement Act' in 1934. This act allowed countries to negotiate the trade liberalization between countries (Trebilcock, 1999), however, such negotiations were stalled with the outbreak of World War II.

[9] The tariff is a duty or tax imposed by the government on the M.

[10] Beggar-my-neighbour policy is a selfish government policy which promotes itself at the expense of others. Such government policies were designed to cure some of the domestic economic problems, while at the same time, it worsened the economic well-being for other countries.

Post World War II, the „Bretton Woods Agreement' lead by John Maynard Keynes[11] and Harry Dexter White initiated 3 major international institutions; the International Monetary Fund (IMF), International Bank for Reconstruction and Development (IBRD) known as the World Bank (WB) and the International Trade Organization (ITO) (Trebilcock, 1999). Although the establishment of ITO did not eventuate, the first significant step in multilateral trade liberalization was achieved with the establishment of the General Agreement of Tariff and Trade (GATT[12]) in 1947, which was historically the first permanent multilateral agreement designed to gradually reduce tariff between signatory countries. The GATT came into force on January 1, 1948 and 23 countries which included Australia (WTO, 2008a), became the initial signatories of the GATT in 1947.

The GATT has made significant progress in trade liberalization and eventually has led to the establishment of the World Trade Organization (WTO[13]) which came into force on January 1, 1995. Unlike its predecessor GATT, the WTO is an institution not an agreement and the rules are binding to all members (WTO, 2008b). The main commitment of the WTO is to further liberalize trade between the countries which are associated with complex tariff and non-tariff barriers to trade.

Membership access to the WTO for non-members and the ability to terminate the WTO membership for the current member countries is voluntary (WTO, 2008b). According to Shujiro (2002), the growing popularity of maintaining the current membership or to gain membership within the WTO is based on the countries' belief that being a member of the WTO is the best way to realize an enhanced economic growth associated with increasing global trade. However, as the numbers of the WTO members are increasing, reaching a consensus amongst all members (152 members[14],

[11] John Maynard Keynes is one of the most influential economists ever known and with his book; „The General Theory of Employment, Interest and Money' (1937) has revolutionized macroeconomic understanding.

[12] GATT is based on a number of principles and they are: 1. Most Favoured Nation (MFN) principle, which means that all members of GATT must be treated equally; 2. National Treatment principles, which stipulates that foreign produced goods must be treated equally with domestically produced goods; 3. Tariff bindings, which means that once any member country has reduced the tariff rate, it automatically becomes a maximum rate, and it is binding and can not be raised above that level without the consensus of GATT members; 4. Prohibition of the usage of the Quota, which is a quantitative restriction of the M levels; 5. Prohibition of Dumping (exporting goods from one member country to another and sold cheaper in importing member country than domestic price and/or the cost of the production); 6. Prohibition of the export subsidies by the member countries and 7. Safeguards for national interest, which stipulate that some exclusion principles applies when the member countries are not obliged to fulfill the above mentioned principles (WTO, 2008b).

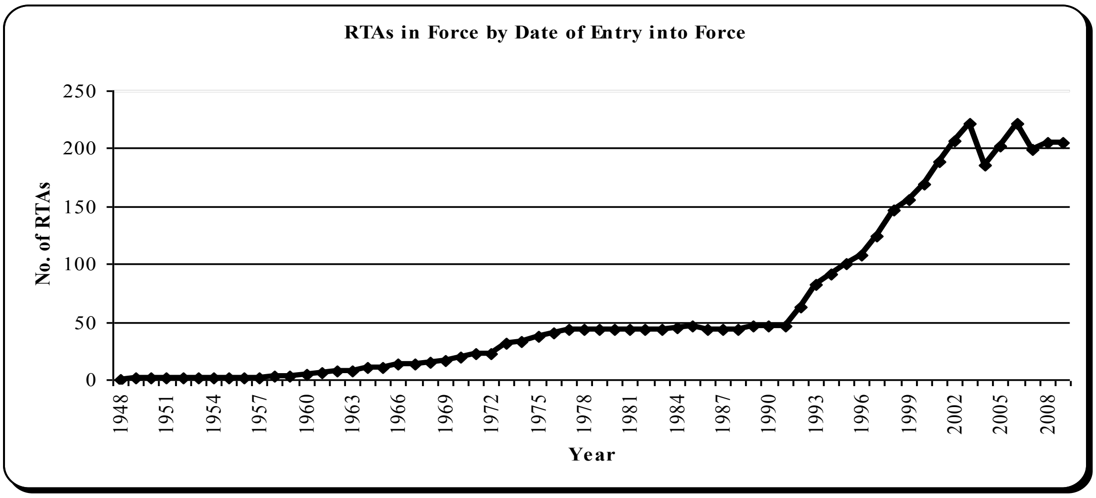
[13] WTO is a rule-based institution and has incorporated the GATT (trade in goods), General Agreement in Trade of Services (GATS) and Trade Related Aspects of Intellectual Property (TRIP), whilst the main principle of predecessor GATT was incorporated within the WTO. The scope of WTO is far greater than those under GATT. The WTO main goals are the same as it was under the GATT, which is to liberalize trade between member countries even further and to confront the arising complexities of the trade relation between member countries which includes tariff and non-tariff barriers to trade (WTO, 2008b).

[14] The figure of 152 includes 31 observer countries.

as of May 16, 2008), has become increasingly difficult and slow (Oxley, 2003) due to the range of issues.

It can be argued that difficulties and the increasing complexities of reaching a consensus over various issues amongst the large number of WTO members has lead to the rise in the popularity of the Regional Trade Agreement (RTA[15]). The WTO recognizes the RTA amongst the countries and such agreements are exempt from the Most Favoured Nation (MFN) principle, while details of such agreements must be submitted to the WTO in a transparent manner (WTO, 2008b). The rise in the popularity of the RTA is evident by observing Graph 2.1; however, these agreements are also being criticized for fostering bilateral, rather than multilateral economic integration and for being in many cases, at the expense of developing countries (Bhagwati & Hufbauer, 2008). In an interview with Bhagwati & Hufbauer (2008) about the RTA and the regionalization in world trade, Bhagwati has made the comment that the current system of regionalization is like a „spaghetti bowl' and it is not necessarily the best way to organize world trade between countries. However, as suggested by Baldwin (2006), even though regionalism is not necessarily the best way to organize world trade, it is here to stay.

Graph 2.1



Source: World Trade Organization (WTO, 2008c).

International trade between countries has experienced notable changes in recent history and the notion of free trade as a means of efficient utilization of economic resources, economic growth and increasing standard of living has been drawing much

[15] RTA is the economic establishment between two or more countries, irrespective of their WTO membership, and are designed to liberalize trade flows amongst such countries (territories) by removing tariff and non-tariff barriers.

attention from the countries' governments, scholars and also from the general public. The concept of free trade as a means of economic prosperity amongst countries has generated both supporters and opponents.

Robertson (1938) has claimed that trade is „the engine of growth', while according to Frankel (2000), free trade and increased economic integration amongst countries is leading to the absorption of the world's best practices which is in turn, leading to higher innovation and the prevention of firms exercising the monopoly power (Frankel, 2000). Furthermore, numerous empirical studies which includes Edwards (1998), supports the link between level of trade and economic growth, and a similar study by Frankel & Romer (1999) found a positive relationship between trade levels and economic growth where the trade levels were associated with Investment (I) in both physical and human capital.

However, the study by Roberts (2000) suggests a link between trade levels and economic growth is doubtful, while according to Stolper-Samuelson[16], trade distributes the income within the economy and does not lead to economic growth (Thompson, 2003). Whereas the study by Bretschger (1997) stipulates that free trade can hurt economic growth significantly if the country's supply of skilled labour is considerable and international dissemination of knowledge is not intensive. Furthermore, the study by Graham (1923) pointed-out that the countries are likely to lose from free trade[17], if free trade leads to the reallocation of the resources from the industries which are experiencing an increasing return to scale to the industries with a decreasing return to scale. This argument is supported by a more recent study by Grossman & Helpman (1991) which suggests that if increasing returns to scale activities in domestic industries are affected by free trade, then in the long-run, such countries can experience lower economic growth than it would be in an autarky[18].

Finally, according to Bhagwati (2002), free trade does not necessary increase economic growth; free trade can have no affect at all on economic growth or in some cases, can decrease economic growth. Comments made by Bhagwati (2002) suggests

[16] Stolper-Samuelson's theorem suggests that free trade in high income countries (relatively capital abundant countries) will increase the wage inequality, while in poor countries this wage gap will decrease.
[17] The view by Graham (1923) is disputed by Ethier (1979). Ethier (1979) suggested that if positive spillovers exists worldwide from the point of world dissemination of knowledge, then free trade is beneficial for countries irrespective of whether free trade leads to the reallocation of resources from industries with a decreasing return to scale to the industries with an increasing return to scale or vice-versa
[18] Autarky is the situation when the country's government pursues the policy of self-sufficiency and is not involved in international trade with the Rest of the World (RoW).

that the theoretical connection between free trade and economic growth advocated by numerous researches does not necessary hold in all situations.

As international trade consists of X and M between countries, some studies have investigated the association between X and its economic effects on countries' economies only, while some studies have only investigated M and its economic effects on the countries' economies. The studies which have investigated a link between X and its economic effects include Balassa (1978; 1985), Bahmani-Oskooee & Alse (1993), Aw *et al*. (2000), Chen (2007); while studies which have investigated M and its economic effects includes Lawrence & Weinstein (1999); Galdón-Sánchez & Schmitz (2003).

The concept learning by exporting has been studied by Clerides *et al*. (1998), Bernard and Jensen (1999) and Aw *et al*. (2000); however, the results were inconclusive. The major findings of these studies were that efficient industries have expanded and increased their X levels, while inefficient industries shrank and decreased their X levels. Furthermore, the study in this area by Keller (2004) point-out that learning by doing in respect to the X, is either non-existent or very uncertain and requires further research.

Another significant concept in the literature is the analysis that attempts to establish a link between X levels and economic growth. Such studies insists that exporting leads to a higher efficiencies, increases in productivity and consequently leads to higher economic growth and this concept is known as the Export Led Growth (ELG) hypothesis. Based on cross-country comparisons, the studies conducted by Balassa (1978) and Ram (1985) suggest that X is an important component in stimulating economic growth. The links between X and real GDP growth has been extensively analysed for all the developing countries, Newly Industrialized Countries (NIC) and developed countries. The studies which have established the support for ELG hypothesis for developing countries includes Kravis (1970), Michaely (1977), Balassa (1978; 1985), Tyler (1981), Jung & Marshall (1985), Chow (1987), Ahmad & Kwan (1991), Nidugala (2001) and Boriss & Dierk (2005). Similarly, the studies by Hsiao (1987) and Chen (2007) which investigated the NICs has found significant support for ELG hypothesis. Finally, studies by Marin (1992), Serletis (1992), Henriques & Sadorsky (1996) and Yamada (1998) have concluded that significant support for ELG hypothesis exists for developed countries. Furthermore, some empirical studies, which include studies by Bahmani-Oskooee & Alse (1993) and Harnhirun (1995), found evidence of bi-directional causality between X and economic growth, while the study by Dodaro (1993) has not been able to establish a conclusive link between X and economic growth.

Overall, empirical evidence suggests that a significant link between X and economic growth exists for all developing, NIC's and developed countries. Furthermore, according to Balassa (1978), the so-called consensus exists that the X promotion in the 1970s has generated significant technological improvements due to increased international competition, which lead to greater exploitation of the economies of scale, which further lead to increases in employment levels and also more efficient resource allocation.

An additional concept which has been examined in the literature is to attempt to establish a link between M and economic benefits for the importing country. This concept is known as „learning by importing', which predominantly studies the effects on economies which are associated with imports. In overall, the studies in this area have established that importing plays a significant part on productivity improvements, both in plant efficiencies and labour productivity amongst domestic industries Dertouzos *et al*. (1990); MacDonald (1994); Lawrence & Weinstein (1999); Galdón-Sánchez & Schmitz (2003)

According to the literature review, both the X and M are important constituents for economic development and long-run prosperity for any country. Dollar (1992), has estimated that by opening up the economy fully to free trade, such countries will increase per capita Gross Domestic Product (GDP) by 2.1 percent in average. Furthermore, free trade allows countries to specialize in certain industries and due to the „learning by doing' process, such specialization leads to decreasing in average unit cost of production, which in turn leads to increases in international competitiveness (Rapping, 1965; Irwin & Klenow, 1994).

Finally, it is important to acknowledge that the notion of free trade in the international trade environment will always have its supporters and the opponents. However, the historical overview and empirical evidence suggests that the benefits outweigh the cost. Overwhelming empirical evidence generated by scholars in this area has significantly contributed to the overall understanding of export and import between countries and their economic benefits and costs. In overall, empirical evidence overwhelmingly suggests that open economies have achieved and are achieving higher economic growth compared to relatively closed economies (Van den Berg, 2006).

2.3 PATTERNS IN THE INTERNATIONAL TRADE

According to Rodrik (1995) and Rodriguez & Rodrik (1999), the evidence between the countries' outward oriented policies and economic growth is weak and doubtful. While these remarks are empirically supported by Pritchett (1996) which show a negative relationship between economic growth and the openness and positive relationship between trade barriers and economic growth. However, the supporters of countries' openness, such as Stiglitz (2002), strongly argues that outward orientated policies are a better alternative, as outward orientated policies lead to higher economic growth and a better standard of living. According to Table 2.1 and 2.2, which shows the historical world X and M of the merchandise respectively, it seems that the world's regions and countries are increasingly involved in international trade. These trends are likely to suggest that the world countries and the regions are recognizing the economic benefits of trade and are increasingly engaged in export and import.

Tables 2.1 and 2.2 shows a historical world X and M in merchandise respectively, for the selected periods between 1870 and 2005 in the constant 1990s values in billions of The United States Dollars (USD), and the percentage of the total world X and M levels. According to Table 2.1, the world X in merchandise has increased from USD5.1 bill. in 1870 to USD10,159 bill. in 2005, which is an increase of almost 2,000 times since the year 1870. Over this period, it is clear that the world's export in merchandise grew exponentially over the entire period, with the exception in the years 1932 and 1973. The decline in the level of merchandise export in the year 1932 was a consequence of the „Great Depression', while the decline in 1973 was due to the „Oil Crisis' when the Organization of Arab Petrol Exporting Countries (OAPEC[19]) announced that it would no longer supply oil to countries[20] which supported Israel in the „Yom Kippur War' (Hammes & Wills, 2005).

[19] OAPEC is the Arab member countries within the Organization of the Petrol Exporting Countries (OPEC).
[20] Such countries included the world largest economies: The United States of America, Japan and the countries from Western Europe (Hammes & Wills, 2005).

By observing the percentages of the world merchandise, the largest proportion of the world X in 1870 was The United Kingdom, followed by France, Germany and The United States of America, which accounted for 18.9, 10.5, 8.3 and 7.9 percent respectively of the world total X in merchandise.

Table: 2.1

WORLD MERCHANDISE EXPORTS, 1870-2005
USD, bill. constant prices – 1990 (Total and Percentage)

	PERIOD											
	1870	1900	1913	1929	1932	1938	1948	1963	1973	1983	1993	2005
Total USD, bill.												
World	**5.1**	**10.1**	**19.5**	**33.0**	**12.7**	**22.7**	**59.0**	**1,570**	**579**	**1,838**	**3,675**	**10,159**
Percentage Share												
World	100	100	100	100	100	100	100	100	100	100	100	100
North America	-	-	-	-	-	-	28.1	19.9	17.3	16.8	18.0	14.5
Canada	1.1	1.7	1.9	3.6	3.5	3.7	5.5	4.3	4.6	4.2	4.0	3.5
United States	7.9	14.1	12.8	15.8	12.5	13.5	21.7	14.9	12.3	11.2	12.6	8.9
Mexico	-	-	-	-	-	-	0.9	0.6	0.4	1.4	1.4	2.1
South and Central America	-	-	-	-	-	-	11.3	6.4	4.3	4.4	3.0	3.5
Argentina	0.6	1.5	2.4	2.7	2.6	1.9	2.8	0.9	0.6	0.4	0.4	0.4
Brazil	1.5	1.8	1.6	1.4	1.4	1.3	2.0	0.9	1.1	1.2	1.0	1.2
Europe	-	-	-	-	-	-	35.1	47.8	50.9	43.5	45.4	43.0
Austria	3.1	4.2	2.9	0.9	0.8	0.6	-	-	-	-	-	-
Belgium-Luxembourg	2.6	3.7	3.6	2.7	3.3	3.2	-	-	-	-	-	-
France	10.5	7.9	6.8	6.0	6.1	3.9	3.4	5.2	6.3	5.2	6.0	4.5
Germany [a]	8.3	10.9	12.4	9.7	10.8	9.3	1.4	9.3	11.7	9.2	10.3	9.5
Italy	4.1	2.6	2.5	2.4	2.7	2.4	1.8	3.2	3.8	4.0	4.6	3.6
Sweden	0.8	1.0	1.1	1.5	1.4	2.0	-	-	-	-	-	-
Switzerland	-	1.6	1.4	1.2	1.2	1.3	-	-	-	-	-	-
United Kingdom	18.9	14.6	13.5	10.9	10.2	10.8	11.3	7.8	5.1	5.0	4.9	3.8
Africa	-	-	-	-	-	-	7.3	5.7	4.8	4.5	2.5	2.9
Russia/USSR	4.2	3.7	4.0	1.3	1.7	1.1	-	-	-	-	-	-
Middle East	-	-	-	-	-	-	2.0	3.2	4.1	6.8	3.5	5.3
South Africa [b]	0.3	-	0.7	0.7	0.7	0.6	2.0	1.5	1.0	1.0	0.7	0.5
Asia	-	-	-	-	-	-	14.0	12.6	15.2	19.1	26.1	27.4
Australia and New Zealand	**2.1**	**2.1**	**2.4**	**2.9**	**3.2**	**3.5**	**3.7**	**2.4**	**2.1**	**1.4**	**1.5**	**1.3**
Australia	**1.9**	**1.6**	**1.9**	**2.1**	**2.3**	**2.5**	-	-	-	-	-	-
New Zealand	0.2	0.6	0.5	0.8	0.9	1.0	-	-	-	-	-	-
China	2.0	1.2	1.5	2.2	1.6	1.9	0.9	1.3	1.0	1.2	2.5	7.5
India	5.0	3.4	4.1	3.5	2.8	2.6	2.2	1.0	0.5	0.5	0.6	0.9
Japan	0.3	1.0	1.6	2.9	2.9	3.3	0.4	3.5	6.4	8.0	9.9	5.9
Six East Asian traders [c]	-	-	-	-	-	-	3.4	2.4	3.4	5.8	9.7	9.7
GATT/WTO Members [d]	-	-	-	-	-	-	63.4	72.8	81.8	76.5	89.5	94.4
European Union [e]	-	-	-	-	-	-	-	27.5	38.6	30.4	36.1	39.4
USSR, former	-	-	-	-	-	-	2.2	4.6	3.7	5.0		
Developing countries	-	-	-	-	-	-	31.4	22.6	20.2	26.8	25.2	34.1
Developed countries	-	-	-	-	-	-	66.4	72.9	76.3	68.2	73.3	62.6

Source: Compiled from the World Trade Organization (WTO, 2008c) - International Trade Statistics 2008, Norbohm (1962) and Maddison (2001).

a Figures refer to the Fed. Rep. of Germany from 1948 through to 1983.

b Beginning with 1998, figures refer to South Africa only and no longer to the Southern African Customs Union.

c Six East Asian traders comprising of Hong Kong, China; Malaysia; Republic of Korea; Singapore; Taipei, Chinese and Thailand

d Membership as of the year stated.

e Figures refer to the EEC(6) in 1963, EEC(9) in 1973, EU(10) in 1983, EU(12) in 1993, EU(15) in 2003 and EU(25) in 2005. Intra-EU trade is always included.

Note: Between 1973 and 1983 and between 1993 and 2003, X and M shares were significantly influenced by oil price developments.

The data for the Australian proportion of the world X in merchandise in Table 2.1 since 1948, is combined together with the X of New Zealand. By observing the proportion since 1948 until 2005 combined, the Australian and the New Zealand proportion of the world X in merchandise has gradually decreased from 3.7 to 1.3 percent of the total.

By observing the GATT/WTO members in Table 2.1, it is clear that since coming into force, the GATT members in 1948 accounted for 63.4 percent of the world merchandise X; while in 2005, almost all of the world X (94.4 percent) is amongst the WTO member countries. Finally, the proportion of the total world X in merchandise in the period between 1948 - 2005 has slightly decreased for developed countries from 66.4 to 62.6 percent, while at the same time, it has increased for the developing countries from 31.4 to 34.1 percent. Now that the comments about the top merchandise X countries and regions are made, similar comments will be made for the world's top merchandise M countries and regions presented in Table 2.2.

Table 2.2 shows the historical world M in merchandise for the period between 1948 to 2005 only. The world merchandise M has gradually increased from USD62 bill. in 1948 to USD10,511 bill. in 2005, while this is an increase in M of almost 170 times since the year 1948. By observing Table 2.1 and Table 2.2, the world M in merchandise exceeded the world X in merchandise by USD3 bill. in 1948, while this gap was widened in 2005 to reach USD352 bill. This discrepancy is likely to be due to statistical errors or the errors associated with different methods of measurements.

The percentages of the world's largest merchandise M country in 1870 for the countries for which data is available were The United Kingdom, followed by France and The United States of America, which accounted for 22.1, 9.7 and 8.9 percent respectively of the world's total M in merchandise. The United Kingdom has maintained the world's top leader in merchandise M until 1948. In 1963, The United States of America has emerged for the first time as the largest merchandise importer in the world, and accounted for 11.4 percent of the world's total merchandise M and remained the world's top leader ever since.

The proportion of the total Australian merchandise M relative to world merchandise M has fluctuated and similarly as in the merchandise X, the proportion has historically accounted for a small percentage of the world's total. The Australian proportion of the total world X in merchandise (Table 2.1) has been always historically higher than the proportion of the total M (Table 2.2), however, in 2005 for the first time the

Table: 2.2

WORLD MERCHANDISE IMPORTS, 1870-2005
USD, bill. constant prices – 1990 (Total and Percentage)

	PERIOD											
	1870	**1900**	**1913**	**1929**	**1932**	**1938**	**1948**	**1963**	**1973**	**1983**	**1993**	**2005**
Total USD, bill.												
World	-	-	-	-	-	-	**62.0**	**164**	**594**	**1,882**	**3,769**	**10,511**
Percentage Share												
World	100	100	100	100	100	100	100	100	100	100	100	100
North America	-	-	-	-	-	-	18.5	16.1	17.2	18.5	21.5	21.7
Canada	1.5	1.7	3.2	3.6	2.8	2.2	4.4	3.9	4.2	3.4	3.7	3.0
United States	8.9	8.2	9.1	12.3	9.5	8.7	13.0	11.4	12.3	14.3	16.0	16.5
Mexico	-	-	-	-	-	-	1.0	0.8	0.6	0.7	1.8	2.2
South and Central America	-	-	-	-	-	-	10.4	6.0	4.4	3.8	3.3	2.8
Argentina	-	1.0	2.4	2.3	1.5	1.8	2.5	0.6	0.4	0.2	0.4	0.3
Brazil	-	0.8	1.6	1.2	0.8	1.2	1.8	0.9	1.2	0.9	0.7	0.7
Europe	-	-	-	-	-	-	45.3	52.0	53.3	44.2	44.8	43.2
Austria	3.1	3.3	3.4	1.3	1.3	1.0	-	-	-	-	-	-
Belgium-Luxembourg	3.1	4.0	4.4	2.7	3.2	3.1	-	-	-	-	-	-
France	9.7	8.5	8.0	6.3	8.2	5.7	5.5	5.3	6.4	5.6	5.8	4.7
Germany [a]	-	12.8	12.7	8.8	7.9	8.7	2.2	8.0	9.2	8.1	9.1	7.4
Italy	3.3	3.1	3.5	3.1	3.0	2.4	2.5	4.6	4.7	4.2	3.9	3.6
Sweden	1.9	1.3	1.1	1.3	1.5	2.1	-	-	-	-	-	-
Switzerland	-	1.9	1.8	1.4	2.3	1.5	-	-	-	-	-	-
United Kingdom	22.1	21.4	16.1	15.0	16.2	17.1	13.4	8.5	6.5	5.3	5.6	4.9
Africa	-	-	-	-	-	-	8.1	5.2	3.9	4.6	2.6	2.4
Russia/USSR [b]	-	2.2	2.8	1.2	0.8	1.1	-	-	-	-	-	-
Middle East	-	-	-	-	-	-	1.8	2.3	2.7	6.2	3.4	3.1
South Africa [c]	-	-	1.0	1.1	1.1	2.0	2.5	1.1	0.9	0.8	0.5	0.6
Asia	-	-	-	-	-	-	13.9	14.2	15.1	18.5	23.3	24.7
Australia and New Zealand	**-**	**2.1**	**2.2**	**2.4**	**1.7**	**2.9**	**2.9**	**2.2**	**1.6**	**1.4**	**1.5**	**1.4**
Australia	**-**	**1.7**	**1.7**	**0.6**	**1.1**	**2.0**	**-**	**-**	**-**	**-**	**-**	**-**
New Zealand	-	0.5	0.5	0.6	0.6	0.9	-	-	-	-	-	-
China	-	1.8	2.0	2.5	2.4	2.7	0.6	0.9	0.9	1.1	2.8	6.3
India	-	2.8	3.3	2.6	2.5	2.3	2.3	1.5	0.5	0.7	0.6	1.3
Japan	-	1.3	1.8	2.8	2.9	3.0	1.1	4.1	6.5	6.7	6.4	4.9
Six East Asian traders [d]	-	-	-	-	-	-	3.5	3.2	3.9	6.1	9.9	8.6
GATT/WTO Members [e]	-	-	-	-	-	-	58.6	74.2	89.1	83.9	88.7	96.1
European Union [f]	-	-	-	-	-	-		29.0	39.2	31.3	34.3	39.3
USSR, former	-	-	-	-	-	-	1.9	4.3	3.6	4.3	-	-
Developing countries	-	-	-	-	-	-	31.3	22.0	18.7	25.6	26.5	28.9
Developed countries	-	-	-	-	-	-	66.7	73.8	78.0	70.1	72.3	69.1

Source: Compiled from World Trade Organization (WTO, 2008c)- International Trade Statistics 2008, Norbohm (1962), Maddison (1962) and Maddison (2001).
a Figures refer to the Fed. Rep. of Germany from 1948 through 1983.
b 1928 instead of 1929 and 1935 instead of 1932 and for two years derived from partner statistics.
c Beginning with 1998, figures refer to South Africa only and no longer to the Southern African Customs Union.
d Six East Asian traders comprising of Hong Kong, China; Malaysia; Republic of Korea; Singapore; Taipei, Chinese and Thailand
e Membership as of the year stated.
f Figures refer to the EEC(6) in 1963, EEC(9) in 1973, EU(10) in 1983, EU(12) in 1993, EU(15) in 2003 and EU(25) in 2005. Intra-EU trade is always included.
Note: Major breaks in time series affect continuity especially between 1913 and 1921(e.g. Habsburg Austria, Germany and Russia).

Australian proportion of the world M has been higher than the proportion of the total world X. This suggests that Australia recently is a more significant world importer, and a less significant world exporter in the world merchandise trade.

By observing the GATT/WTO members in Table 2.2, in 1948 the GATT members accounted for 58.6 percent of the world merchandise M, while in 2005, the WTO members accounted for 96.1 percent in the world merchandise M. This suggests that the GATT/WTO members accounts for almost all merchandise M in the world in 2005, while these trends are similar to the X trends in Table 2.1. Finally, the proportion of the total world M in merchandise in the period between 1948-2005 has slightly increased for developed countries from 66.7 to 69.1 percent; while at the same time, it has decreased for the developing countries from 31.3 to 28.9 percent.

It is evident that the world X and M volumes in merchandise is growing rapidly without any sign of slowing down. These patterns could be due to numerous reasons, and one such reason is the greater economic cooperation between countries due to the associated economic benefits which are validated by many empirical studies. As Francis (2003) suggests, the cost associated with engagement in international trade between countries over the last few decades, has significantly declined due to the decrease in transportation costs, communication costs and falls in trade barriers. Consequently, such factors have significantly contributed to the rise in international trade volumes between countries.

Another way of assessing international trade flows is by observing the historical proportion of the merchandise X to the corresponding country's GDP. This concept is related to the ELG hypothesis, which evaluates the relationship between the country's X levels and economic growth. Table 2.3 shows the ratio of the world and selected countries merchandise X to GDP levels. The world proportion of the X to world GDP has increased from 4.6 percent in 1870 to 20.5 percent in 2005, which suggests that the world X in merchandise accounted for 20.5 percent of the world's economic output. The highest proportion of X to GDP in 1870 was for Switzerland, followed by Netherlands and Finland accounting for 18.9, 17.4 and 15.5 percent respectively; while in 2005, the highest proportion of X to GDP was for Belgium where the X accounted for more than the total GDP reaching 112.6 percent. In overall, the Western European countries accounted for the highest merchandise X level to GDP for the entire period between 1870-2005, while this proportion has increased overtime.

At the same time, the Australian merchandise X to GDP has in overall, gradually increased over this period between 1870-2005. It has been increasing from 7.1 percent to 13.2 between 1870-1929; it dropped to 8.8 percent in 1950 and since then, it has

Table: 2.3

RATIO OF MERCHANDISE EXPORT TO GDP, 1870-2005 SELECTED COUNTRIES								
	PERIOD							
Percentage	**1870**	**1913**	**1929**	**1950**	**1973**	**1998**	**2000**	**2005**
World	**4.6**	**7.9**	**9.0**	**5.5**	**10.5**	**17.2**	**18.5**	**20.5**
Australia	7.1	12.3	13.2	8.8	11.0	18.1	19.8	18.6
Austria	**5.5**	**8.6**	**7.4**	**5.2**	**16.3**	**45.5**	**52.7**	**64.8**
Belgium	9.0	22.6	24.3	17.3	52.1	88.5	97.0	112.6
Brazil	12.2	9.8	6.9	3.9	2.5	5.4	5.5	8.9
Canada	11.3	11.6	22.4	12.3	19.3	39.0	42.4	39.7
China	0.7	1.7	2.6	2.6	1.6	4.9	5.9	10.7
Denmark	8.3	12.8	23.2	12.1	23.7	41.9	45.5	49.4
Finland	15.5	25.0	40.4	18.7	30.2	51.6	54.6	51.9
France	4.9	7.8	11.5	7.6	15.2	28.7	29.9	27.6
Germany	9.5	16.1	14.8	5.0	20.6	38.9	42.1	51.1
India	2.6	4.6	4.0	2.5	2.0	2.4	2.9	3.7
Italy	4.3	4.8	5.9	3.5	12.5	26.1	28.7	28.8
Japan	0.2	2.4	6.1	2.2	7.7	13.4	14.6	15.7
Mexico	3.9	9.1	14.3	3.0	1.9	10.7	12.3	12.3
Netherlands	17.4	17.3	29.7	12.2	40.7	61.2	62.9	77.7
Norway	9.0	14.0	23.3	12.9	26.2	55.4	56.7	55.6
Sweden	10.3	15.3	23.9	15.6	31.4	62.5	63.3	64.5
Switzerland	18.9	34.8	35.0	15.3	33.2	51.8	56.0	59.3
United Kingdom	12.2	17.5	14.2	11.3	14.0	25.0	23.1	19.3
United States	2.5	3.7	5.9	3.0	4.9	10.1	10.6	10.2

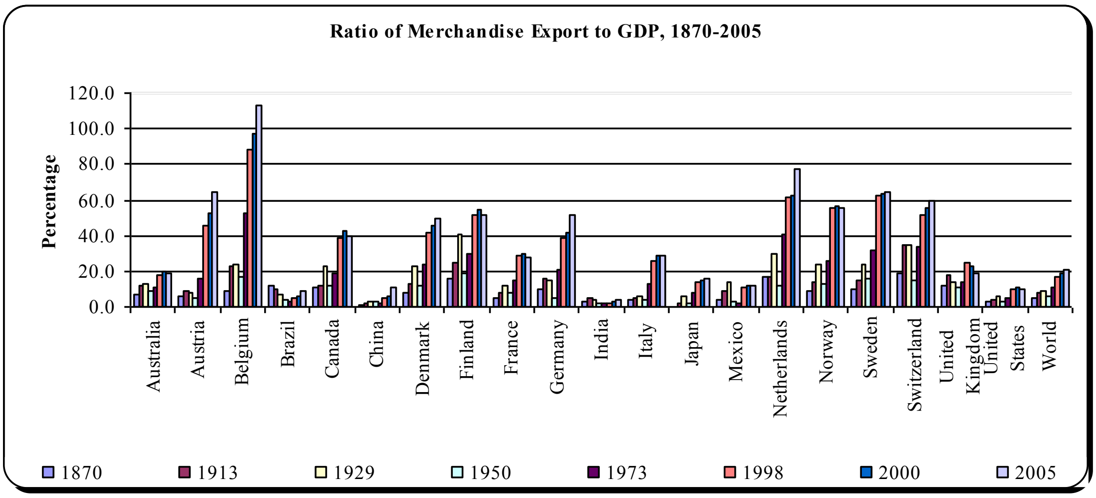
Source: Compiled from Maddison (2001) and World Trade Organization (WTO, 2008c) - International Trade Statistics 2008.
Note: Territorial changes affect comparability in time for a number of countries especially between 1913 and 1929 and 1929 and 1950 (e.g. Austria, France, Germany, Great Britain, China, India and Japan).

gradually increased to 19.8 percent in 2000, while in 2005, it has slightly decreased to 18.6 percent.

In overall, the highest increases of merchandise X to GDP overtime is recorded for Belgium which is over 100 percent, and the lowest increase is for India, which recorded 1.1 percent, while Brazil is the only country in which it recorded a net decline of merchandise X to GDP by 3.3 percent over this period. All trends of the ratio of merchandise X to GDP are observable in Graph 2.2, which clearly shows that in overall, the highest ratio of the X to GDP is for Belgium, while Australia recorded similar trends as the world average ratios.

Recently, trade in services has gained more significance in world trade and according to McGuire & Findlay (2005), it currently accounts for approximately 20 percent of the world X, while recently, trade in services is growing slightly faster than the trade in merchandise.

Graph 2.2



Source: Compiled from World Trade Organization (WTO, 2008c) - International Trade Statistics 2008, and Maddison (2001).

In attempt to verify the claim made by McGuire & Findlay (2005) that the world's trade in services is growing faster than the world trade in merchandise is by observing Graph 2.3. Graph 2.3 shows the merchandise and service world trade as a percentage of the world GDP and the world trade in services as a proportion of the world trade in merchandise for the period between 1980 and 2006.

Graph 2.3

Source: Compiled from the United Nation Conference on Trade and Development (UNCTAD): UNCTAD Handbook of Statistics, 2007, Tables: 1.1 Value and Shares of Merchandise Exports and Imports, 5.1 Value and Shares of Total Exports and Imports of Services and Table for GDP and its Breakdown at Constant 1990 Prices in US Dollars.

According to Graph 2.3, it is evident that world trade in merchandise is significantly higher compared to the world trade in services. In the period between 1980 and 2006, the world trade in merchandise as a proportion of the world GDP has increased from 0.0000125 to 0.000035 percent which is an almost 3-fold increase over this period. At the same time, the world trade in services as a proportion of the world GDP over the same period has increased from 0.0000025 to 0.0000075 percent, which is exactly, a 3-fold increase over the same period from the initial level in 1980. By looking at the figures alone, it may appear that the world service trade as a proportion of the world GDP is growing faster than the world trade in merchandise over the world GDP; however, this figure only shows a relative growth for each, compared to its initial levels. By comparing the world trade in merchandise with the world trade in services as a proportion of the world GDP over the period between 1980 and 2006, the growth in the world merchandise trade has grown 4.5 times faster than the world trade in services over the same time period.

In order to confirm that world trade in merchandise is gaining more significance than the world trade in services, is by observing the world trade in services as a proportion of the world trade in merchandise. In Graph 2.3, the world trade in services as a proportion of the world trade in merchandise in 1980 was 19 percent. This has gradually increased and reached a peak of 27 percent in 1993; however, since 1993 in overall, world trade in services as a proportion of world trade in merchandise has been declining and reached 23 percent in 2006. These trends suggest that the significance in world trade in merchandise are far from being a shadow of the world trade in services and certainly deserves significant consideration.

2.4 TRADE FLOWS DETERMINANTS, TRADE IMBALANCES AND THE NATIONAL ACCOUNTS

As international trade volumes are increasing overtime, it is important to understand what economic variables are determining the trade flows between countries. According to theory, international trade can either operate in perfectly competitive markets or imperfectly competitive markets, while imperfectly competitive markets would be most likely. According to neoclassical theory, perfectly competitive markets are when countries export and import products according to the CA theory, and the countries will specialize[21] in the production of the products in which they hold a CA and X products from such industries to other countries; while M the products from the industries in which hold a Comparative Disadvantage (CD). Once international trade

[21] According to Proudman (2000), who analyzed G-5 countries - France, Germany, Japan, United Kingdom and The United States of America, suggests that international trade specialization is a dynamic process. The major finding in this study is that significant differences in trade specialization exists between these 5 countries overtime, where the highest specialization mobility is for France and The United Kingdom, while the lowest mobility is for Japan.

has taken place, the specialization process will instigate an expansion of the industries which posses a CA, while the industries with a CD will shrink (Ghosh, 2000).

According to the new trade theory which is associated with imperfectly competitive markets, product differentiation and economies of scale, the countries will simultaneously export and import the products within the same industry.

Both neoclassical and new trade theory explains which countries are likely to export and import from and to each other; however, they stop short of explaining what economic variables are influencing these flows. Consequently, it is important to identify these economic variables and other macroeconomic forces which are influencing the X and M flows between countries.

2.4.1 TRADE FLOWS DETERMINANTS

Trade flows, hence the X and M levels between countries, are influenced by numerous factors. According to Morici (2007), X and M is affected by GDP levels, Exchange Rates (EXR), competitiveness[22] and government policies; while government policies includes fiscal and monetary policies and foreign trade practices, both domestically and internationally.

According to Orcutt (1950), Goldstein & Khan (1978, 1985), Bahmani-Oskooee (1986) and Deyak *et al*. (1993), income levels and relative prices affect X and M volumes, while the relative prices are determined by EXR differentials between countries. This proposition stipulates that countries with higher economic growth are likely to import relatively more than countries which are experiencing relatively lower economic growth. Furthermore, the price levels of the products which are determined by a relative EXR is another detrimental factor of the X and M volumes between countries. Other things being equal, it is expected as a country currency depreciates relative to other currencies, the products originating from a country in which the currency has depreciated will be relatively cheaper compared to other countries; hence, the X volumes from that country will increase.

The relative prices of products are not solely determined by the relative EXR between countries. Another important factor that determines the relative price of products

[22] According to Porter (1990, 1991), the concept of international competitiveness is not only about working smarter or being more efficient (the ability to produce products at a lower cost than competitors). International competitiveness according to Porter, is about numerous sets of decisions that include decisions of where to compete, a capacity to innovate continuously and become the best in the world, while all of these decisions are interrelated and are influenced by numerous internal and external forces.

amongst countries is productivity levels in the corresponding industries. According to Trefler (1993, 1995), Weinstein *et al*. (1997), Helpman (1998) and Harrigan (1997, 1999), productivity levels are influencing X and M volumes between countries. This proposition stipulates that as industries becomes more productive, it has a direct effect on the relative price of the products and hence on international competitiveness. The industries where productivity levels are increasing, the relative price of products from such industries are also relatively decreasing and consequently, it is expected that the levels of X from such industries will increase. On the other hand, for industries in which productivity levels are lagging behind, international productivity levels will experience a relative price rise of their products and consequently, will reflect in the decline of international competitiveness that will result in the decline of X levels from that industry[23]. Furthermore, the levels of innovation are also influencing the levels of the X and M volumes (Krugman, 1979b). The level of innovation affects many aspects of international trade flows, which includes product quality, product variety and also productivity levels.

According to Hayward & Erickson (1995), international trade policies play an important part in X and M level determination between countries. Such international trade policies can have an impact of the level of Foreign Direct Investment (FDI), which in turn will have an effect on the X and M volumes (Orr, 1991; McCulloch, 1993). Furthermore, the X and M levels are affected by the distance between countries (Tinbergen, 1962; Deardoff, 1998) and various government policies (Feaver *et al.* 1998; Kyereme, 2002; Jayanthakumaran, 2002), as well as the Saving (S) and I differentials between countries (Graham & Krugman, 1995).

In overall, the X and M determinants according to this review tends to produce mixed findings in regards to the relevance and impact of different determinants and variables in different industries/ countries. This is due to the continuously changing trading environment and the diverse nature of trading relationships between individual countries.

[23] If such industry also supplies domestic markets, the decline in relative productivity in such industries may instigate an increasing M level in that industry also.

2.4.2 TRADE IMBALANCES

According to empirical evidence, international trade flows between countries is unlikely to balance; some countries are experiencing a large and protracted growing TD, while other countries are experiencing prolonged and large Trade Surplus (TS). One of the neoclassical trade theory's main assumption is that trade between countries is balanced, which is a prerequisite for the countries to realize gains from their CA (Skarstein, 2007). Some scholars such as Dernburg (1989), Krugman (1993) and Blanchard (1997) suggest that trade imbalance will self-correct in the long-run without government intervention as long as the EXR are flexible, however, empirical evidence does not support these claims. As Skarstein (2007) pointed-out, there is no reason that market forces alone will balance trade in the long-run. He gave an example of how The United States of America has been in deficit since 1976, and this deficit is continuously escalating; while Japan is historically accumulating a massive TS.

According to the national accounting principles - Balance of Payment (BoP), which is explained in the next section, the countries which are running the TS overtime will generate a Current Account Surplus (CRAS) and a Capital Account Deficit (CPAD) and the status of such countries are known as „Creditor Countries'. On the other hand, the countries which run the TD overtime will generate a Current Account Deficit (CRAD) and a Capital Account Surplus (CPAS) and the status of such countries are known as „Debtor Countries'. As pointed-out by Quiggin (2004), a persistent TD will generate an exploding CRAD overtime. These imbalances amongst the countries are presented in Tables 2.4-2.6, while countries in these tables are divided into creditor and debtor countries, where the creditor and debtor countries are the countries which are running an overall TS and TD overtime respectively.

Table 2.4 lists the world's Top 20 creditor and debtor countries, while the rankings are according to average values for the selected periods between 1973 and 2006. The first half of Table 2.4 shows the world's Top 20 creditor countries while the second half shows the world's Top 20 debtor countries. The ranking for creditor countries are in descending order which shows the country with the highest average TS on top of the list, while the debtor countries are ranked in ascending order, which shows the country with the highest average TD on top of the list. Furthermore, the selected periods are between 1973-2006 and observations are in 5 year intervals; while for the last period interval, observations are only made in 3 year intervals in order to observe the most recent figures in more detail. The starting year 1973 is chosen because in 1973, „The Bretton Woods' of the fixed EXR system officially come to an end (Carbaugh, 2005). According to Orcutt (1950), Goldstein & Khan (1978, 1985), Bahmani-Oskooee (1986) and Deyak *et al*. (1993), the X and M levels hence, the TD

Table: 2.4

TOP 20 WORLD'S CREDITOR AND DEBTOR COUNTRIES, 1973-2006
USD, mill. constant prices – 1990, Total and Average

TOP 20 WORLD'S CREDITORS

		1973	1978	1983	1988	1993	1998	2003	2006	Ave.
1	**Germany**	12,673	20,699	16,540	72,856	37,525	72,206	146,896	203,258	**72,832**
2	**Japan**	-1,372	18,289	20,528	77,478	120,620	107,443	88,887	70,357	**62,779**
3	**Russian Federation**	-	-	-	-	8,211	11,068	52,252	124,266	**48,949**
4	**Saudi Arabia**	7,043	20,312	6,665	2,592	14,193	8,809	56,329	149,168	**33,139**
5	**China**	669	-1,176	836	-7,752	-12,215	43,475	25,468	177,775	**28,385**
6	**Belgium**	-	-	-	-	-	-	20,665	14,950	**17,807**
7	**Netherlands**	-1,392	-3,724	5,455	3,744	12,344	18,312	31,297	46,778	**14,102**
8	**Ireland**	-659	-1,431	-571	3,173	7,843	21,112	38,856	36,350	**13,084**
9	**Norway**	-1,564	-615	4,501	-784	7,898	2,926	27,994	57,109	**12,183**
10	**Indonesia**	482	4,953	4,794	5,971	8,495	23,033	24,563	22,834	**11,891**
11	**Canada**	1,724	2,154	11,960	4,394	6,143	8,261	27,791	31,879	**11,788**
12	**Brazil**	-800	-2,395	5,098	17,439	10,950	-9,995	22,203	41,953	**10,557**
13	**Unit. Arab Emirates**	1,335	4,467	7,548	3,728	4,120	6,331	15,061	40,251	**10,355**
14	**Republic of Korea**	-1,019	-2,250	-1,746	8,885	-1,564	39,031	14,990	16,082	**9,051**
15	**Malaysia**	599	1,495	842	4,575	1,481	14,983	17,421	29,493	**8,861**
16	**Sweden**	1,293	1,201	1,348	4,120	7,221	16,352	18,557	20,273	**8,796**
17	**Kuwait**	2,761	5,829	4,199	1,613	3,208	934	9,689	41,275	**8,688**
18	**China, Taiwan**	582	1,631	4,778	10,739	7,542	5,572	16,534	21,282	**8,582**
19	**Middle Africa**	1,077	1,022	2,318	1,741	4,571	3,480	8,860	44,127	**8,399**
20	**Venezuela**	2,079	-2,580	7,518	-2,482	2,075	1,889	16,747	31,594	**7,105**
World Trade Balance		**-10,581**	**-36,939**	**-45,535**	**-92,432**	**-64,900**	**-119,948**	**-226,504**	**-238,325**	**-104,396**

TOP 20 WORLD'S DEBTORS

		1973	1978	1983	1988	1993	1998	2003	2006	Ave.
1	**United States**	-2,749	-40,199	-64,239	-137,116	-138,665	-262,215	-578,279	-881,160	**-263,078**
2	**United Kingdom**	-8,891	-7,926	-8,366	-44,236	-27,971	-47,230	-93,741	-152,442	**-48,850**
3	**Spain**	-4,469	-5,598	-9,459	-20,161	-12,930	-24,662	-52,437	-114,934	**-30,581**
4	**Greece**	-2,020	-4,461	-5,087	-6,892	-13,587	-19,410	-31,459	-42,751	**-15,709**
5	**Turkey**	-769	-2,311	-3,507	-2,673	-14,083	-18,947	-19,061	-51,672	**-14,128**
6	**India**	-	-1,194	-4,913	-5,868	-1,217	-9,543	-13,595	-54,579	**-12,987**
7	**Portugal**	-1,173	-2,823	-3,642	-6,951	-8,804	-13,619	-15,437	-23,331	**-9,473**
8	**France**	-1,671	-3,769	-13,411	-15,020	-668	12,846	-6,799	-44,509	**-9,125**
9	**Egypt**	206	-4,990	-7,061	-17,592	-5,962	-13,036	-4,828	-3,909	**-7,146**
10	**Poland**	-1,381	-2,506	645	1,248	-4,691	-19,303	-14,467	-15,063	**-6,940**
11	**Mexico**	-1,563	-2,104	13,477	1,290	-16,553	-13,488	-13,107	-17,728	**-6,222**
12	**Croatia**	-	-	-	-	-748	-3,758	-8,022	-11,112	**-5,910**
13	**Australia**	**2,166**	**-1,151**	**-1,345**	**-2,862**	**-2,854**	**-8,737**	**-17,538**	**-10,320**	**-5,330**
14	**Israel**	-2,792	-3,493	-4,466	-6,821	-7,798	-6,349	-4,519	-3,544	**-4,973**
15	**China, Hong Kong**	-584	-1,941	-2,058	-733	-3,406	-10,516	-8,134	-12,012	**-4,923**
16	**Serbia-Montenegro**	-	-	-	-	-1,428	-1,991	-5,395	-6,743	**-3,889**
17	**Lebanon**	-365	-1,092	-2,901	-1,677	-4,369	-6,408	-5,502	-6,833	**-3,644**
18	**Austria**	-1,836	-3,844	-3,939	-5,512	-8,417	-5,421	-2,385	2,781	**-3,572**
19	**Morocco**	-234	-1,462	-1,586	-1,147	-3,677	-3,137	-5,472	-10,987	**-3,463**
20	**Romania**	-47	-1,552	1,098	3,138	-1,630	-3,521	-6,384	-18,770	**-3,458**

Source: Compiled from the United Nation Conference on Trade and Development (UNCTAD): UNCTAD Handbook of Statistics, 2007.
Note: Average figures are average values of all periods presented in this table for the specific country and rankings are according to average values. Furthermore, the creditor countries are named those with a positive average trade balance, while debtor countries are with average negative trade balance. Finally, the ranking for creditor countries are in descending order, whilst the ranking for debtor countries are in ascending order.

and TS are effected by EXR. Prior to 1973, the EXR was heavily manipulated by the countries' governments, however, since the collapse of the fixed EXR in 1973, for many countries, the EXR was freely floated[24].

According to Table 2.4, the world's top creditor countries are Germany, Japan, Russian Federation, Saudi Arabia and most recently, China. These 5 countries average annual TS with the Rest of the World (RoW) for the entire period between 1973 and 2006, is a staggering USD246,084 mill. Furthermore, it is apparent that all of the world's Top 20 creditor countries are either the countries with a strong manufacturing sector or associated with a significant world's energy sector production, such as oil and natural gas[25].

Before making comments about the top world's debtor countries in Table 2.4, it is interesting to observe the overall world trade balance. The world trade balance records a deficit in all years, started with a deficit of USD10,581 mill. in 1973, while it has continuously increased ever since, reaching a deficit of USD238,325 mill. in 2006. This increase between 1973 and 2006 is more than 22 times, while the average world deficit for the entire period accounted for USD104,396 mill.

According to Table 2.4, the world's top debtor countries are The United States of America, The United Kingdom and Spain. The single largest debtor country is The United States of America which accounts for the average TD for the entire period of USD263,078 mill., while the TD for The Unites States of America reaching a staggering USD881,160 mill. in 2006. This single TD by The United States of America is larger both in the year 2006 and also in average for the entire period than the combined deficit for all the remaining 19 debtor countries in Table 2.4. By observing the remaining countries in Table 2.4, Australia is also amongst the world's Top 20 debtor countries. Australia has recorded a TD in all years except in 1973, however, since 1973, the Australian TD is continuously increasing, and recording an average TD for the entire period of USD5,330 mill. Finally, by observing the composition of the world's top debtor countries in Table 2.4, it is noticeable that

[24] Freely floated EXR are determined by the market forces, which provide a continuous adjustment to the BoP by correcting imbalances in demand and supply for currency. Hence, it facilitates a corrections of the payment imbalances between countries that also shift the X and M volumes of goods and services and the short-term capital movements (Carbaugh, 2005, p.449).
[25]This can be verified by observing the corresponding countries' national macroeconomic accounts and reports published by the UN, UNCTAD, WB, IMF and WTO.

debtor countries are mainly the countries with a relatively declining manufacturing sector relative to the increasing service sector and developing countries[26].

Another way of viewing the top world's creditor and debtor countries is by observing the TS for creditor countries and the TD for debtor countries overtime as a proportion of the corresponding country's GDP levels. This is achieved by dividing the TS for creditor countries or the TD for debtor countries with a corresponding GDP for that country for each period. Such an approach will clearly show the TS for the creditor country or the TD for the debtor country relative to the size of the corresponding country's economy. This is particularly important for debtor countries, due to fact that the TD cannot be labeled as large or small, without observing the corresponding country's GDP levels.

Table 2.5 shows the initial world's Top 20 creditor and debtor countries in Table 2.4, however, in Table 2.5 the TS and TD levels are expressed as a percentage of the corresponding country GDP levels and ranking is according to the average percentage over the entire period between 1973 and 2006. According to Table 2.5, the world's top creditor and debtor countries' rankings is somewhat different compared to Table 2.4, and in Table 2.5, the top creditor countries as a proportion of their GDP are Kuwait, The United Arab Emirates, Saudi Arabia and Ireland. The first rank creditor country Kuwait has an average TS for the entire period of 24.18 percent of its GDP, while in 2006, Kuwait's TS to GDP accounted for a staggering 89.62 percent. In general, it is evident that the top creditor countries relative to their size of the economy are mainly oil producing countries.

The world TD in Table 2.5 as a percentage of the world GDP has increased from 0.08 percent in 1973 to 0.39 percent in 2006, which is equivalent to almost a 5-fold increase over this period in the world TD as a percentage of the world GDP.

According to Table 2.5, the world's top debtor countries as a proportion of their GDP are Lebanon, Croatia and Serbia-Montenegro[27], while Lebanon's TD as a percentage of GDP in average for the entire period is 68.73 percent, with a staggering TD to GDP of 112.26 percent in 2006. The Australian TD to GDP increased from 1.09 percent in 1973 to 1.86 percent in 2006, with an average for the entire period of 1.41 percent.

[26] This can be verified by observing the corresponding countries' national macroeconomic accounts and reports published by UN, UNCTAD, WB, IMF and WTO.
[27] In May 2006, Serbia and Montenegro declared independency; however, the trade data for the year 2006 reflects trade statistics for both countries combined.

This proportion is relatively low compared to the world's top debtor countries; however, since 1998, the Australian proportion of the TD to GDP has noticeably increased and averaging almost 2.5 percent in the period between 1998 and 2006 compared to the overall average of 1.41 percent for the entire period. Finally, by

Table: 2.5

RATIO OF TRADE BALANCE TO GDP, 1973-2006
FOR TOP 20 WORLD'S CREDITOR AND DEBTOR COUNTRIES
Percentage

	TOP 20 WORLD'S CREDITORS									
		1973	**1978**	**1983**	**1988**	**1993**	**1998**	**2003**	**2006**	**Ave.**
1	**Kuwait**	8.80	22.11	22.47	8.11	12.04	3.13	27.15	89.62	**24.18**
2	**Unit. Arab Emirates**	32.50	21.40	25.56	14.75	11.26	12.83	22.11	45.52	**23.24**
3	**Saudi Arabia**	9.71	18.88	6.18	2.41	10.66	6.01	34.08	76.09	**20.50**
4	**Ireland**	2.70	4.53	1.61	7.61	15.15	26.81	34.81	28.10	**15.17**
5	**Venezuela**	6.23	5.80	17.96	5.14	3.78	3.18	33.31	44.05	**14.93**
6	**Malaysia**	3.96	7.06	2.81	12.37	2.57	19.79	18.05	25.57	**11.52**
7	**Russian Federation**	-	-	-	-	1.94	3.38	11.55	22.58	**9.86**
8	**Norway**	2.35	0.74	4.70	0.70	6.19	1.84	15.93	29.94	**7.80**
9	**Indonesia**	1.17	8.46	5.84	5.65	5.39	12.81	11.39	9.04	**7.47**
10	**Belgium**	-	-	-	-	-	-	7.98	5.41	**6.70**
11	**Netherlands**	0.69	1.62	2.29	1.37	3.96	4.95	7.60	10.66	**4.14**
12	**Germany**	1.10	1.61	1.19	4.65	2.05	3.60	6.89	9.10	**3.77**
13	**Sweden**	0.75	0.65	0.67	1.77	3.11	6.07	6.03	5.91	**3.12**
14	**Republic of Korea**	1.42	2.07	1.21	3.92	0.48	9.74	2.75	2.58	**3.02**
15	**China**	0.61	0.82	0.39	2.07	2.12	4.65	1.80	9.34	**2.73**
16	**Brazil**	0.34	0.75	1.45	3.92	2.37	1.85	3.76	6.38	**2.60**
17	**Japan**	0.08	0.97	0.93	2.84	3.82	3.23	2.55	1.87	**2.04**
18	**Canada**	0.49	0.52	2.62	0.78	1.04	1.18	3.35	3.51	**1.69**
19	**China, Taiwan**	0.53	1.14	2.26	2.87	1.31	0.60	1.17	1.12	**1.37**
20	**Middle Africa**	-	-	-	-	-	-	-	-	**-**
World Percentage		**0.08**	**0.23**	**0.26**	**0.43**	**0.28**	**0.44**	**0.73**	**0.69**	**0.39**
	TOP 20 WORLD'S DEBTORS									
		1973	**1978**	**1983**	**1988**	**1993**	**1998**	**2003**	**2006**	**Ave.**
1	**Lebanon**	4.31	22.64	72.46	29.85	100.49	115.03	92.84	112.26	**68.73**
2	**Croatia**	-	-	-	-	4.71	18.05	32.97	40.38	**24.03**
3	**Serbia-Montenegro**	-	-	9.56	10.64	29.82	27.57	19.40	27.57	**19.40**
4	**Egypt**	1.87	29.55	26.17	49.75	13.26	22.65	6.87	4.67	**19.35**
5	**Greece**	2.44	4.59	5.23	6.62	12.30	15.39	20.28	24.45	**11.41**
6	**Romania**	0.23	4.80	2.75	7.25	5.25	10.95	16.81	40.86	**11.11**
7	**Portugal**	2.66	5.71	6.43	10.22	11.32	14.70	15.18	22.30	**11.06**
8	**Morocco**	1.76	8.07	7.56	4.23	12.54	8.78	13.12	23.16	**9.90**
9	**Poland**	2.80	3.68	1.07	1.71	7.35	22.48	14.53	13.23	**8.36**
10	**Israel**	8.81	0.44	10.17	12.89	11.45	7.13	4.54	3.08	**7.31**
11	**Turkey**	1.08	2.47	3.39	1.94	8.09	9.05	8.43	18.41	**6.61**
12	**Spain**	1.34	1.47	2.36	4.21	2.42	3.95	6.96	13.76	**4.56**
13	**United Kingdom**	1.24	1.04	1.05	4.59	2.79	4.01	6.94	10.44	**4.01**
14	**United States**	0.08	0.99	1.46	2.51	2.27	3.57	6.91	9.50	**3.41**
15	**Mexico**	1.10	1.13	5.94	0.54	5.72	4.04	3.47	4.21	**3.27**
16	**Austria**	1.69	3.13	2.85	3.62	4.79	2.73	1.09	1.18	**2.64**
17	**India**	0.00	0.65	2.23	2.02	0.33	1.90	2.06	6.41	**1.95**
18	**Australia**	**1.09**	**0.51**	**0.53**	**0.93**	**0.83**	**2.04**	**3.47**	**1.86**	**1.41**
19	**France**	0.21	0.41	1.31	1.29	0.05	0.91	0.43	2.68	**0.91**
20	**China, Hong Kong**	0.54	1.35	0.97	0.20	0.59	1.12	0.57	0.63	**0.75**

Source: Compiled from the United Nation Conference on Trade and Development (UNCTAD): UNCTAD Handbook of Statistics, 2007 and The United Nations (UN, 2008a): United Nations Statistic Division.
Note: Average figures are average values of all the periods presented in this table for the specific country and the rankings are according to the average percentage values (Trade Balance/ GDP). Finally, the ranking for both the creditor and debtor countries are in descending order.

observing the composition of the world's top debtor countries and their TD to GDP it is apparent that the highest proportion are recorded for the developing countries, while the developed countries' proportion of TD to GDP is considerably lower.

Now that the world's top creditor and debtor countries have been identified and the relative magnitude of the TS and TD to countries GDP is determined, it is very important to establish what percentage of the TS and TD accounts for the corresponding countries I levels. This is particularly important for debtor countries such as Australia, which has been a permanent member of the debtor countries for more than 20 years. According to Carbaugh (2005), if debt is used for the I, it will increase the future productive capacity of the economy and this is likely to be sufficient to repay the debt and increase domestic spending; however, if it is used for Consumption (C), such a scenario is likely to represent a burden of borrowing in the future.

Table 2.6 shows the world's top creditor and debtor countries and their corresponding TS and TD as a percentage of the gross national capital formation for the period between 1973 and 2006. This assessment, as mentioned previously, is particularly important for the debtor countries as this is an indication of the future ability to repay their debts associated with the growing TD levels. In Table 2.6, the proportion of the trade balance to gross capital formation is calculated by dividing each country's trade balance with the level of gross capital formation and multiplied by 100 for each period. For the creditor countries, these figures shows what proportion of the TS is used for the I, while for the debtor countries, these figures shows what proportion of the TD is used for the I.

Observing the top creditor countries in Table 2.6, the highest proportion of the TS that accounts for the gross capital formation is for Kuwait. Kuwait's proportion of the TS to gross capital formation in average for the entire period is 175.81 percent, which means that Kuwait's gross capital formation for the entire period is in average almost double its TS levels, where gross capital I in average exceeds the TS by 75.81 percent. It is also interesting to observe Kuwait's astonishing proportion of the gross capital formation to its TS level in 2006 which accounted for 438.85 percent. This means that Kuwait's gross capital formation in 2006 was 4.38 times higher than its TS levels. It is apparent that for creditor countries, the highest proportion of gross capital formation to the TS levels is mainly for the countries which are the world's largest energy exporters such as the export of oil and natural gas. Establishing the proportion for creditor countries' gross capital formation to their TS levels is informative; however, establishing the proportion for debtor countries' gross capital formation to their TD level is likely to be critical. This is due to fact that debtor countries are

Table: 2.6

RATIO OF TRADE BALANCE TO GROSS CAPITAL FORMATION, 1973-2006
FOR TOP 20 WORLD'S CREDITOR AND DEBTOR COUNTRIES
Percentage

	TOP 20 WORLD'S CREDITORS									
		1973	**1978**	**1983**	**1988**	**1993**	**1998**	**2003**	**2006**	**Ave.**
1	**Kuwait**	297.15	165.15	93.84	60.77	118.45	29.57	202.74	438.85	**175.81**
2	**Russian Federation**	-	-	-	-	10.27	51.07	114.54	196.71	**93.15**
3	**Unit. Arab Emirates**	112.19	56.19	86.40	61.29	50.59	55.25	104.45	152.62	**84.87**
4	**Venezuela**	25.83	18.95	151.44	17.16	16.21	12.30	236.41	142.16	**68.53**
5	**Ireland**	9.65	17.86	7.05	46.71	100.90	118.06	165.00	123.11	**64.90**
6	**Saudi Arabia**	72.42	52.02	18.00	12.24	43.34	31.09	148.14	273.34	**63.22**
7	**Malaysia**	15.76	25.82	7.48	46.37	6.32	67.36	67.56	98.84	**41.94**
8	**Belgium**	-	-	-	-	-	-	39.26	24.18	**31.72**
9	**Norway**	6.45	2.47	16.98	2.52	29.47	6.71	75.59	112.79	**28.76**
10	**Indonesia**	4.35	23.30	13.03	13.73	13.01	39.32	42.08	33.29	**22.76**
11	**Germany**	4.23	7.12	5.75	21.61	9.26	16.34	36.34	46.09	**18.34**
12	**Sweden**	3.38	3.70	3.80	8.33	19.33	31.36	32.54	29.77	**16.53**
13	**Netherlands**	2.39	6.29	10.98	6.19	19.64	20.22	34.75	48.01	**16.39**
14	**Brazil**	1.28	2.85	7.72	15.27	10.07	7.34	16.31	28.21	**8.26**
15	**Canada**	2.61	2.74	14.80	3.56	5.54	5.46	14.42	13.34	**7.81**
16	**Japan**	0.24	3.14	3.44	9.03	12.61	11.54	10.15	7.36	**7.13**
17	**Republic of Korea**	7.78	6.93	4.49	12.54	1.30	34.88	8.99	8.79	**5.59**
18	**China, Taiwan**	1.58	3.01	6.60	7.76	3.18	1.60	2.84	2.58	**3.64**
19	**China**	1.82	2.17	1.15	-5.60	5.16	12.45	4.38	21.54	**3.55**
20	**Middle Africa**	-	-	-	-	-	-	-	-	**-**
World Percentage		**0.31**	**0.97**	**1.18**	**1.85**	**1.24**	**1.83**	**3.10**	**2.72**	**1.57**
	TOP 20 WORLD'S DEBTORS									
		1973	**1978**	**1983**	**1988**	**1993**	**1998**	**2003**	**2006**	**Ave.**
1	**Lebanon**	28.26	164.22	458.99	102.21	373.37	694.70	671.89	811.44	**413.13**
2	**Serbia-Montenegro**	-	-	-	-	85.34	116.04	131.51	97.85	**107.68**
3	**Croatia**	-	-	-	-	32.42	72.27	110.16	125.13	**85.00**
4	**Romania**	0.72	10.76	7.64	23.56	22.90	66.22	86.20	186.78	**50.60**
5	**Egypt**	3.47	33.40	35.90	161.70	42.19	59.60	18.40	10.44	**45.64**
6	**Portugal**	8.88	23.09	29.48	39.05	46.62	45.42	53.95	85.88	**41.55**
7	**Greece**	5.06	14.14	21.64	27.27	53.71	57.42	64.50	78.16	**40.24**
8	**Israel**	29.31	43.64	48.22	74.20	44.03	28.97	24.63	16.94	**38.74**
9	**Morocco**	8.15	22.89	25.97	16.53	48.44	30.23	40.03	66.36	**32.33**
10	**Poland**	10.44	13.85	4.16	6.28	38.11	70.53	57.84	48.00	**31.15**
11	**Turkey**	5.90	17.07	21.66	9.60	28.96	35.94	34.92	65.27	**27.42**
12	**United Kingdom**	5.79	5.53	6.02	21.49	15.06	17.83	31.63	45.11	**18.56**
13	**Spain**	5.03	6.67	12.38	17.58	11.00	15.71	24.94	45.78	**17.39**
14	**United States**	0.41	5.16	8.68	13.88	12.66	15.73	32.01	41.27	**16.12**
15	**Mexico**	3.97	3.97	28.26	2.40	22.04	14.39	13.21	16.24	**13.06**
16	**Austria**	6.33	13.63	14.10	15.61	21.13	11.64	4.86	5.40	**11.59**
17	**India**	0.00	2.45	9.31	7.37	1.39	7.25	7.15	17.19	**6.51**
18	**Australia**	**3.81**	**2.11**	**2.18**	**3.35**	**3.49**	**7.31**	**10.88**	**5.32**	**4.81**
19	**France**	0.85	2.02	6.91	6.07	0.28	4.46	2.06	12.02	**4.26**
20	**China, Hong Kong**	1.59	3.58	2.84	0.53	1.44	3.01	1.40	1.46	**1.98**

Source: Compiled from the United Nation Conference on Trade and Development (UNCTAD): UNCTAD Handbook of Statistics, 2007 and The United Nations (UN, 2008a): United Nations Statistic Division.

Note: Average figures are average values of all periods presented in this table for the specific country and t rankings are according to the average percentage values (Trade Balance/ Gross Capital Formation). Finally, the ranking for both the creditor and debtor countries are in descending order.

accumulating debt levels overtime by running a TD and such debts must be repaid in the future. Consequently, the I levels represented by gross capital formation to their debt level (reflected by the TD levels) is imperative.

The world's percentage levels of the gross capital formation to the world's TD levels in Table 2.6 has increased from 0.31 percent in 1973 to 2.72 percent in 2006. This is an increase of more than 5 times over this period. Furthermore, the average world's gross capital formation to the world's TD levels for the entire period accounts for only 1.57 percent, which is relatively low and this may also suggest that the world's TD is used mostly for the C rather than the I.

The world's top debtor countries in Table 2.6 shows that the highest proportion of gross capital formation to the TD levels are mainly for developing countries. The first place is occupied by Lebanon, followed by Serbia-Montenegro, Croatia and Romania which accounts in average for the entire period of 413.13, 107.68, 85 and 50.6 percent respectively. This shows that developing countries such as Lebanon and Serbia-Montenegro's average TD levels, proportionally accounts for less than the gross capital formation for these countries. By observing The United States, The United Kingdom and Spain in Table 2.6 which are the world's top debtor countries in average (this was established in Table 2.4), their proportion of the gross capital formation to their TD levels are in excess of 16 percent in average for the entire period. This means that for these world's Top 3 debtor countries, the gross capital formation accounts for more than 16 percent of their TD levels, while recently, these levels are significantly higher and accounts for more than 40 percent in 2006.

By observing Australia in Table 2.6, the levels of the gross capital formation to the TD levels are somewhat different. Australia's gross capital formation as a percentage of the TD levels accounted for 3.81 percent in 1973, which is very close to The United Sates of America, The United Kingdom and Spain for that period; however, in 2006, Australia's gross capital formation to the TD levels in 2006 accounted for only 5.32 percent. In overall, for the entire period, Australia's gross capital formation as a percentage of the TD level accounts for only 4.81 percent, which can be interpreted that an increasing Australian debt levels are associated with a growing TD which accounts for less that 5 percent in the I, while the remaining 95 percent is likely to be associated with the C. It is clear that Australia's gross capital formation as a percentage of Australia's debt levels is amongst the lowest amongst all of the worlds' top debtor countries. These facts are not encouraging news for the Australian economy and certainly warrants further investigation.

The growing TD and its implications are viewed in different perspectives amongst different schools of thought. The studies conducted by Moon (2006), Scott (2007) and Tonelson & Petrucci (2007), suggests that the growing TD is a problem, while the study by Robert (1992) and Griswold (2007), argues that there is almost nothing to worry about. While Pakko (1999) and Ghosh (2006) take the view that it all depends on the overall macroeconomic environment. Therefore, a question must be posed – "To what extent should the trade imbalances and the TD be examined?" Stein (2004) argues that there are inadequate policies concerning the growing TD and increasing external debt. Increasing external debt is financed by the selling of assets or by further increasing the national debt levels that are measured by Net International Investment Position (NIIP[28]). As the NIIP declines due to the increasing TD levels, a classical concern is the so-called „Hard-landing Scenario[29]' (Cline, 2007). Furthermore, there are also increasing concerns that the growing TD in some countries may eventually lead to trade protection[30] (Cline, 2007) and such actions can subsequently cause the decline of the overall national welfare.

In order to support further review of the implication of the growing TD for the TD countries such as Australia, the next section will comment about the national accounts principles and its relevance to the growing TD levels. As the TD is part of the BoP which consists of the Current Account (CRA) and Capital Account (CPA), the next section will summarize some of the major aspects of the BoP. In addition to the BoP, the next 2 sections will also comment about the connections between the TD and economic growth.

2.4.3 NATIONAL ACCOUNTS

International trade and the X, M levels hence the TD levels cannot be examined autonomously because they are interrelated with international money markets. As Krueger (1969) pointed-out, international economics consists of two main branches;

[28] NIIP is the financial statement which is part of the Capital Account (CPA) of the BoP and shows the countries' net foreign assets minus net foreign liabilities.
[29] Hard-landing Scenario indicates a sudden loss of investors' confidence in particular the country's ability to repay its debts associated with the increase of foreign liabilities. As a consequence, there is a massive outflow of funds which ultimately leads to an economic downturn or a recession.
[30] Due to the raising TD levels, politicians of The United States of America are unwilling to talk about the possible free trade with China, not even as a long-term proposition (Schott, 2006).

which are the international trade economics and the international monetary economics. The BoP summarise all economic transactions in monetary terms for both the flows in the goods and services and the monetary flows between one country and the RoW and consists of the CRA and the CPA (Carbaugh, 2005). Furthermore, the BoP is based on the principle of double-entry accounting and whatever is recorded as a debit on the CRA must be recorded as a credit of the CPA and vice-versa, so that the BoP is always balanced. The CRA consists of export and import of goods and services, income and unilateral transfer between country and the RoW; while the CPA consists of international purchases and sales of assets and international lending and borrowing. Some studies suggests that debtor countries which are experiencing the CRAD and CPAS is caused by the differences between C and S differentials (Calvo *et al*., 1996); S and I differentials (Graham & Krugman, 1995; Milesi-Ferretti, 2001; Chinn & Prasad, 2003; Lee *et al*., 2006); the global supply and demand for S (Bernanke, 2005); while some studies suggests that the I levels alone are largely responsible for the CRAD (Spatafora & Warner 1995; Serven, 1999). Furthermore, according to Carbaugh (2005, p.329), the CRAD is equal to: (G – T) + (I – S), where (G – T) is the government deficit (Government Expenditure (G) minus Government Tax (T)) and (I – S) is private I minus private S. Finally, according to Griswold (2007), the direct link between the CRA and the CPA is the equality between the S and I differentials and the trade balance, where: (S – I) = (X – M). However, according to Dorman (2007), a low domestic S is not responsible for increasing TD levels, because trade factors are influencing the macroeconomic aggregates rather than as conventionally assumed, that macroeconomic aggregates influences trade factors.

The world's top debtor countries that are presented in Tables 2.4-2.6 including Australia, has generated a significant CRAD overtime, while this deficit is increasing overtime. Consequently, it is important to establish whether the growing CRAD represents a potential economic problem. According to the *Lawson Doctrine*, the CRAD is not a major problem as long as this deficit is due to the private sector I and not due to the public sector deficit (Corden, 1994). However, when Mexico's financial crisis occurred in 1994, the *Lawson Doctrine* proved to be flawed and this phenomenon is supported by other studies. The study by Loser & Ewart (1997) noted that regardless of factors underlying the CRAD, a large CRAD is likely to be unsustainable.

As the CRAD increases, it is financed by capital inflows, so the CPA has to be in surplus. However, if there are insufficient inflows on the CPA side and the CRAD is present, the macroeconomic implication for the country can be very serious. According to Hutchinson & Noy (2002), a sudden stop in foreign capital inflows is likely to decrease the levels of I, reduction in GDP and decline in employment levels. Furthermore, countries which have experienced a sudden decline in capital inflows, have experienced a significant decline in the GDP (Calvo *et al.* 2004; Edwards, 2004a; 2004b; 2005a; 2005b; 2005c). According to the Organization for Economic Cooperation and Development (OECD) (OECD, 2007) and IMF, historical examples of CRAD imbalances, which caused a currency crisis, decline in the GDP, and rise in unemployment, were Denmark in 1970 and 1983, Sweden in the 1980s, The United Kingdom in the 1990s and France and Italy in 1992.

Pitchford (1990, 1995) argued that the CRAD is not a problem and does not constitute a macroeconomic policy concern as long as the EXR is flexible; however, this view has not been supported by empirical studies. Based on empirical studies such as Debelle & Faruqee (1996), Milesi-Ferretti & Razin (1998), Cashin & McDermott (1998), Freund (2000), Chinn & Prasad (2003), Mussa (2004), Edwards (2004b; 2005a; 2005b) and Munro (2005), it has been suggested that a CRAD cannot increase indefinitely and the adjustments are likely to take place in the range between 4 and 5.5 percent of the GDP[31].

According to Mann (2002), the CRAD can be caused from two perspectives – firstly, the domestic perspective, which is associated with S and I differentials; and secondly, the international perspective, which is associated with international assets flows and the flows of goods and services. Due to the growth of external debts overtime which are represented by CRAD, servicing the debt or settlements of debt has to be financed by trade surpluses (Raybaudi *et al.*, 2003). There is a fundamental connection between the trade balance and CRA - as the trade balance becomes unstable, this has an effect on the stability of the CRA (Raybaudi *et al.*, 2003). Furthermore, the

[31] Fisher (1988) claims that it does not matter how large the CRAD is, but what matters is whether the CRAD is sustainable or not. If not, it will lead to currency devaluation sooner or later. According to Mann (2002), the CRAD is sustainable as long as they do not induce and are not associated with significant changes in the economic variables, such C and I levels, interest rates or EXR.

growing and persistent TD will generate an exploding CRAD; consequently, the substantial TD cannot be sustained (Quiggin, 2004). This proposition is easy to verify - as foreign liabilities increase due to the growing TD, the income of foreigners increases as well, which is the TD amount plus the interest rate on the principal. All things being equal, increasing the TD will initiate a self-perpetuating escalating CRAD.

According to Bonnaz & Paquier (1993), a growing TD affects the EXR stability which can have an effect on the stability of the money markets[32]. Cline (2007) argues that a growing external debt undermines foreign investors' confidence, which will eventually cause a rapid decline in capital inflow and depreciation of the EXR[33]. This will increase the interest rates and as a result, I levels, the stock market, as well as the housing market will decline. This chain of consequences is likely to lead the economy into a recession.

By observing the Keynesian macroeconomic model that focuses on the demand side, the relationship between economic growth or the GDP and trade balance is viewed as an expenditure identity where; GDP = C + I + G + NX[34]. Consequently, the GDP growth can be achieved by the Domestic Demand Led Growth (DDLG) = C + I + G or ELG = NX or by a combination of both. It has been suggested that a sustainable economic growth requires both a DDLG and an ELG (Felipe & Lim, 2005).

Finally, the growing TD can have a negative impact on the nation's Terms of Trade (TOT[35]), unemployment levels and the stability of the international money markets (Carbaugh, 2005). The TD indicates that the country's capital goes to foreign holdings, which will ultimately undermine economic growth in the future (Morici, 2007).

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[32] The models of international trade „Hysteresis Phenomena' stipulates that a significant EXR shocks; both appreciation and depreciation of the currency in terms of other currencies can inflame a permanent effect on the trade flows between the countries, hence on the trade balance (Amano *et al*., 1993; Baldwin, 1988; Harris, 1993; Mastropasqua & Vona 1989).

[33] It has been suggested that the relative depreciating of the currency in relations to other trading partners currencies will lead to the improvement in trade balance in the long-run. After devaluation of the currency relative to other trading partners' currencies, it will lead to an initial worsening of the trade balance, however, in the long-run, trade balance will improve. This phenomena is known as a „J-curve' (Dornbusch *et al*., 2002). However, the empirical support for the J-curve phenomena is inconclusive, and some studies shows the evidence for the J-curve phenomena (Bahmani-Oskooee, 1985), while others such as Himarios (1989) do not.

[34] Where; GDP - Gross Domestic Product, C - Consumption, G – Government Expenditure and NX - Net Export. While „NX=X-M', X - Export and M - Import.

[35]TOT is the ratio of the price of exports to the price of imports; increases in the TOT indicates that the relative price of imports requires relatively less of the exports in order to achieve the trade balance.

2.4.4 TRADE DEFICIT ECONOMIC IMPLICATION

The global imbalances represented by the TD, TS hence CRAD and CPAS amongst the countries is evident. Dooley *et al*., (2003; 2006) suggests that the principal driving force which is causing the global imbalances is due to the ELG strategy perused by the East Asian countries, most notably China.

According to Stein (2004), the TD may show the effects of the low levels of domestic S, but at the same time, the TD is an indication of the RoW competitiveness. This comment made by Stein (2004) suggests that countries that are generating a TD, should examine their level of competitiveness. The growing TD is frequently associated with significant job losses, most noticeably in the manufacturing sector. According to Ghosh (2000), there is a long-run evidence between employment levels in manufacturing and the net import in The United States of America; as the M increases in manufacturers' products, the employment in manufacturing industry is decreasing. Morici (2006) pointed-out that the growing TD levels are shifting domestic productive resources from X and M competing industries (manufacturing sector) which are high in Research and Development (R&D) to non-tradable activities (service sector) such as restaurants and retirement villages which in turn „cripples' future economic growth. Furthermore, Bivens (2004) suggests that a huge debt levels associated with a growing TD and CRAD damages future living standards, as the country X in the manufacturing trading sector plays a key role in preventing the harmful consequences which are associated with an increasing debt levels.

The growing TD levels are non-discriminatory and are common for both the developing and developed countries, while there is a strong association between TD levels and the stage of development (Siebert, 1989; Eichengreen, 1992; Genberg & Swoboda, 1992; Roldos, 1996; Chinn and Prasad, 2003). The danger of running a large and growing TD levels which are associated with mounting debt levels is well documented. Moon (2007) suggests that developing countries should exercise caution and to adopt a prudent avoidance of the mounting and chronic TD levels which would prove to be a better alternative for the economic progress for the developing countries.

The growing TD levels are an increasing concern for many developed countries, which includes The United States of America, Australia and many European Union member countries (Wijeweera & Deskins, 2008). According to Wijeweera & Deskins (2008), a large TD is not likely to be self-correcting as previously suggested by

Dernburg (1989), Krugman (1993) and Blanchard (1997), and the government intervention to correct the TD is likely to be the only option. According to Moon (2007, p.11), the growing TD is far more than just an accounting concept - there is also a power struggle amongst countries and can have serious economic consequence if they are not managed well.

Pattillo *et al*. (2004) suggests that for each time the debt level is doubled for highly indebted countries, it will reduce the GDP's growth by approximately 1 percent, while the debtor countries are likely to have higher real interest rates between 20 and 30 basis points for each 1 percent of debt to GDP levels (Obstfeld & Rogoff, 2001; IMF, 2005). According to Peter Morici (2006), the growing TD is a tax on economic growth and represents a financial burden on working families (Becker, 2005; Moon, 2005). This is supported by Moon (2001) which argue that the TD is certainly slowing down GDP growth.

Moon (2005) pointed-out that the raising debt levels associated with a growing TD level makes the country more dependent on external factors which can not be longer controlled by the country's government, and as a consequence, it generates an increasing economic uncertainty. In addition, Reisen (1998), Erturk (2003), and Pattillo *et al*., (2004) advocate that growing debt levels makes the financial crises to occur more likely, and this view is also supported by Moon (2005). Moon (2005) pointed-out that a huge TD levels amongst the Asian countries in 1990s has contributed to the Asian financial crisis.

Despite the fact that many countries are experiencing a significant and growing TD levels, this area has not been investigated sufficiently. According to Moon (2005), there is insufficient research in the growing TD and this means that there is an inadequate frame to interpret the TD, despite being amongst the most significant concerns in the modern economic landscape. This comes as a surprise, that neither the growing TD nor CRAD for the countries which are experiencing such concerns have not been subject to vigorous empirical analysis by economists (Moon, 2005).

The growing TD has been so far regarded as a „consequence' of other macroeconomic variables rather than an independent causing agent for economic policy concern, however, Moon (2005; 2006) Morici (2006; 2007), Dorman (2007) Scott (2007) and Tonelson & Petrucci (2007) disagree - they suggests that the growing TD is more as a causing agent rather than the consequence of other macroeconomic variables. Dorman (2007) explicitly advocates that the TD is a cause rather than a consequence, as the TD is affecting the macroeconomic aggregates rather than the other way around.

Finally, the empirical findings by Moon (2006) revealed that the TD is not cyclical and a short-lived phenomena, but rather a long and protracted occurrence. In addition, the growing TD levels are causing mounting liabilities, slowing down economic growth and the liabilities resulted from the TD, continues over a long period of time which are not easily unwound by future trade surpluses.

2.5 CONCLUSION

The overall understanding of the benefits associated with international trade since Adam Smith (1776) and his well-known book of „The Wealth of Nations' has evolved significantly. The trade volumes amongst the countries overtime has grown drastically; while trade in manufacturers traditionally dominates the composition of trade between countries, and more recently, trade in service has increased in significance. Despite international trade in services gaining more significance in recent times, trade in manufacturing remains the most significant component of X and M volumes amongst countries and this trend appears to continue in the near future. These trends are likely to be result of trade liberalization lead by multilateral agreement GATT, the rise in the popularity of RTA and most recently, the formation of the WTO. Trade liberalization is associated with the reduction of tariff and non-tariff barriers to trade that has lead to significant increases in the trade of manufacturing and service products, while the reduction in barriers to trade in the service sector has been more challenging due to the nature of the service products. Consequently, the world's trade volumes in the manufacturer's products accounts increasingly for the higher volumes as a percentage of world GDP than the overall trade in service products as a percentage of the world GDP.

According to numerous researches and their empirical findings, strong evidence exists that relatively open countries are achieving a higher economic prosperity compared to less open countries. However, not all scholars agree that free trade would always lead to higher economic prosperity. One such example is that some countries, due to various macroeconomic factors, experienced unbalanced trade with other countries. Unbalanced trade in particular for the TD countries, represents rising debt levels with the RoW, while these growing liabilities can have negative macroeconomic consequences for the countries in question, if these growing TD levels are not managed well.

One of the countries with a prolonged and persistent TD levels with the RoW is Australia, which has been running a significant TD for the last 30 years, while these TD levels in overall are increasing as a percentage of GDP. Furthermore, it has been suggested that the TD levels and associated increased liabilities are not necessary bad if such liabilities are used for the I rather than for the C. However, once again, the percentage of Australia's rising liabilities associated with the TD as a proportion of gross capital formation accounts for less than 5 percent in overall since 1973. This suggests that Australia's liabilities with the RoW are mainly used for other purposes like C rather than for the I and these facts are not so encouraging.

These findings warrant further research, which will be carried out in the following chapter. Chapter 3 will include an assessment of the macroeconomic situation in Australia which is associated with the international accounts, and a review of the existing literature in respect to the X and M flows between Australia and the major trading partners[36] and the RoW in overall. Once this assessment is completed, it will clearly identify the areas that will be examined in more detail in subsequent chapters.

[36] The major Australian trading partners includes the countries like The United States of America, China, Japan, Singapore, Indonesia and Malaysia.

CHAPTER 3

3. THE AUSTRALIAN ECONOMY AND TRADING ENVIRONMENT: AN OVERVIEW

3.1 INTRODUCTION

According to Chapter 2, where international trade theory, trade flows and associated trade imbalance were overviewed, it was established that the growing trade imbalances warrants further investigation, since the growing Trade Deficit (TD) can instigate a negative macroeconomic consequences if not managed well. Australia is one of the world's largest TD countries and this TD levels are continuously growing. Consequently, it is important to overview the Australian macroeconomic and trading environment and to establish to what extent the TD has been empirically investigated in Australia.

The aim of this chapter is to overview the macroeconomic environment in Australia which includes the trends in economic activity, trading environment and the main scholarly empirical examination in the area of the Export (X), Import (M) and TD between Australia and the Rest of the World (RoW). Once this is accomplished, it will clearly identify the areas that require further examination in the area of the growing TD in Australia.

The structure of this chapter is divided into 4 distinct sections – Section 3.2, the Australian macroeconomic environment; Section 3.3, the Australian trading environment; Section 3.4, a review of empirical studies; followed by Section 3.5, the conclusion. Section 3.2 reviews the overall macroeconomic environment in Australia, which includes an overview of the major industries and GDP composition, while Section 3.3 comments on the overall trading environment between Australia and the RoW. In addition, this section also includes the X and M patterns, the identification of the major trading partners, trading blocks and an overview of the Australian TD within the national account. Section 3.4 reviews the major empirical studies associated with the X, M and TD from an Australian perspective in order to establish to what extent the TD levels in Australia has been examined. Finally, Section 3.5 will identify the main areas that require further empirical investigation of the growing TD in Australia and consequently, provide direction of this research that will be carried out in the subsequent five chapters.

3.2 THE AUSTRALIAN MACROECONOMIC ENVIRONMENT

Australian historian Blainey Geoffrey (1966) in his book „The Tyranny of Distance' described how distance and isolation has shaped the Australian economy. While David Byers Chief Executive Officer (CEO) for the Committee for Economic Development of Australia (CEDA) believes that the Australian remoteness is relevant today as it was before, because Australia's remoteness even today, impedes national economic development (Thirsk, 2007). Guttmann & Richards (2006) pointed-out that Australian trade openness with the RoW is relatively lower than would be normally expected, while the large geographic size and distance from the RoW is partially responsible for these trends. Furthermore, Guttmann & Richards (2006) suggests that the relative openness and remoteness are not necessary static, since they depend on other economic factors which includes the RoW countries' economic growth rates. The remoteness can also have negative effects on productivity levels. According to Battersby (2006), who empirically investigated the link between labour productivity levels and the distance between countries, found that the Australian labour productivity is 45 percent less compared to levels of The United States of America. These results strongly suggest that this is due to the Australia's geographic isolation from the world's major economic activities.

According to the Australian Industry Group (AIG) (2008a, p.24), the overall productivity between 2000 and 2007 in Australia has declined significantly for all sectors in Australia's economy in overall by 1.82 percent for this period, while only sector which recorded an improvement in productivity is the „Culture and Recreation'. The highest decline in productivity over this period was recorded for „Mining', which declined by 13.52 percent, followed by „Utilities' and „Wholesale Trade' with an overall decline of 11.57 and 3.1 percent respectively; whilst the only sector that has recorded a productivity growth over this period the „Culture and Recreation' recorded a growth in productivity of 1.6 percent.

Despite Australia's geographically remoteness from the RoW, the Australian economy has been growing by 3.25 percent per annum in average since 1990 and currently is in the 16th year of the expansion. This remarkable growth is in overall the second highest amongst the Organisation for Economic Co-operation and Development (OECD) member countries behind Ireland (Edey, 2007). However, this significant growth by the Australian economy especially in recent years, must be viewed with caution since it has been fueled by the raising Terms of Trade (TOT) which has averaged 2 percent annual growth in the period between 1990:1 - 2008:1, while this growth in TOT is more pronounced recently with 6.8 percent annual growth in the period between 2003:1 - 2008:1 (ABS, 2008a)[37]. The relationship between the TOT and Gross Domestic Product (GDP) is well documented, and one of the recent empirical studies by Becker & Mauro (2006) suggests that a 10 percent decline in TOT has lead to an annual decline in GDP by 2.8 percent.

In order to identify the precise direction of this research, which will investigate the growing TD in Australia, an overview of the major industries and the composition of the GDP in Australia are presented in the following section.

3.2.1 MAJOR INDUSTRIES

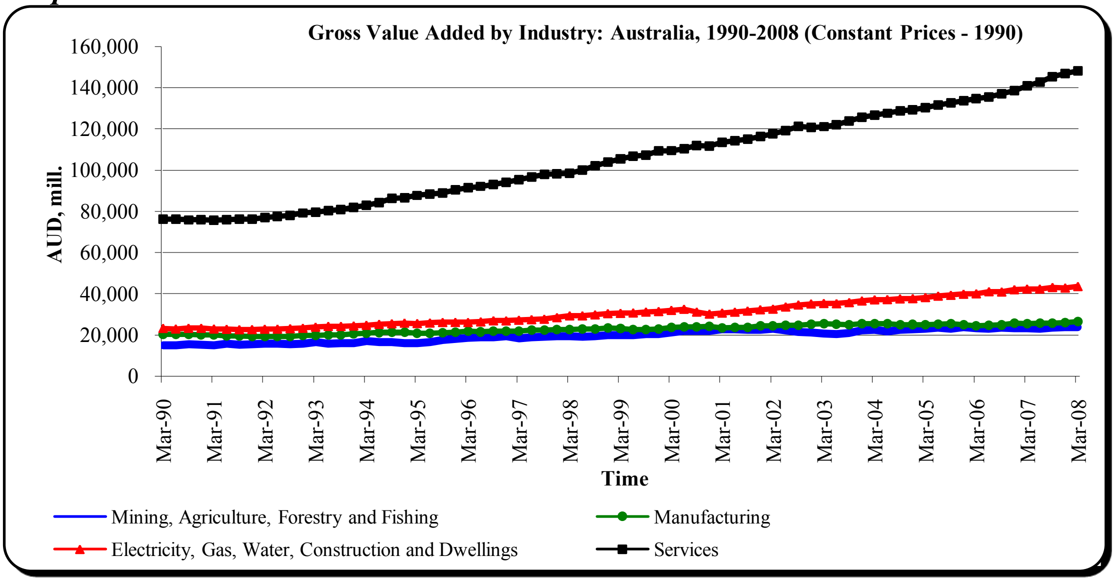
The meaning of the major industry is subject to various definitions, since the major industry could be based on numerous factors such as the industry which employs the largest number of employees; the fastest growing industry; the largest gross value added industry or some other definition. The adopted approach for the identification of the major Australian industries is based on the gross value added, as the industry with the largest contribution to the GDP is likely to be the major industry. The data used for the identification of the major Australian industries are the production approach measure of GDP and are obtained from the Australian Bureau of Statistics (ABS). Graph 3.1 shows the four major aggregate industries, while Graphs 3.2-3.5 shows the breakdown of these industries.

According to Graph 3.1, the „Service' industry accounted for AUD75,941[38] mill. value added in March quarter 1990, while in March quarter 2008 it accounted for AUD148,215 mill., which is roughly twice compared to the levels 18 years ago. The „Service' industry in Australia is the single most important industry in Australia and its value added is gradually increasing by AUD347.36 mill. per quarter in average since 1990. By observing the other three remaining industries; „Mining, Agriculture, Forestry and Fishing', „Electricity, Gas, Water, Construction and Dwellings' and „Manufacturing', it is apparent that the overall combined value for all three industries value added in 1990 accounted for less than the „Service' industry alone. While in

[37] These are the most recent trends in the Australian TOT, since 10 years ago the study by Beardow & Ottley (1998) found that the Australian TOT has experienced a long-run deterioration, as relative importance of the X of commodities in which Australia is one of the major players, has decreased in significance relative to the world trade in manufacturers.
[38] The Australian Dollar Currency (AUD).

2008, the „Service' industry still accounts for almost double than the combined values for all the three remaining industries. During the period between 1990 and 2008,

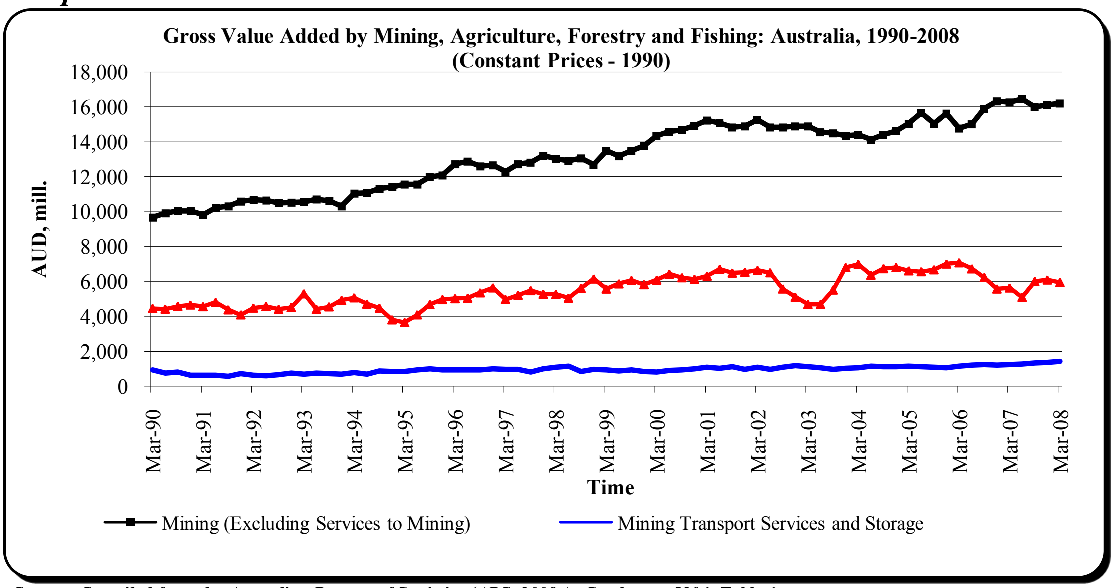
Graph 3.1



Source: Compiled from the Australian Bureau of Statistics (ABS, 2008c): Catalogue; 5206, Table 6.

the value added for „Mining, Agriculture, Forestry and Fishing' has been increasing by AUD44.34 mill., for „Electricity, Gas, Water, Construction and Dwellings' by AUD98.57 mill. and for „Manufacturing' AUD34.74 mill. in average per quarter. In overall, is apparent that the „Service' industry value added is the fastest growing, while the „Manufacturing' industry, the value added is the slowest growing for this period - in fact the „Manufacturing' industry value added growth for the entire period

Graph 3.2



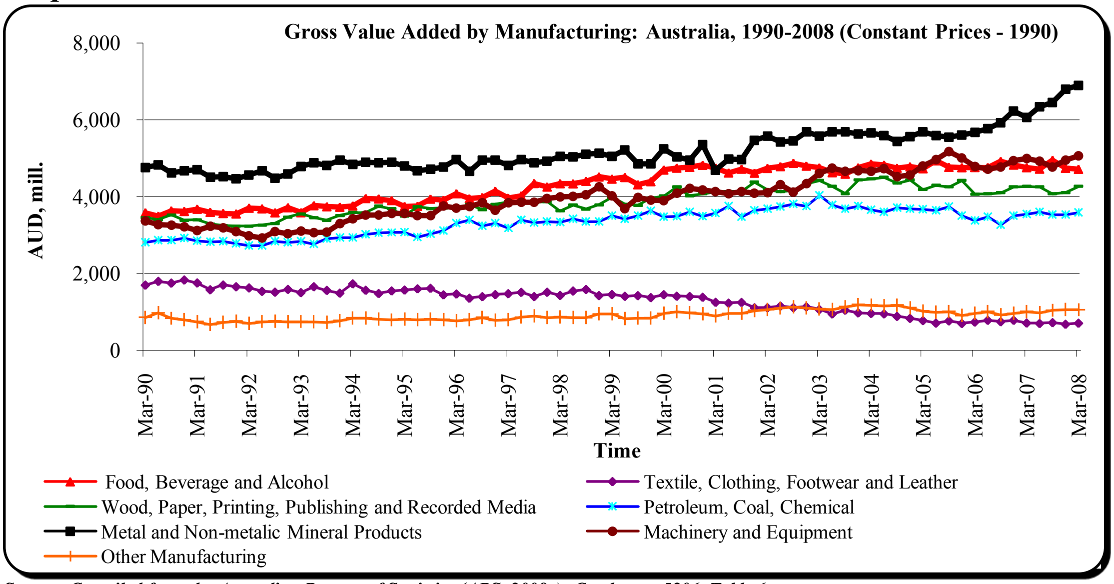
Source: Compiled from the Australian Bureau of Statistics (ABS, 2008c): Catalogue; 5206, Table 6.

is marginal.

Graph 3.2 shows the breakdown of the gross value added for „Mining, Agriculture, Forestry and Fishing' industry. According to Graph 3.2, „Mining (excl. Services to Mining) accounts for the highest value added, where in 1990, it accounted for AUD9,659 mill. per quarter and it has gradually increased to AUD16,205 mill. per quarter in 2008, with the average quarterly value added increase for the entire period of AUD30.82 mill.. While the „Mining Transport Service and Storage' are relatively constant and accounted for the quarterly value added for AUD941 mill. and AUD1,428 mill. in the year 1990 and 2008 respectively. By observing the „Agriculture, Forestry and Fishing' in Graph 3.2, it has experienced the most fluctuation over the entire period and has increased in the quarterly value added from AUD4,438 mill. to AUD5,939 mill. between period 1990 and 2008, with an average quarterly value added growth for the entire period of AUD10.8 mill.

Graph 3.3 shows breakdown of the gross value added for „Manufacturing' industry.

Graph 3.3



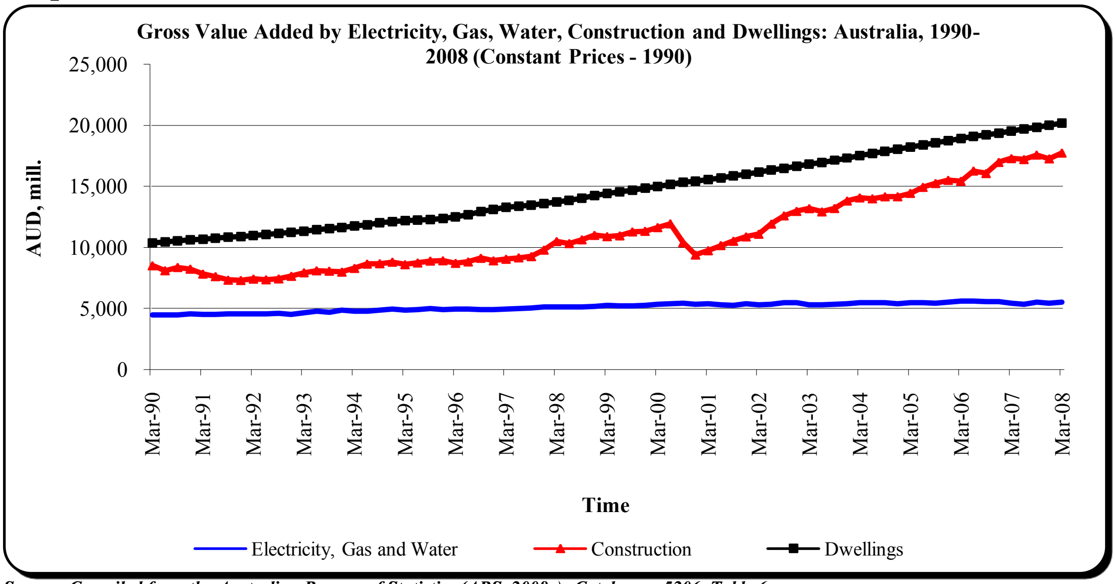
Source: Compiled from the Australian Bureau of Statistics (ABS, 2008c): Catalogue; 5206, Table 6.

According to Graph 3.3, all „Manufacturing' industries has recorded an increase in the gross value added between the period 1990 and 2008, except for the „Textile, Clothing, Footwear and Leather', which recorded a decrease in overall value added for this period. The highest value added industries in manufacturing sector are „Metal and Non-metalic Mineral Products', „Food, Beverage and Alcohol' and „Machinery and Equipment which accounted for the gross value added in 1990 for AUD4,770 mill., AUD3,589 mill. and AUD3,369 mill. respectively. While the same industries in

2008 recorded a gross value added of AUD6,905 mill., AUD4,719 mill. and AUD5,070 mill. respectively. Furthermore, the highest increasing value added industry in „Manufacturing' industry is „Machinery and Equipment' and is increasing by AUD9.63 mill. in average for the entire period, while for the same period, „Textile, Clothing, Footwear and Leather' value added is decreasing in average by a staggering AUD5.1 mill. per quarter, which is the only decreasing value added industry in „Manufacturing' on this level of aggregation.

Graph 3.4 shows the breakdown of the gross value added for „Electricity, Gas, Water, Construction and Dwellings', where „Dwellings' is the highest value added industry, followed by „Construction' and utilities „Electricity, Gas and Water'. The „Dwellings' accounted for AUD10,352 mill. in 1990 and has gradually increased to AUD20,205 mill. value added in 2008, with an average quarterly value added growth over the entire period of AUD47.1 mill. The „Construction' industry value added has also been increasing overtime; however, it has fluctuated at most. The most noticeable instability has been recorded between the year 2000-2001, when the value added in the year 2000 for the „Construction' industry plummeted between September and December quarter of more than AUD1,000 mill. It took over 2 years to again reach year 2000 levels of the gross value added in this industry and has since continuously

Graph 3.4

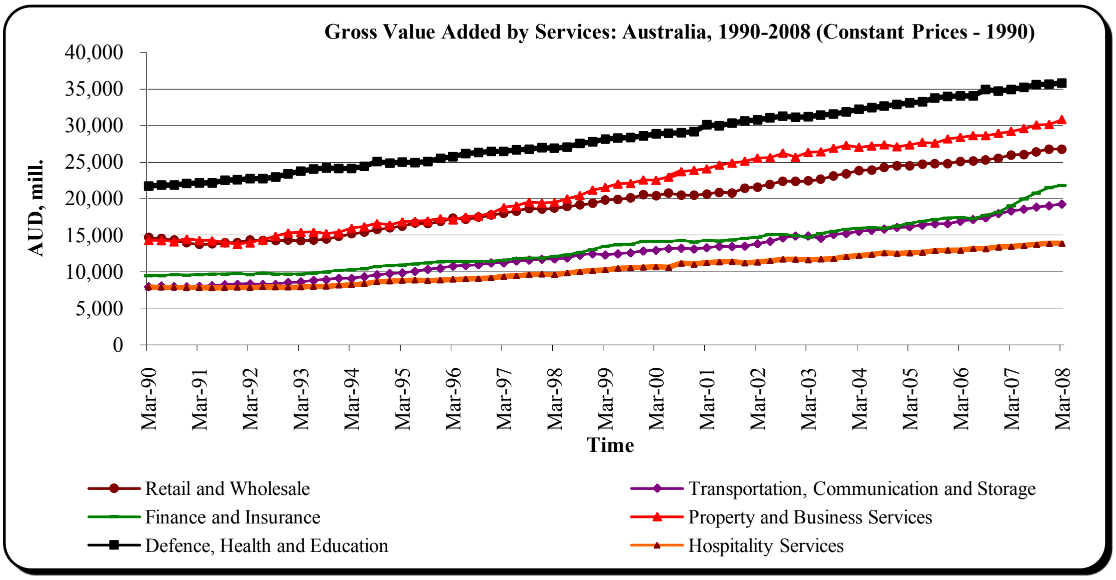


Source: Compiled from the Australian Bureau of Statistics (ABS, 2008c): Catalogue; 5206, Table 6.

increased, with an average quarterly increase for the entire period of AUD46.1 mill. Finally, the utilities „Electricity, Gas and Water' industry accounts for steady value added for the entire period of approximately AUD5,000 mill. per quarter gross value added with a marginal increase overtime.

Graph 3.5 shows the breakdown of the gross value added for the „Services' industry:

Graph 3.5



Source: Compiled from the Australian Bureau of Statistics (ABS, 2008c): Catalogue; 5206, Table 6.

As expected, according to Graph 3.5, all „Services' industries has recorded an increase in gross value added between the period 1990 and 2008. The highest gross value added is for „Defence, Health and Education' industry which accounts for gross value added of AUD21,687 mill. and AUD35,794 in 1990 and 2008 respectively, with an average quarterly growth for the entire period of AUD66.68 mill. The second and third highest value added in „Services' are „Property and Business Services' and „Retail and Wholesale' which accounts for an average gross value added of AUD14,289 mill. and AUD14,710 mill. respectively in 1990, while in 2008 these two industries accounted for a gross value added of AUD30,795 mill. and AUD26,726 mill. respectively. The highest average quarterly growth of gross value added over the entire period is for the „Property and Business Services' industry which accounts for AUD84.76 mill., while the lowest average growth in gross value added for the entire period is for „Hospitality Services' industry, which accounts for AUD30.66 mill.

In summary, according to the gross value added in the period between 1990 and 2008, the most significant industry in Australia is the „Service' industry and accounts in overall for 56.5 percent of the total value added in 1990, while in the year 2008, it has increased to 61.4 percents of the total value added in the Australian economy. At the same time, „Electricity, Gas, Water, Construction and Dwellings' sector remains steady and accounts for just over 17 percent of the total gross value added for the periods between 1990 and 2008. The declining sectors of the total value added are „Mining, Agriculture, Forestry and Fishing' and „Manufacturing', while the overall decline from 1990 to 2008 levels for „Mining, Agriculture, Forestry and Fishing' is from 11.12 to 9.8 percent and for „Manufacturing' for the same period, from 15.03 percent to 10.9 percent. It is apparent, that the „Manufacturing' is the fastest declining gross value added sector as a proportion of total value added. As Edey (2007) noted, the growth in the Australian manufacturing is growing considerably slower than the rest of the economy

Finally, the fastest growing industries amongst the „Services' are the „Property and Business Services', „Defence, Health and Education', and „Retail and Wholesale' industries, while the lowest growth is recorded for „Hospitality and Tourism' industry. Furthermore, the fastest growing industries for „Manufacturing' industry are „Machinery and Equipment', „Metal and Non-metalic Mineral Products' and „Food, Beverage and Alcohol', while the gross value added for „Textile, Clothing, Footwear and Leather' industry is decreasing overtime.

3.2.2 GDP COMPOSITION

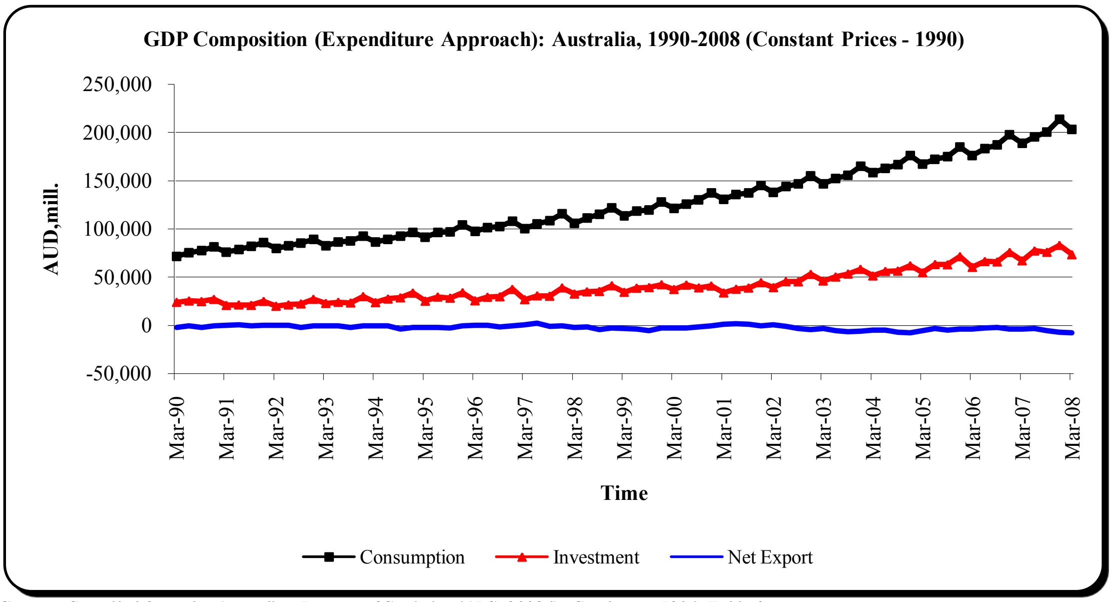
Now that the major Australian industries have been identified, this section will identify the major GDP components that are driving economic growth in Australia. In order to achieve this task, the conventional Keynesian macroeconomic model of GDP measure by expenditure where GDP = C + I + G + NX[39] is used. The data source for the identification of the composition of GDP expenditure approach is the ABS. Graph 3.6 shows the three major components of the GDP, while the Government Expenditure (G) component is under either overall Consumption (C) for the government C or overall Investment (I) for the government I, while Graphs 3.7-3.9 shows the breakdown of these three GDP components.

According to Graph 3.6, the „Consumption' component of GDP accounted for AUD71,816 mill. in March quarter 1990, while in March quarter 2008 it accounted for AUD203,621 mill., which is more than 2.8 times greater compared to the levels 18 years ago. The „Consumption' is the single most distinct component of the GDP in

[39] Where; GDP - Gross Domestic Product, C - Consumption, G – Government Expenditure and NX - Net Export. While ‚NX=X-M', X - Export and M - Import.

Australia's economy and since 1990, it is increasing by AUD598.83 mill. per quarter in average. Furthermore, the „Investment', component of the GDP has accounted for AUD24,332 mill. in 1990, while in 2008, it has accounted for AUD73,471 mill., while it is increasing by AUD244.37 mill. in average per quarter since 1990 level[40]. In overall, the „Consumption' component of GDP is almost three times greater than the

Graph 3.6



Source: Compiled from the Australian Bureau of Statistics (ABS, 2008d): Catalogue; 5206, Table 3.

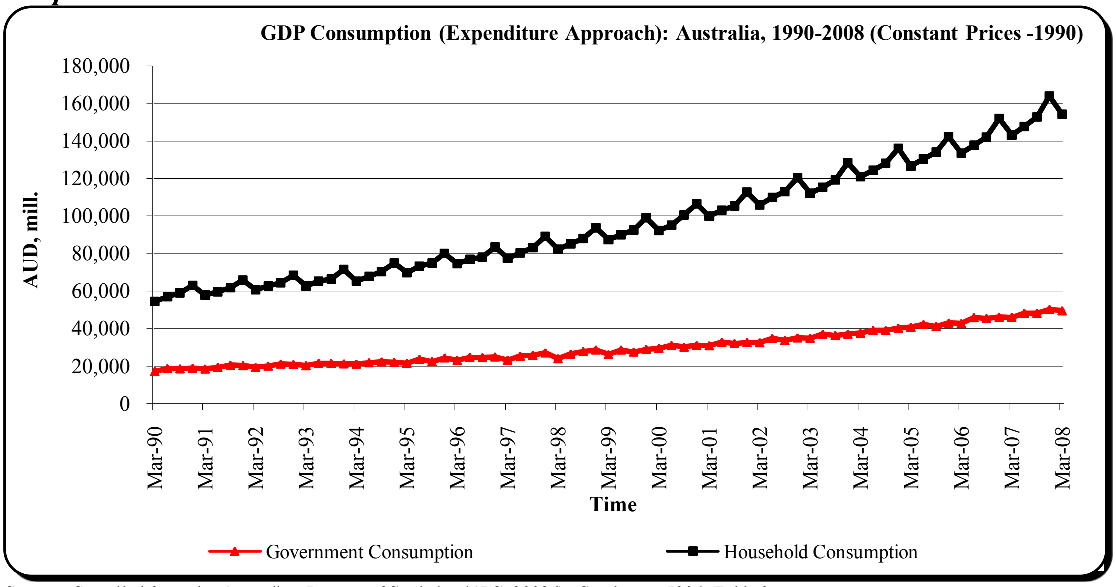
„Investment' component of GDP throughout the entire period between 1990-2008. While „Consumption' and „Investment' have a positive contribution to economic growth in Australia. By referring to the „Net Export' component of GDP, it has accounted for a negative AUD1,768 mill. in 1990, while in 2008, it has remained in negative territory and accounting for a negative AUD7,532 mill., with an average quarterly increase in the TD of AUD23.6 mill. throughout the entire period. In overall, it is apparent that the „Consumption' component of the GDP is the largest component followed by „Investment', while both „Consumption' and „Investment' have a positive contribution to Australia's economic growth, while the „Net Export' component of the GDP is negative in overall throughout the entire period. This negative contribution of the „Net Export' to economic growth in Australia reduced the GDP by 1.84 percent in 1990, and since then, it has worsened. In 2008, it has reduced the GDP by 2.75 percent, while the overall long trend of the negative „Net Export' is

[40] Mishra & Kevin's (2006) findings suggest that the Australian investment levels as a percentage of GDP are one of the lowest amongst all of the Organisation for Economic Co-operation and Development (OECD) countries.

increasingly reducing the GDP by an additional 0.0243 percent per each additional quarter in average.

Graph 3.7 shows breakdown of the „Consumption' component of the GDP.

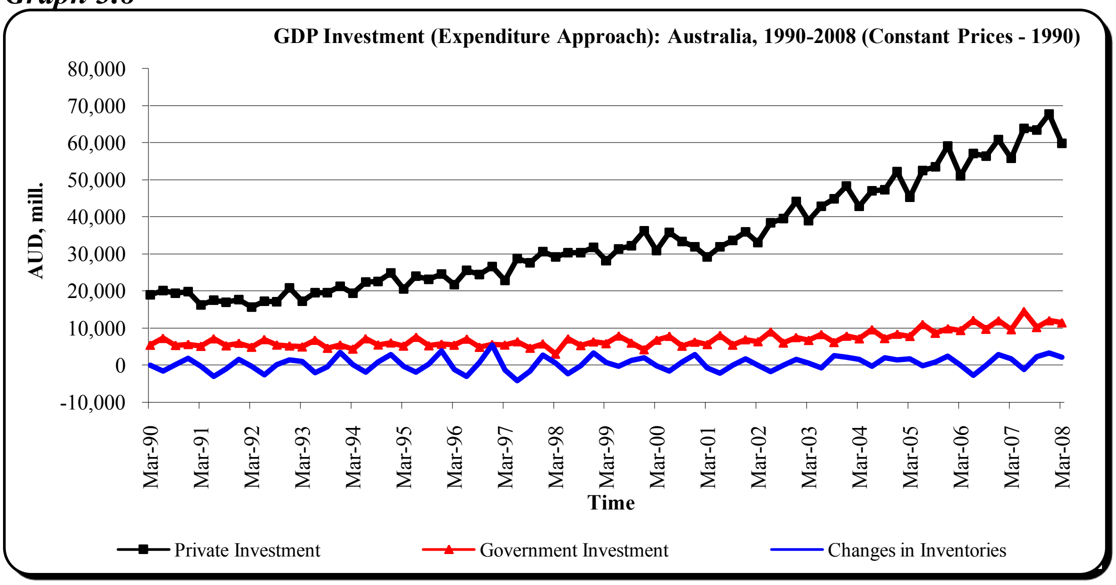
Graph 3.7



Source: Compiled from the Australian Bureau of Statistics (ABS, 2008d): Catalogue; 5206, Table 3.

According to Graph 3.7, „Household Consumption' as expected, accounts for the highest proportion of overall „Consumption', recording AUD54,560 mill. and AUD154,001 mill. in 1990 and 2008 respectively, with an average quarterly growth of AUD457 mill. during the entire period. „Government Consumption' accounted for AUD17,256 mill. and AUD49,621 mill. in 1990 and 2008 respectively, with an average quarterly growth during this period of AUD141.8 mill.

Graph 3.8



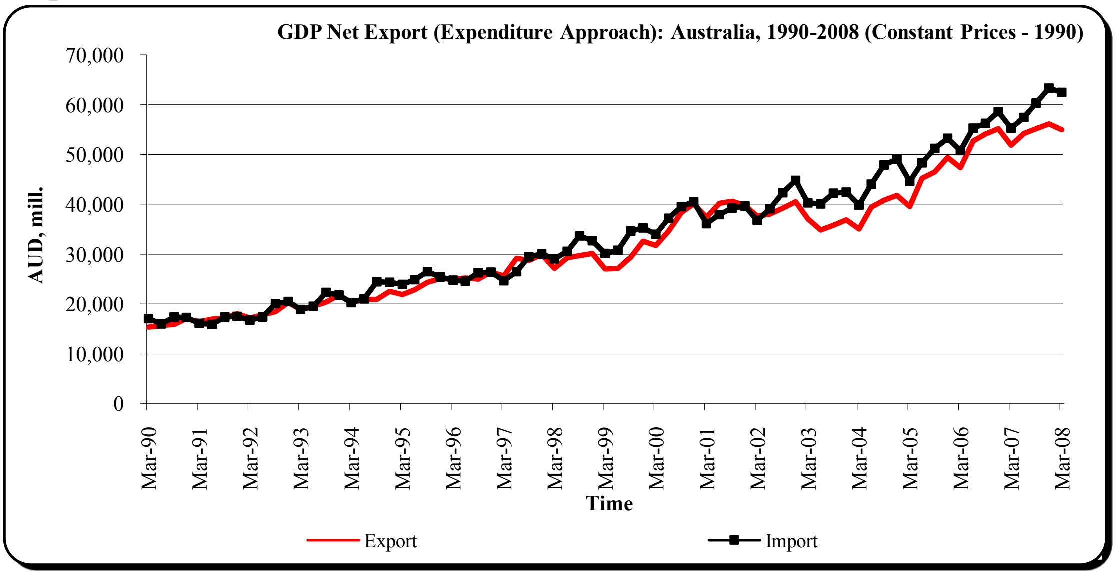
Source: Compiled from the Australian Bureau of Statistics (ABS, 2008d): Catalogue; 5206, Table 3.

Graph 3.8 shows the breakdown of the „Investment' component of the GDP into „Private Investment', 'Change in Inventories' and „Government Investment'.

According to Graph 3.8, „Private Investment' accounts for the highest proportion of the overall „Investment' component of the GDP, recording AUD18,960 mill. and AUD59,878 mill. in 1990 and 2008 respectively, with an average quarterly growth during this period of AUD212.9 mill.. While the „Changes in Inventories' as a part of „Private Investment' exhibits normal patterns of fluctuation which are associated with the „Consumption' component of GDP. By observing the „Government Investment', it accounted for AUD5,412 mill. in 1990 and AUD11,447 mill. in 2008, with an average quarterly growth during the entire period of AUD24.5 mill. In overall, the „Government Investment' levels are not only significantly lower than the „Private Investment', but also has been growing almost nine times slower than the „Private Investment' during the entire period between 1990 and 2008.

Graph 3.9 shows the final component of the GDP breakdown for the combined „Net Export' in goods and services into „Export' and „Import'. According to Graph 3.9, the total „Export' in 1990 accounted for AUD15,316 mill., and it has increased to AUD55,042 mill. in 2008, which is approximately 3.6 times higher than the level in 1990; while the overall „Export' levels are growing AUD180.97 mill. in average per quarter during the entire period between 1990 and 2008. Furthermore, the „Import' levels accounted for AUD17,084 mill. in 1990 and has increase to AUD62,574 mill. in 2008, which is approximately 3.7 times higher compared to the levels in 1990;

Graph 3.9



Source: Compiled from the Australian Bureau of Statistics (ABS, 2008d): Catalogue; 5206, Table 3.

while the „Import' is growing in average for the same period of AUD204.57 mill. per quarter. By comparing the Australian „Export' and „Import' trends, it shows that „Import' levels in 1990 was 11.5 percent higher than „Export' levels, while in 2008, the „Import' levels are 13.7 percent higher than „Export' levels. Another way of viewing these differences between „Export' and „Import' levels is by observing the trends throughout the entire period between 1990 and 2008 for both the „Export' and „Import'. During this period the „Import' levels are growing faster than „Export' levels by AUD23.6 mill. in average per quarter, which also corresponds to a negative contribution to the Australian GDP.

In summary, according to the Australian GDP composition in the period between 1990 and 2008, the most significant component is „Consumption', which overall has accounted for approximately 74 percent of total GDP throughout the entire period between 1990 and 2008, while the second most important component of the GDP which is „Investment', accounted for the rest. Finally, in overall, the „Net Export' has been negative throughout the entire period as the „Import' levels are growing faster than the „Export' levels, while this gap between „Import' and „Export' levels are widening overtime. This negative „Net Export' represents a negative contribution to the Australia's economic growth, while this negative contribution is more pronounced in most recent times.

3.3 THE AUSTRALIAN TRADING ENVIRONMENT

According to AIG (2008b), Australia's X growth in manufacturers in 2008 is expected to reach 7.5 percent, however, this growth is only just over half of the growth, which has been achieved between 2006-2007, where in 2006-2007 the X growth, was 13.7 percent. Furthermore, the expected X growth of 7.5 percent in 2008 must not be viewed too optimistically, since being influenced by price fluctuation and once this expected growth is adjusted[41] for the price movements, the manufacturing X is expected to grow in 2008 by 0.5 percent[42] only.

[41] Adjustments are made by observing the X volumes QTY only.

[42] This price adjustment raises an important point which must be considered, as both the X and M volumes are influenced by the price fluctuations and in order to overcome bias associated with the fluctuation in TOT, Beardow & Ottley (1998) recommends that the trade flows analysis is based on both monetary values and Quantity (QTY). In addition, empirical findings by Beardow & Ottley (1988) established that is not uncommon for a country to experience significant TS or TD based on monetary values. However, based on QTY, it show to be the opposite. These findings signify the importance that international trade flows analysis should be carried-out based on both the monetary values and QTY, especially when the TOT is fluctuating which is the case in Australia.

According to the Australian Department of Industry, Tourism and Resources (DITR) (2008), Australia's service sector trade is in better shape than international trade in manufacturing. The international trade in services between Australia and the RoW has produced the TD of AUD4 bill. in 1984, however, in 2006, Australia's service sector is running a TS with the RoW in total of AUD1 bill., while the major Australian service exports includes education, tourism, financial and business services and communication (DITR, 2008). These improvement in the trade balance between Australia and the RoW in the service sector between 1984 and 2006 suggests that Australia has become more internationally competitive in the service trade, however, the DITR (2008) report suggests that the service sector currently commands less international competition compared to trade in manufacturing.

Finally, the commodity sector X and M between Australia and the RoW is proving to be very beneficial for Australia's economy as Australia is one of the largest commodity exporter in the world. As a result, Australia is generating a significant TS with the RoW in the commodity sector (Access Economics, 2008).

In overall, all three sectors combined which includes the manufacturing, services and commodity sectors accounts for the greater M levels than the overall combined X levels. As a result, the TD between Australia and the RoW is increasing (ABS, 2008d). According to Access Economics (2008), the Australian TD is the fourth largest in the world despite the fact that the commodity X sector is booming and that Australia is one of the world's largest commodity exporter, while the Australians TOT are at historically high levels. Despite the surge in the Australian commodity X, Australia is running the Current Account Deficit (CRAD), whereas most of the world's commodity exporters are running a Current Account Surplus (CRAS). However, a record high TOT is unlikely to last forever and any downturn in the commodity prices would increase the TD as share of the economy which is likely to have serious macroeconomic consequences (Access Economics, 2008).

The growing TD levels in Australia is not an unusual occurrence for economies such as Australia, since the Australian manufacturing sector is experiencing a relative decline in favour of increasing its service sector (ABS, 2008c). Batra & Beladi's (1998) empirical findings suggests that countries that mostly imports manufacturers are likely to experience a TD, while countries which mainly exports manufacturers, are likely to experience a Trade Surplus (TS), since productivity growth in manufacturers are higher than in other industries such the service and primary industries. Finally, these trends did not emerge suddenly as Beardow (1993) pointed-out – Australia's economic structure is the outcome of the decisions made in past, while the world high growth industries are not in which Australia hold a CA. Consequently, this has led to the declining living standards in Australia as the Australian GDP per capita was 17 percent higher than the OECD average in 1960, while in 1990 it plummeted to 0.7 percent above the OECD average (Beardow, 1993). However, this has improved since 1990, though it still remains significantly below the 1960 levels (OECD, 2008a).

3.3.1 EXPORT AND IMPORT PATTERNS

According to the latest report by DFAT (2008a), the major Australian X are coal, iron ore and non-monetary gold which accounts for AUD20.6 bill., AUD16.3 bill. and AUD11.4 bill. respectively in 2007 alone; while for the same period, the overall X, including all goods and services, accounted for AUD217.5 bill. By referring to Table

Table: 3.1

AUSTRALIA'S TOP 25 EXPORTS: GOODS AND SERVICES, 2005-2007 AUD, mill. constant prices – 1990					
Rank	**Commodity**	**2005**	**2006**	**2007**	**% Growth**
1	**Coal**	21,825	23,276	20,751	**-10.8**
2	**Iron ore**	11,071	14,366	16,269	**13.2**
3	**Education services**	9,587	10,733	12,566	**17.1**
4	**Personal travel (excl education) services**	10,927	11,037	11,815	**7**
5	**Non-monetary gold**	5,822	9,154	11,360	**24.1**
6	**Crude petroleum**	6,281	6,674	7,984	**19.6**
7	**Aluminium ores (incl. alumina)**	4,684	6,127	6,074	**-0.9**
8	**Aluminium**	4,460	5,940	5,886	**-0.9**
9	**Professional, technical & other business**	3,827	4,525	5,589	**23.5**
10	**Natural gas**	3,694	5,109	5,079	**-0.6**
11	**Bovine meat f.c.f.**	4,670	4,856	4,488	**-7.6**
12	**Passenger transportation services**	4,157	4,096	4,172	**1.9**
13	**Other transportation services**	3,305	3,700	3,844	**3.9**
14	**Copper ores**	2,556	4,096	3,802	**-7.2**
15	**Medicaments (incl. veterinary)**	2,921	3,081	3,540	**14.9**
16	**Refined petroleum**	2,756	3,119	3,202	**5.2**
17	**Copper**	1,903	3,045	3,202	**2.7**
18	**Alcoholic beverages**	2,853	2,855	3,066	**7.4**
19	**Passenger motor vehicles**	3,147	2,876	2,910	**1.2**
20	**Wool**	2,320	2,367	2,746	**16**
21	**Business travel**	1,894	2,283	2,572	**12.7**
22	**Zinc ores and concentrates**	970	2,381	2,525	**6.1**
23	**Meat (excl. bovine) f.c.f.**	2,062	2,112	2,028	**-4**
24	**Wheat**	2,984	3,362	1,960	**-41.7**
25	**Zinc**	800	1,424	1,704	**19.7**
	Total	**179,732**	**207,651**	**216,377**	**4.2**

Source: Department of Foreign Affairs and Trade, DFAT (2008e): STARS databases and ABS Cat. 5368.0.

3.1, the major Australian X in the service sector are education, personal travel and professional, technical and other business, which accounted for AUD12.6 bill., AUD11.8 bill. and AUD5.6 bill. respectively in 2007.

By observing the growth of the X in individual categories between 2005 and 2007 in Table 3.1, it is evident that during this period, the highest growth in X is recorded for non-monetary gold (24.1 percent), followed by professional, technical and other services (23.5 percent), zinc (19.7 percent) and crude petroleum (19.6 percent). On the other hand, the largest decline in the X percentage for this period is recorded for wheat, which declined by 41.7 percent, which is most likely caused by the draught in Australia, followed by coal which recorded a decline in X for this period of 10.8 percent. Finally, the X growth for all goods and services for this period accounted for 4.2 percent increase, while the service sector recorded X increases in all categories during this period between 2005 and 2007.

The major Australian M is the passenger motor vehicles and crude petroleum, which

Table: 3.2

AUSTRALIA'S TOP 25 IMPORTS: GOODS AND SERVICES, 2005-2007
AUD, mill. constant prices – 1990

Rank	Commodity	2005	2006	2007	% Growth
1	**Crude petroleum**	10,493	13,271	14,676	**10.6**
2	**Passenger motor vehicles**	12,156	12,572	13,850	**10.2**
3	**Personal travel (excl. education) services**	11,590	12,140	13,500	**11.2**
4	**Refined petroleum**	6,153	8,646	8,241	**-4.7**
5	**Freight services**	7,573	7,991	8,161	**2.1**
6	**Computers**	5,929	6,413	6,904	**7.7**
7	**Passenger transportation services**	5,688	6,237	6,615	**6.1**
8	**Medicaments (incl. veterinary)**	5,961	6,064	6,437	**6.2**
9	**Non-monetary gold**	2,796	5,789	6,128	**5.9**
10	**Telecommunications equipment**	5,145	6,162	6,124	**-0.6**
11	**Motor vehicles for transporting goods**	4,167	4,638	5,722	**23.4**
12	**Civil engineering equipment**	2,306	2,847	3,451	**21.2**
13	**Royalties and licence fees**	2,625	2,903	3,371	**16.1**
14	**Professional and business services**	2,520	2,710	3,354	**23.8**
15	**Aircraft & parts**	3,654	3,498	2,990	**-14.5**
16	**Business travel**	2,439	2,592	2,669	**3**
17	**Motor vehicle parts**	2,306	2,388	2,573	**7.7**
18	**Measuring and controlling instruments**	2,222	2,366	2,520	**6.5**
19	**Furniture**	1,963	2,248	2,435	**8.3**
20	**Other electrical machinery**	1,970	2,107	2,350	**11.5**
21	**Toys, games & sporting goods**	1,781	2,069	2,182	**5.5**
22	**Computer parts**	2,112	2,265	2,167	**-4.3**
23	**Televisions**	1,622	1,983	2,156	**8.7**
24	**Pumps for gas**	1,377	1,639	2,109	**28.7**
25	**Paper & paperboard**	2,046	2,056	2,094	**1.8**
	Total	**195,682**	**218,829**	**233,879**	**6.9**

Source: Department of Foreign Affairs and Trade, DFAT (2008e): STARS databases and ABS Cat. 5368.0.

accounts for AUD13.9 bill. and AUD14.7 bill. respectively in year 2007 alone, while for the same period, the overall manufactured M accounted for AUD145 bill. and total M of all goods and services were valued AUD233.9 bill. (DFAT, 2008b).

By observing the growth of M in individual categories between 2005 and 2007 in Table 3.2, it is evident that during this period, the highest growth in M is recorded for pumps for gas by 28.7 percent. This is most likely associated with the investment in exploration of gas in Australia; followed by professional and business services (23.8 percent) and motor vehicles for transportation of goods (23.4 percent). The largest decline in the M percentage for this period is recorded for aircraft and parts, and refined petroleum, which experienced a decline by 14.5 and 4.7 percent respectively. Overall, the M growth for all goods and services for this period accounted for 6.9 percent increase and the overall X levels in Table 3.1 recorded 4.2 percent increase, while this shows that the TD levels in Australia are increasing further. Finally, by comparing the overall X and M levels between 2005 and 2007, in Table 3.1 and Table 3.2 it shows that the Australian TD has increased from AUD15.95 bill. to AUD17.5 bill. in 2007.

3.3.2 MAJOR TRADING PARTNERS

The Australian major X destination countries are Japan, China, Republic of Korea, The United States of America and New Zealand which accounts for 18.9, 14, 8, 6 and 5.6 percent of the total Australian X respectively, while at the same time these 5 countries accounts for more than half of the total Australian export (DFAT, 2008d). Table 3.3 shows the data for the Top 10 Australian X markets in goods and services for 2007. According to this table, in 2007 the top X markets in the goods categories is Japan, which accounted for AUD31.9 bill., while the top X market for the service categories is The United States of America which accounted for AUD5.8 bill. in total X in 2007. Finally, it is clear that the Australian X to these Top 10 X markets dominate in goods X which is greater by 3.5 times than the service X to these countries for this period.

According to DFAT (2008d), the Major Australian M source countries are China, The United States of America, Japan, Singapore and Germany which accounts for 15.5, 12.6, 9.6, 5.6 and 5.2 percent respectively of the total Australian M, while these countries account for 48.5 percent of the total M to Australia. Table 3.4 shows the data for the Top 10 Australian M source countries in both the goods and services for 2007. According to this table, in 2007 the top M source country in the goods categories is China, which accounted for AUD29 bill., while the top M source country

Table: 3.3

AUSTRALIA'S TOP 10 EXPORT MARKETS, 2007 AUD, mill.					
Country	**Goods**	**Services**	**Total**	**% Share**	**Rank**
Japan	31,914	2,670	34,585	16	**1**
China	23,824	3,930	27,754	12.8	**2**
The United States of America	10,021	5,783	15,804	7.3	**3**
Republic of Korea	13,465	1,857	15,322	7.1	**4**
New Zealand	9,477	3,405	12,881	6	**5**
The United Kingdom	7,012	4,699	11,711	5.4	**6**
India	9,281	2,062	11,343	5.2	**7**
Singapore	4,068	3,171	7,238	3.3	**8**
Taiwan	5,942	515	6,457	3	**9**
Thailand	4,418	804	5,223	2.4	**10**
Total	**168,335**	**48,041**	**216,376**	**100**	

Source: Department of Foreign Affairs and Trade, DFAT (2008e): STARS databases and ABS Cat. 5368.0.

for the service categories is the same as for the X, which is The United States of America and accounts for AUD8.3 bill. in total M in 2007. Furthermore, the Australian M from these Top 10 M source countries in goods is 4 times greater compared to the service M from these countries for this period.

Table: 3.4

AUSTRALIA'S TOP 10 IMPORT SOURCE COUNTRIES, 2007 AUD, mill.					
Country	**Goods**	**Services**	**Total**	**% Share**	**Rank**
The United States of America	23,651	8,254	31,904	13.6	**1**
China	29,014	1,264	30,279	12.9	**2**
Japan	18,044	1,922	19,966	8.5	**3**
Singapore	10,475	4,708	15,183	6.5	**4**
The United Kingdom	8,101	4,020	12,121	5.2	**5**
Germany	9,741	1,350	11,091	4.7	**6**
Thailand	7,890	1,610	9,500	4.1	**7**
New Zealand	6,244	2,393	8,637	3.7	**8**
Malaysia	7,324	1,017	8,341	3.6	**9**
Republic of Korea	5,939	495	6,435	2.8	**10**
Total	**187,825**	**46,052**	**233,877**	**100**	

Source: Department of Foreign Affairs and Trade, DFAT (2008e): STARS databases and ABS Cat. 5368.0.

Finally, by observing figures in Tables 3.3 and 3.4, it is evident that the Australian X is more concentrated where the Top 5 countries accounts for 52.6 percent of the total Australian X, while the Australian M is more diversified as the Top 5 M source countries accounts for 48.5 percent of the total Australian M.

The last Table 3.5 in this section shows the Top 10 two-way trade trading partners in 2007 for both the goods and service X and M levels.

According to Table 3.5, the largest two-way trade volume for the combined X and M levels for the goods categories is with China, while the largest two-way trade volumes in the service categories is with The United States of America. While the overall largest trading volumes in both the goods and services combined, is with China and

Table: 3.5

AUSTRALIA'S TOP 10 TWO-WAY TRADING PARTNERS, 2007 AUD, mill.					
Country	**Goods**	**Services**	**Total**	**% Share**	**Rank**
China	52,838	5,194	58,032	12.9	**1**
Japan	49,958	4,592	54,551	12.1	**2**
United States	33,672	14,036	47,708	10.6	**3**
United Kingdom	15,113	8,718	23,832	5.3	**4**
Singapore	14,543	7,879	22,422	5	**5**
Republic of Korea	19,405	2,353	21,757	4.8	**6**
New Zealand	15,721	5,798	21,518	4.8	**7**
Thailand	12,308	2,414	14,722	3.3	**8**
Germany	11,165	2,352	13,517	3	**9**
India	10,740	2,521	13,261	2.9	**10**
Total	**356,160**	**94,093**	**450,253**	**100**	

Source: Department of Foreign Affairs and Trade, DFAT (2008e): STARS databases and ABS Cat. 5368.0.

accounts for AUD58 bill. in 2007 alone.

3.3.2.1 REGIONAL TRADING AGREEMENTS

Australia is currently having preferential trade agreements or Free Trade Agreement (FTA) in operation with four countries and they are with New Zealand, Singapore, Thailand and The United States of America, while the agreement with New Zealand is the eldest and the most advanced (DFAT, 2008c).

The Australia New Zealand Closer Economic Relations Trade Agreement (ANZCERTA), was established in 1983 and according to the survey by AIG (2008c), it's provide the greatest benefits for the Australia's exporters in the manufacturing industry than any other agreement. According to Siriwardana (2006), ANZCERTA is the most successful FTA for Australia as it has significantly contributed to the economic growth for both countries; while New Zealand is Australia's number seven trading partner and Australia's the number one trading partner for New Zealand.

The FTA with Singapore has been established in 2003 and according to AIG (2008c), the FTA with Singapore has provided some benefits to the manufacturing industry in Australia, however, the export in service sector proved to be a greater beneficiary of this agreement. However, the FTA with Singapore is causing a significant trade diversion from European Union (EU) countries and the North Asian countries. Furthermore, this agreement is likely to increase Australia's TD levels with Singapore as the X levels from Australia to Singapore are predicted to fall short of the M levels from Singapore to Australia (Siriwardana, 2006).

The FTA with Thailand was established in 2005 and it has proved to benefit numerous manufacturing industries in Australia, while the most beneficial are manufacturers in the basic metal product (AIG, 2008c). According to Siriwardana (2006), the FTA with Thailand is likely to have a positive effect on the TD levels between Australia and Thailand, as the Australian TD levels is expected to improve.

The final existing FTA with The United States of America came into force in 2005 and proved beneficial, in particular for machinery and equipment, transport equipment and fabricated metal products manufacturer industries. However, according to Krever (2008), the FTA with The United States of America has not been a success as the main components of the agricultural sector like sugar and dairy products are excluded from this agreement, while at the same time the Australian CA is mainly in primary industries such as agricultural products. Furthermore, Garnaut (2002; 2004) was one of the major critics of the FTA between Australia and The United Sates of America and argued that the economic benefits of this FTA between Australia and The United States of America are negligible. Furthermore, the study conducted by Siriwardana (2006) suggests that as a results of the FTA with The United States of America, Australia's trade balance with The United States of America will deteriorate and trade diversion from non-member countries towards the United States of America may results in welfare loss for Australia.

In addition to the existing FTA, according to the Department for Foreign Affairs and Trade DFAT (2008c) further talks in establishing a similar agreements are with China, Malaysia, Japan and Chile, while feasibility studies for similar FTA are currently being analysed for India, Indonesia and the Republic of Korea. According to AIG (2008c), further additional studies and negotiations are currently taking place for the establishment of the FTAs with the Association of South-East Asian Nations (ASEAN[43]) member countries, while in 2007 in Table 3.6, the current trade volumes between Australia and the ASEAN account for 11.6 of the total Australian X and 19.5 of the total Australian M.

[43] ASEAN is a Free Trade Agreement (FTA) that was established in 1967 and the current 10 member countries are Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, The Philippines, Singapore, Thailand, and Vietnam (ASEAN, 2008).

Besides the existing FTAs and the World Trade Organization (WTO) membership, Australia is also a member of the economic communities which includes the Asia-Pacific Economic Cooperation (APEC[44]) and OECD[45]. Although, these economic communities are not the trading agreements, they are significant in economic development and further trade liberalization as Table 3.6 shows the extent of trade between Australia and these economic communities is significant. In addition to APEC, ASEAN and OECD, the EU[46] is also included in Table 3.6, as a significant trade relationship exists between Australia and EU member countries.

Table: 3.6

AUSTRALIA AND THE ECONOMIC COMMUNITIES: EXPORT-IMPORT, 2007
AUD, mill.

		Goods	Services	Total	% Share
APEC	**X**	120,619	28,056	148,675	47.31
	M	132,362	25,852	158,214	41.59
	NX	**-11,743**	**2,204**	**-9,539**	
ASEAN	**X**	18,194	7,002	25,196	8.02
	M	37,033	8,507	45,540	11.97
	NX	**-18,839**	**-1,505**	**-20,344**	
EU	**X**	19,182	8,693	27,875	8.87
	M	41,145	10,079	51,224	13.47
	NX	**-21,963**	**-1,386**	**-23,349**	
OECD	**X**	88,608	23,881	112,489	35.80
	M	100,805	24,600	125,405	32.97
	NX	**-12,197**	**-719**	**-12,916**	

Source: Compiled from Department of Foreign Affairs and Trade, DFAT (2008e), STARS databases and ABS Cat. 5368.0.

According to Table 3.6, the trade volumes between Australia and the economic communities are significant and in overall, the highest trade volumes are with APEC followed by the OECD member countries. Furthermore, the trade imbalances between Australia and the economic communities is evident as Australia in overall recording the TD with all communities in overall, while the highest TD is with the EU member countries follow by ASEAN member countries

Despite that some FTAs and the economic communities are more beneficial than others for the Australian economy, not everyone agrees that the FTA is the best way of liberalizing the trade between countries, and according to Garnaut (2002; 2004), the multilateral trade negotiation can be compromised with raising level of FTAs.

[44] APEC is the economic cooperation that was established in 1989 and its 21 current members are Australia, Brunei Darussalam, Canada, Chile, China, Hong Kong, Indonesia, Japan, Republic of Korea, Malaysia, Mexico, New Zealand, Papua New Guinea, Peru, The Philippines, Russia, Singapore, Chinese Taipei, Thailand, The United States of America and Vietnam (APEC, 2008).
[45] OECD is an economic cooperation that was established in 1960 and its current 30 member countries are Australia, Austria, Belgium, Canada, The Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, The Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Spain, Sweden, Switzerland, Turkey, The United Kingdom and The United States of America (OECD, 2008b).
[46] EU is an economic integration of the European countries that was established in 1952 and current 27 member countries (2008) are Austria, Belgium, Bulgaria, Cyprus, The Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, The Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and The United Kingdom (EU, 2008).

However, on a positive note, according to Siriwardana (2006) the possible FTAs with China, Japan and Malaysia are looking promising for Australia.

3.3.3 NATIONAL ACCOUNTS AND TRADE DEFICIT

The former Australian minister for trade Hon. Mark Vaile in 2003, during the 40th anniversary of the „Australian Export Award' announced that in early 1960s, Australia's X contributed about 15 percent to Australia's GDP, while in 2003, X contributed about 20 percent to Australia's GDP (Vaile, 2003). However, these figures were a bit inflated, and according to the ABS (2008d), Australia's X contribution to the GDP growth during 1960s was in average 13.28 percent (average for period 1960:1 - 1969:4) and in 2003, it was an average of 17.93 percent (average for period 2003:1 - 2003:4). The point that is made here is that the comments made by Hon. Mark Vaile is only one-half of the story in respect to the trade patterns and GDP contribution in Australia. According to the ABS (2008d), the M levels during 1960s and 2003 has slowed down Australia's GDP growth in average by 14.46 and 20.45 percent respectively, and generating a net negative contribution to Australia's GDP growth by 1.18 percent in 1960s and of 2.52 percent in 2003. The most recent data from the ABS (2008d) shows that in the March quarter 2008, this negative contribution to the Australian GDP growth is due to the growing TD, which has increased further to 2.8 percent.

According to the ABS (2008b), the Australian TD began to deteriorate since the 1950's and this negative trend continues to exist to the present day. By observing the long-run trend, the current signs indicates that the TD will continue to widen into the future. In the March quarter 2008, the Australian CRAD was almost AUD19.5bill. and the TD account was AUD8.2bill. This is an approximate average increase of 152 and 178 percent for the CRAD and TD respectively since 2000. For the March quarter 2008, the TD is in excess of 41 percent of the total CRAD, while in the March quarter 2000, the TD/CRAD were 37.3 percent (ABS, 2008e).

Between 2000 and 2008, the TD in Australia has increased by AUD162.94 mill. per quarter on average (Table 3.7), while in seasonally adjusted terms, the TD in the March quarter was in excess of AUD8 bill. (ABS, 2008e). Consequently, the TD is negatively affecting economic growth and diminishing the chances of an Export Led Growth (ELG). It has been argued that from a microeconomic perspective, the TD represents productivity problems and a loss in international competitiveness; and from a macroeconomic perspective, it represents a debt burden on current and future generations (Tonelson & Petrucci, 2007). The X levels in Australia are continuously falling short of the increasing levels of M. In the last year alone (2007), this trend contributed to an additional AUD18.7 bill. to the existing TD (ABS, 2008e) and these trends highlight the growing concerns of Australia's escalating foreign liabilities to the RoW. As a result, a recent senate inquiry conducted by a leading economist in Australia, concluded that the recent trends are worrisome to Australia and the committee recommended that the Australian government must develop strategies in order to improve the TD and the CRAD (Stephens *et al.* 2005).

The growing TD in Australia means that our foreign liabilities to the RoW are increasing, and it has doubled in Australia for the past ten years, while these liabilities are increasing at an annual average rate of more than 7 percent (ABS, 2008f). An increasing level of GDP is used for servicing the national debt, which is associated with the growing TD. The long-run debt level in Australia is growing approximately three times faster than the level of GDP (ABS, 2008e; 2008f) and this trend seems to be unsustainable as borrower constraint is the ratio between NIIP/GDP where; the Net International Investment Position (NIIP) is the stock of debt and GDP is the ability to serve that debt. As the NIIP/GDP rises, the financial payments may eventually cut into consumption and investment levels, thereby contracting the growth of an economy (Mann, 2002).

The growing liabilities to the RoW can have very harmful impact on Australia's economy. According to Simensen & Tuckerin (2006), the countries with a large external imbalances such as Iceland, New Zealand, Hungary, Turkey and Australia, are seen as the most vulnerable to an exodus of foreign investment, and statistics

Table: 3.7

AUSTRALIAN ECONOMIC TRENDS, 2000-2008 (March 2000:1 – March 2008:1), AUD, mill.	
Growth	**Quarterly Trend**
Gross Domestic products (GDP)	+3,760.7
Consumption (C)	+2,544.3
Investment (I)	+1,347.6
Trade Deficit (TD)	+162.94
Current Account Deficit (CRAD)	+440.04
Net International Investment Position (NIIP)	+11,225

Source: Compiled from Australian Bureau of Statistics (ABS): GDP, C and I (ABS, 2008d); TD and CRAD (ABS, 2008e), NIIP (ABS, 2008g).

presented in Table 3.7 justifies the cause for such concern as the TD, CRAD and NIIP are continuously increasing.

Table 3.7 shows that Australia's liabilities to the RoW represented by NIIP for the period between 2000 and 2008, which is increasing three times faster than the GDP on average. Another disconcerting fact is that Australia's C growth is twice the overall growth in the I, while the average TD growth accounts for almost one third of the CRAD growth.

In the March quarter 2008, the seasonally adjusted figures show that the TD increased by a staggering 123 percent, compared to the March quarter 2007 to reach AUD7.53 bill. Furthermore, it had an average quarterly increase for the last 8 years of AUD162.94 mill. (ABS, 2008d), while the Australian X volume does not increase sufficiently to offset the increasing M volumes.

Furthermore, it must be noted that Australia's growth was achieved almost exclusively through the expansion of the Domestic Demand Led Growth (DDLG), while the overall ELG was in a negative range for the last 30 years (ABS, 2008d). Persisting TD in Australia is of great concern to many economists, since this growing TD is failing to instigate the ELG and continuously undermining the overall economic growth in Australia, while a negative Net Export (NX) is also increasing at an unprecedented rate. The study conducted by Felipe & Lim (2005) on some Asian countries such as, Korea, Philippines, Thailand and China, concluded that the best periods of economic growth was when the countries experienced both a DDLG and ELG. It must be also noted that Australia's overall growth is achieved exclusively through the expansion of the DDLG, mainly the C.

The argument here is not to limit the M levels to Australia, but to increase the X levels from Australia to the RoW, as the X expansion is considered to be a catalyst for growth both directly[47] and indirectly[48]. The main reason for this, is that X does not constitute any restriction due to the domestic market limitation on the demand side (Agosin, 1999). Furthermore, X provides an increasing level of capital imported from abroad, which in turn, increases capital formation domestically, and as a consequence, domestic output potential rises. In addition, it is increasing the supply of foreign

[47] Referring to a component of aggregate output.
[48] Referring to the stimulation of efficient resource allocation, exploitation of economies of scale and providing a great stimulus for technological improvement associated with a foreign competition.

exchange that allows the importation of capital goods (McKinnon, 1964; Balassa, 1978; Buffie, 1992).

An increasing X is also associated with the exploitation of economies of scale and these in turn initiate positive spillovers to other industries in the long-run, which include dissemination of technical knowledge (Feder 1983, Grossman & Helpman 1991, Helpman & Krugman 1985). Moreover, the ELG provides exposure to the latest and most advanced technology, fostering dynamic innovation, which leads to higher production, economies of scale, and finally increasing returns (Felipe 2003). Australia's X consists mainly of primary products, while the major limitation is that the primary products lack the potential for positive knowledge spillovers compared to the manufacturing sector. Also, the expansion of primary industry comes at a expense of the manufacturing industry (Matsuyama, 1992). Furthermore, as the primary industry X increase, it may lead to a greater GDP variability, thus macroeconomic uncertainty and this in turn may, amongst other factors, undermine the efficiency of the I and as a result, the GDP growth (Dawe, 1996).

Marks (1996) suggest that improvements in the manufacturing sector's performance is crucial in order to ensure Australia's ability to finance the increasing CRAD levels, as the Australian CRAD is substantially higher than the average of OECD countries since 1980s. Furthermore, Toner (2000) pointed-out that TD in manufacturing place a „brake' on GDP growth and each country that allows the manufacturing base to decline, should expect rising TD levels.

Finally, the TD has been a pertinent issue to economists, policy makers and governments, and has recently attracted considerable debate in open economies, including Australia. The TD in Australia is reaching an unprecedented level, and this could bring negative and protracted macroeconomic consequences if it is not managed well. The next section will review the existing empirical studies of the X, M and TD from an Australian perspective and once this is achieved, it will provide the point of reference for the direction of this research.

3.4 REVIEW OF EMPIRICAL STUDIES

The overall aim of this research is to examine X and M between Australia and the RoW, which are causing the growing TD in Australia. According to the literature review in Chapter 2 and in this chapter, the TD in Australia is reaching an unprecedented level, which can potentially have negative and protracted macroeconomic consequences. In order to establish which categories and countries should be selected and examined, this section will review the existing empirical studies in the international trade between Australia and the RoW. This approach will assist to identify whether any empirical studies have investigated the trade flows between Australia and the RoW in respect to TD in Australia.

The empirical studies in international trade that is investigating the trade flows from an Australian perspective can be subdivided into a number of areas, which include the primary, manufacturing and service sectors, and other wide-ranging trade issues. These include a trade analysis in relation to the specific country/ countries and the studies which are testing the trade theories. The review of empirical studies in this section will include some of the major and the most recent studies.

As the Australian X consists of mainly primary industries, numerous studies have been undertaken in this sector which includes McColl & Nicol (1980), Gunawardana *et al*. (1995), Cabalu (1995), Duncan & Yang (2000), Chang & Nguyen (2002), Swift (2004), Aylward (2004), Labys & Cohen (2006) and Gunawardana & Khorchurklang (2007).

The empirical study by McColl & Nicol (1980) examines Australia's X patterns for the major Australian trading partners. The main findings suggest that the Australian X shares are declining for The United Kingdom, European Economic Community (EEC) and The United States of America, while the X share for Japan is rising. Further findings suggests that Australia has gain a larger share in X of some ferrous metals, non-ferrous metals and semi-manufactured products, while for other commodities the market shares has declined. Finally, a major loss in the agricultural X shares to The United Kingdom has been due to the lack of competitiveness by Australian firms.

Cabalu (1995) examines Australia's mineral X sector and its influences on trade performance and external balances. The major findings is that the mineral sector X in Australia is one of the most efficient and important industries, and provides the bulk of Australia's X earnings. However, competitiveness in the Australian mineral sector has been reduced by protecting other relatively less efficient sectors in the economy, and this has been argued as an imprudent decision given that future prospects of the mineral sector X are very promising. The study by Swift (2004) examines the relationship between the EXR and the pricing decision in tradable agricultural products. The major findings shows that Australia's X in agricultural products (beef, meat, products, cheese, hides and skins) operates in a very competitive market and pass-through[49] associated with Exchange Rate (EXR) fluctuation is complete, while in the long-run, the relationship between EXR and prices is only unstable for livestock products.

Gunawardana *et al*. (1995) examines the X supply response of Australia's citrus industry and the results shows that in both the short and long-run supply of the Australian X of citrus is price inelastic, while the supply adjustments to changes in relative price is not instantaneous. Furthermore, a significant and positive relationship between domestic production capacity and the export supply of citrus exists, while Quantity (QTY) of the export supply in the June quarter is significantly lower than in other quarters.

Empirical studies by Aylward (2004) and Labys & Cohen (2006) examines the wine industry and the X performance between Australia and the RoW. Aylward (2004) examines the cluster intensity in wine production in Australia and linkages between innovation and the X, while the findings supports the link between cluster intensity, innovation and the X performance. Furthermore, according Labys & Cohen (2006), the global trends in the wine industry has changed significantly and the new world's wine producers which include Australia, have recently increased their X shares in the wine industry.

Chang & Nguyen (2002) examines the price and income elasticity of demand for Australian cotton in Japan. The major findings suggest that Australia's cotton export to Japan is income inelastic and price elastic, while the major competitor for Australia in the cotton export to the Japanese market is The United States of America, which records an inelastic demand in both income and price. Furthermore, Australia's and The United States of America's cotton export to Japan are substitutes and the major findings suggests that Australia need to improve its cost and quality competitiveness to enhance its market standing in Japan.

[49] The extent of the „Pass-through' shows to what extent the fluctuations in the Exchange Rate (EXR) are reflected in price changes of the imported products. A full „Pass-through' shows that appreciation/ depreciation of the exporting country currency has been fully reflected in the price of the product in the importing country, while no „Pass-through' shows that fluctuation in the exporting country currency did not instigated price changes in the importing country and the prices remained constant.

The study by Gunawardana & Khorchurklang (2007) examines the Comparative Advantage (CA) between Australia, New Zealand, The United States of America, The United Kingdom and the selected European countries in dairy products and the findings suggests that Australia possess a CA and competitive advantage in all dairy products.

Finally, Duncan & Yang (2000) examined the affects of the Asian crisis on X patterns in Australia's primary industry. The results shows that due to the Asian crisis, investment levels and the TD in Australia has increased; the TOT has deteriorated in the short-run and improved in medium and the long-run, while Australia's X levels in primary industry were largely unaffected.

The empirical studies that are examining the manufacturing sectors in Australia can be divided into overall trade in manufacturers, IIT in manufacturers and trade in specific manufacturing industries. The studies which are examining the overall manufacturing sector trade patterns includes Wood *et al*. (1991), Menzies (1994), Feaver *et al*. (1998), Toner (2000), Jayanthakumaran (2002), Neri & Jayanthakumaran (2005) Swift (2005) and the Australia Treasury (2006b).

According to Menzies (1994), the manufacturing sector in Australia, suggests that the increasing X levels in the Australian manufacturing sector is likely to continue, even if some unfavourable shocks will emerge according to the „sunk cost[50]' model. While, Wood *et al*. (1991) pointed-out that the objective of the Australian government is to have a more competitive and X orientated manufacturing sector. This is supported by significant tariff level reductions and deregulation of the financial markets in the Australian economy. Furthermore, Wood *et al*. (1991) suggests that the investment levels in the manufacturing industry are positively influencing the X capacity, and the movements from resource based to Elaborately Transformed Manufactures (ETM) in Australia has been recently recorded, whilst these trends are desirable as the fastest growing world's markets are in the ETM. In addition, according to Jayanthakumaran (2002) there is a long-run link between labour productivity growth and trade reforms in Australia; consequently, increases in productivity is likely to lead to the improvements in the X performance in the manufacturing sector.

[50] The „Sunk Cost' represents an investment cost in the manufacturing sector that cannot be reversed and it is not recoverable.

According to Toner (2000), the manufacturing industry in Australia is essential in order to support a high growth strategy and suggests that the manufacturing sector is a major driver of the modern economic growth. This is due to fact that the manufacturing industry fosters diffusion of economic efficiency and innovation, while playing a key role of maintaining high-wage employment and it accounts for 50 percent productivity growth in the long-run in the Australian economy. While some empirical studies examines the manufacturing industry from a national perspective, some studies like Neri & Jayanthakumaran (2005) investigate the manufacturing sector X from Australia's states and territories viewpoint. Neri & Jayanthakumaran (2005) pointed-out that changes in the X levels in the manufacturing sector from the various states in Australia has been substantial, which is due to states and territories competitiveness levels linked with the level of capital per worker, regulatory framework and other specific state characteristics. This finding emphasises an important role of the states and territories governments in stimulating manufacturing X in addition to federal government incentives.

The study by Swift (2005) examines both the X and M in manufacturers by observing the differences between 1990-1991 and 2000-2001 in the Australian X, M and imported inputs market shares between Australia the RoW. The major findings suggests that the X market shares for all industries has increased, however, the M market shares has increased in overall to a greater extent, compared to the X market shares.

As the manufacturing X sector plays an important role in the economy, the Australian government has been traditionally assisting the manufacturing industry. According to the Australia Treasury (2006b), the Australian government stimulates growth in manufacturers through direct and specific assistance to the industry, while avoiding protection as has been the historical practice since such policies were proven to be „counterproductive'. Feaver *et al*. (1998) has analysed the government's assistance to the manufacturing sector and suggests that the X concession schemes are costly to the taxpayers in Australia; however, they are having a positive influence on the Australian X levels. However, since M replacement with X orientation in the manufacturing sector has been achieved, a more costly scheme may not be required (Feaver *et al*., 1998). Finally, the recent trends examined by the Australia Treasury

(2006b) suggest that X growth in Australian manufacturers before 2004 has been fluctuating, however, since 2004 it has been increasing.

The empirical studies that examined the simultaneous X and M in the manufacturing sectors in Australia is known as IIT and it includes studies by Grubel & Lloyd (1971), Menon (1994a), Dixon *et al*. (2000), Sharma (2000) and Jayanthakumaran (2006).

One of the first empirical studies, which examined the simultaneous X and M of manufacturers in Australia, is the study by Grubel & Lloyd (1971). The empirical study examines the IIT between Australia and the selected major trading partners, while findings suggest that the highest level of the Australian IIT in the selected industries is between New Zealand and South Africa. Furthermore, Menon (1994a) examines the IIT in manufacturers between Australia and New Zealand and the findings suggest a sharp rise in IIT between (Australia and RoW) and (Australia and New Zealand), while this sharp rise is likely to be due to significant trade liberalization. The trade liberalization effect on the extent of the IIT is validated by Sharma (2000), which investigates the IIT in the Australian manufacturing. The major findings suggests that the levels of the IIT since mid 1980s has significantly increased in numerous manufacturers industries in Australia, while these results are associated with Australia's outward orientated policy.

Dixon *et al*. (2000) analyses the Australian IIT in manufacturers and the major findings is that the major growth in trade levels as a proportion of the GDP in Australia is due to changes in preferences and technology. Finally, Jayanthakumaran (2006) examines the effects of trade in manufacturers and employment in Australia; more specifically the link between the IIT and the employment levels in Australia. The major findings suggests that trade reforms are having a negative impact on employment levels, while IIT is having a positive impact on employment levels in Australia.

The empirical studies that examined the specific manufacturing industries such as automotive, pharmaceutical and textile and clothing industries from an Australian perspective includes studies by Conlon & Perkins (1995), Prasit (1997), Prasit & Gunawardana (1997), Jayanthakumaran (2001), Havrila & Gunawardana (2003), Havrila (2004) and Havrila & Gunawardana (2006).

Conlon & Perkins (1995) analyses the automotive industry policy in Australia such as tariff protection, production and X subsidies and other concession schemes „Post-Button[51] Plan' and concludes that the quality of Australian produced cars has improved significantly in recent years. Furthermore, the future of the automotive industry in Australia is tied-up with the success in the X market as the domestic market is not sufficient for the long-run success, while the current rates of improvements in the productivity and quality are unlikely to be sufficient. Finally, most local producers were running losses and unless improvements in the profitability are achieved, the question is raised whether to continue in manufacturing activities in the automotive industry in Australia.

Empirical study by Prasit (1997) examines the patterns and determinants in pharmaceuticals between Australia and RoW and the selected trading partners. This study findings established that Australia possess a high CD in pharmaceuticals. The foreign demand for Australian pharmaceuticals is significantly affected by the relative price and foreign GDP, while the M demand for pharmaceuticals by Australians is highly income elastic. Furthermore, the extent of the IIT between Australia and the selected countries in pharmaceutical is relatively low, while the extent of IIT in pharmaceuticals is higher between countries with a similar market size and similar language spoken. Additionally, Prasit & Gunawardana (1997) examines the structure, policies and trade in pharmaceuticals between Australia, the RoW and the selected trading partners. The major findings suggest that the pharmaceutical industry in Australia is relatively highly regulated, while the X in pharmaceuticals has rapidly expanded in recent years due to various government interventions.

Jayanthakumaran (2001) examines the Textile, Clothing and Footwear (TCF) industry in Australia and the findings suggests that Australia has recorded a positive annual average growth in the X and the output per worker in the period between 1992-1993 and 1996-1997. However, the TCF industries rise needs further assistance, especially in the X performance for the Small and Medium Enterprises (SME). The study by Havrila & Gunawardana (2003) suggests that Australia possess a distinct Comparative Disadvantage (CD) in the textiles and clothing on an aggregate level, while there is some evidence of a CA in some sub-groups in textile and clothing. Furthermore, there

[51] Named after the Australian Senator John Button, who held a ministerial position for industry, technology and commerce under the Labour government, during the years 1983-1993.

is an increase in evidence that Australia is increasing its X and M of textile and clothing simultaneously with the RoW.

A comprehensive analysis in the Textile and Clothing (TAC) industry in Australia was carried out by Havrila (2004) which examines the Australian CA, X supply and M demand, IIT and some trading indices in the TAC industry. The major findings suggests that Australia possess a CD in TAC, however, there is some evidence of trade performance improvements in some sub-categories such as special textile. Furthermore, the major determinants of TAC export supply and import demand are relative prices and the level of GDP, while the most significant determinant of the IIT are average per capita GDP, difference in per capita income and Regional Trade Agreements (RTA). A follow up study in the TAC was by Havrila & Gunawardana (2006), which further analyses the textile industry. This empirical study suggests that the Australian X in textile is price elastic and 1 percent increase/ decrease in relative price of the textile leads in the long-run 1.83 percent decreases/ increases in the export of textile. Further findings is that Australia is a small country in the world X in textile and further increases in the overall X of textiles depends strongly on the domestic policy actions.

A further area of empirical studies in international trade from the Australian perspective is the service sector, which includes studies by Turner & Kulendran (1990), Moshirian (1993), Divisekera (1993), Cezara (1997), Min-En (2006) and Australia Treasury (2006a).

Turner & Kulendran (1990) examines international tourism arrivals to Australia by using a newly developed forecasting methodology, however, despite the fact that an initial forecast produced relatively reliable estimates, further validation and development of this model has been suggested. Another study in this area is by Moshirian (1993) which examined the determinants of international trade flows in travel and passenger services in Australia, which subsequently established that similarities in goods and service trade exist. The major findings in this study suggests that price competitiveness is an important factor in determining the flows in travel services and the EXR also have some influence on the volume of travel and passenger transportation services. Furthermore, Divisekera (1993) has investigated international visitor arrivals to Australia from The United Kingdom, New Zealand, The United States of America and Japan. The major findings are that international visitors' arrivals to Australia are highly influenced by various economic variable, where the airfares are the most significant, followed by income and relative prices. Furthermore, the tourists from The United States of America and New Zealand are relatively more elastic to relative prices than The United Kingdom and Japanese tourists. While Japanese tourists are the most elastic/ sensitive to competitors' prices and the visitors from The United Kingdom are relatively inelastic/ insensitive to the competitors' prices. Finally, the tourists from all four countries are income and price elastic while in the short-run only, income is significant.

The empirical study by Cezara (1997) investigates the international trade between Australia and The Association of Southeast Asian Nations (ASEAN) countries in the service sector. According to this study, the ASEAN countries in overall has a larger service sector relative to its manufacturing industry and recently the trade flows in services between ASEAN countries and Australia has been growing faster than the growth in the manufacturing sector trade. As a result, it has been suggested that this will provide many opportunities for Australian trade and economic development.

Min-En (2006) investigate the relationship between international students arrival to Australia and demand in other tourism related industries in Australia. The major findings suggests that international students account for a significant volume of the overall Australian X, while international students also accounts for a significant demand in other tourism related industries in Australia.

Finally, the Australia Treasury (2006a) examines the Australian X in services between Australia and the RoW and the major findings suggest that X in services has slowed recently due to various reasons. While one of the main reasons is because of the most recent appreciation of the Australian currency, however, it is expected further growth in the service sector X, while the Australian government will actively continue to support exporters in services through a range of financial incentives and market intelligence.

The empirical studies that examined wide-ranging trade issues from the Australian perspective includes trade analysis in relation to the overall X levels, specific country/ countries trade and the studies which are testing the various trade theories. The studies, which examined the Australian X levels in overall, are empirical studies by Martin (1989), Roos & Russell (2002) and Gunawardana (2006).

Martin (1989) investigated the composition of the Australian X and the variability in the X returns. The major findings in this study are that since 1970s, Australia's X is more diversified. The X levels in the mineral sector are increasing, the share of the X levels in the rural sector is decreasing, which have significantly reduced fluctuation in the TOT and consequently, reduced the fluctuation in X returns for Australian exporters.

The study by Roos & Russell (2002) examined the foreign business cycle and their effect on the Australian X volumes. The major finding suggests that fluctuations in the foreign business cycle are sometimes having a significant impact on the Australian X levels and GDP. Furthermore, it has been established that The United States of America and the Japanese business cycle are having the highest impact on Australia's X levels, while these two countries are also recording the highest output elasticity of demand for the Australian X.

Finally, Gunawardana (2006) analyses the effect of the Asian financial crisis on the Australian X levels to East Asia. The major finding suggests that the GDP has a significant positive impact and the EXR has a significant and negative impact on Australia's X levels to East Asian countries. Furthermore, this study suggests that there is a significant prospect of increasing the X levels to these countries in the future, in particular to China and Hong Kong.

The empirical studies that has examined the specific country/ countries international trade from Australia's perspective include studies by Iltae & Kenneth (1995), Tongzon & Felmingham (1998), Kalirajan & Shand (1998), Petersen & Gounder (2003) and Mulgan (2008).

Iltae & Kenneth (1995) examined bilateral trade between Australia and Korea. The overall findings suggests that the prospects for further economic corporation and trade relation between Australia and Korea are very good, while both the Inter-industry trade and Intra-Industry Trade (IIT) are rising. Furthermore, it is recommended that further economic integration between these two countries should be encouraged.

Tongzon & Felmingham (1998) examines the bilateral trade flows in the Asia-Pacific between Australia, The United States of America, Japan and Singapore. The major findings suggests that international trade in the short-run between (Singapore and The United States of America) and (The United States of America and Japan) are significantly influenced by the real EXR, while trade between (Australia and Japan) and (Australia and The United States of America) are significantly influenced by real income and real cash balance effects. In overall, the real EXR are having a limited effect on trade between these three countries, while the real-balance and income are having a greater impact.

Kalirajan & Shand (1998) examines the trade flows between Australia, India and South Africa and suggests that all three countries are having the potential to increase the level of trade and to exploit the CA in their corresponding manufacturing sectors. A further suggestion is that the Australian manufacturing sector in both Elaborately Transform Manufacturers (ETM) and Simply Transformed Manufacturers (STM) should increase productivity levels, in order to become more competitive.

Petersen & Gounder (2003) examines the trade relations between Australia and New Zealand and the findings suggest that in the 1980s, both countries were directly competing mostly in commodities, however, since ANZCERTA was established, increases in trade complementarities between the two countries is evident as both countries have increasingly specialized in complementary X and M.

Finally, the study by Mulgan (2008) investigates the agricultural trade policy between Australia and Japan and its effects of a possible FTA between these two countries. The major findings suggest that there is a small likelihood that agricultural trade under FTA with Japan will be significantly liberalized, as Japan remains a strong protectionist of its agricultural sector.

The final review section of the existing empirical studies from Australia's perspective is in wide-ranging trade issues. These studies are testing various trade theories which includes areas of the ELG; Bodman (1996) and Xiao & Reed (2007), EXR; Swift (1998) and Bahmani-Oskooee & Wang (2007); and Gravity Model; Ewing (2005).

Empirical studies by Bodman (1996) and Xiao & Reed (2007) tested the ELG hypothesis for Australia, and both studies have established the support for the ELG hypothesis. The study by Bodman (1996) suggests that the X levels and labour productivity are co-integrated for both Australia and Canada which provide supports for the ELG hypothesis for both countries; while the reverse casualty is valid for Canada, however, it is rejected for Australia. In addition, the study by Xiao & Reed (2007) examines the three major world wheat producers; Australia, Canada and The

United States of America. This study also finds the supports for the ELG hypothesis, while for Canada and The United States of America, the by-directional causality is established.

Furthermore, empirical studies by Swift (1998) and Bahmani-Oskooee & Wang (2007) examine the relationship between Australia's trade flows and the EXR fluctuation**.** The study by Swift (1998) suggests that for Australia as a „small country' hence the „price taker' status in the international markets it is expected that Pass-through on the Australian X would be zero. However, it is found that the pass-through on the Australian X is reaching 60 percent in the long-run, consequently, it rejects the assumption that Australia satisfy assumption of the „small country', while these findings are having significant effect on the Australian TOT and the CRAD.

In addition, Bahmani-Oskooee & Wang (2007) tested the validity of the J-curve phenomenon between Australia and The United States of America, and the findings support the validity of the J-curve phenomenon (that currency depreciation does have an effect on trade balance) in 64 industries in the short-run and 35 industries in the long-run.

Finally, Ewing (2005) used a Gravity model to examine Australia's trade flow performance. The major findings suggest that Australia's trade performance is slightly better than the results obtained by the Gravity model would suggest. Finally, considering that Australia is relatively remote from its trading partners, the Australian trade performance is considerably better relative to other similar situated countries in the world.

By observing all existing empirical studies in the international trade from Australia's perspective in various categories and between various countries, it is apparent that some categories and countries are more intensively examined, while for others, insufficient examination is noticeable. Additionally, the existing studies tend to be sporadic or selective in their focus on industries and countries, and finally there has not been an investigation of Australia's TD at the aggregate level, particularly one that investigates the major TD categories and countries.

As a result, there is strong evidence to show that a systematic, intensive and in-depth research in the Australian trade flows has not been undertaken in respect to the Australian TD. An inclusive approach, which encompasses the selection criteria for

TD categories and countries, needs to be developed in order to better explain the growing TD in Australia. As a result, this research aims is to develop a more robust selection framework for the TD categories and countries to overcome the current conceptual and methodological limitations.

3.5 CONCLUSION

In this chapter, a comprehensive overview of the Australian macroeconomic and trading environment has been reviewed in order to determine the specific areas that warrants further empirical analysis of the growing TD in Australia.

The main findings suggests that the major Australian industries are „Service', followed by „Mining, Agriculture, Forestry and Fishing', „Electricity, Gas, Water, Construction and Dwellings' and „Manufacturing'; while the „Service' industry accounts for approximately double the value added than all of the remaining industries combined throughout the whole period between 1990 and 2008. Furthermore, the „Service' industry is the fastest growing value added industry in Australia, at the same time as the value added for the „Manufacturing' industry during this period recording the slowest growth and account for negligible one tenth of the growth compared to the „Service' industry. This relative decline in manufacturing industry has a significant effect on the growing TD in Australia. Because of these trends, it can be stated that Australia's economy is becoming beyond doubt, a service economy, while the „Manufacturing' industry is declining in relative significance.

After reviewing the composition of the Australian GDP, it has been established that „Consumption' is the main driver of economic growth in Australia followed by „Investment', while the „Consumption' levels are growing two and half times faster than the levels for the „Investment' during the period between 1990 and 2008. By observing the „Export' and „Import', it is established that „Export' levels in overall, are greater than and are increasing faster than the levels of „Import'. As a result, the NX has a negative contribution to economic growth in Australia for the entire period between 1990 and 2008, whereas this negative contribution is more pronounced overtime.

The trends associated with the increasing „Consumption' and TD levels in Australia are having a significant impact on national accounts in Australia, and this is noticeable by observing the increasing debt levels in Australia. According to the NIIP which measures the stock of international liabilities, shows that Australia's debt levels are growing approximately three times faster than the levels of Australia's GDP during the period between 1990 and 2008, while these trends are more pronounced in recent times. Additionally, the TD and CRAD's long-run levels are increasing overtime as a percentage of the GDP and „Investment' levels are increasingly accounting for a smaller percentage of the GDP, while the „Consumption' levels are increasing as a proportion of the GDP. This suggests that Australia's liabilities with the RoW are mainly used for other purposes such as „Consumption' rather than for „Investment' and these facts are not so encouraging. In summary, these long-run trends of the TD and CRAD are not so comforting for the Australian economy given that Australia's TOT are at historical high levels.

Australia's economic growth is solely based on the expansion of the domestic demand, while for the last 30 years, the ELG has been negative, which has been negatively effecting economic growth in Australia. Based on the current literature presented in Chapter 2, it has been established that the growing TD can have very serious macroeconomic implications. Understanding the forces responsible for the growing external trade imbalance is critical for undertaking appropriate action. The key endeavour in this research is to identify the TD categories that warrant further attention and to identify the trade patterns and determinants in the selected TD categories.

A review of the current literature suggests that there has not been a sufficient investigation of the Australian TD at the aggregate level, particularly involving the major trade categories. The existing literature is sporadic and selective in their focus on industries, countries and the X and M determinants/ variables. According to the list of empirical studies, there is strong evidence to show that a systematic, intensive and in-depth research has not been undertaken in respect to the Australian TD within the current literature. An inclusive approach, which encompasses the formal selection procedure for the TD categories needs to be adopted in order to better explain the growing TD in Australia. As a result, this research will develop a more robust selection framework of TD categories in Australia and consequently to overcome the conceptual and methodological limitations associated with the current literature. Furthermore, unlike the current studies, this research will also analyse these trends based on both monetary and QTY values, because it has been established in the literature that such an approach is important. Additionally, this research will also provide a clear understanding of the principle driving forces of the TD in Australia in the selected categories and consequently, facilitate the formulation of a microeconomic and macroeconomic policy in Australia. The development of a formal selection procedure of the major TD categories and countries that warrants further attention are presented in the following chapter, Chapter 4, while the trade flow determinant analysis and modelling for the selected TD categories and countries are carried out in Chapters 5 and throughout Chapter 8.

CHAPTER 4

4. EXPORT AND IMPORT TREND ANALYSIS

4.1 INTRODUCTION

This chapter has two main objectives: firstly, to identify the goods and services categories, and secondly, to identify the major trading countries associated with the increasing Trade Deficit[52] (TD) in Australia. Existing studies relating to the international trade flows between Australia and the Rest of the World (RoW) are very sporadic because the industries and the countries analysed do not describe on what basis the particular industry, category or a country has been selected. This is confirmed by observing numerous studies in the current literature such as Hazari & Kingma (1976), Morrison (1997), Tongzon & Felmingham (1998), Wadud (2004), Irwin (2006), Guttmann & Richards (2006) and Anderson *et al*. (2007). The two general weaknesses that can be identified in these studies, is the lack of a formal selection procedure and the inability of such a selection to serve over an extended period. In reference to these studies, it is evident that the industries and/or countries were chosen first, and then an attempt was made to justify the benefits of the selections. Although this reasoning is valid, however, at the same time it is inadequate. Furthermore, it also appears in these studies, that the underlying reasons of how a particular industries and/or countries were chosen are very weak or non-existent. In addition, even if the existing studies did provide such information, this does not necessarily represent the best possible focal point of analysis in respect to the TD between Australia and the RoW of the world. The reason why this is the case, is that the selected industries and the countries in the current literature are likely to be chosen based on unsubstantiated preferences – consequently, there is a need for a set of robust and reliable guidelines in the current literature for such a selection.

This inadequacy in the selection processes in some cases imply that some of the categories and industries analysed in the literature does not take a holistic assessment approach and consequently, such selection processes in some cases can be of dubious significance. This type of selection can be coined as convenience selection, rather than a holistic and systematic approach based on the established guidelines. In summary, what this commentary merely emphasizes are the shortcomings of the

[52] The TD is a negative NX, while NX is X-M

existing selection approach and highlights the needs to look at the selection process from a different angle, which should be focused on industries with a considerable TD, with a noteworthy Export (X) potential and account for a significant Import (M) volume. This approach is likely to form the selection framework for the industries and the countries for the international trade flow analysis from a national point of view, between Australia and the RoW. Once this selection framework is developed, it will clearly identify the significant categories and countries for this research, it will provide a formal selection procedure that can serve over an extended period of time and finally, it will provide the point of reference for future studies.

Existing studies have not adequately addressed the selection procedure, because a selection protocol framework does not exist. Furthermore, the reason why certain studies in the international trade flows between countries and in the various industries have ever been undertaken, is open to wide interpretation. Due to this literature gap, this has resulted in some trade categories X and M flows between Australia and numerous trading partners being extensively investigated; while some categories and countries are being inadequately investigated, despite being areas that require more attention. As a result, some categories which have been more represented in the current literature such as the textile and clothing industry (Chang & Nguyen, 2002; Havrila & Gunawardana, 2003; Havrila, 2004; Havrila & Gunawardana, 2006); are in certain cases, the categories with minor prospects of trade balance improvements. While the categories where prospects are considerable, they are being negligibly represented in the current literature and this interpretation is equally applicable to the country selection.

The absence of a selection protocol framework for the identification of the main categories and countries for international trade flow analysis generates a need for the development of a systematic framework. Attempts to develop and apply this framework in this chapter, is used to identify the major TD categories and countries which will be examined further in this research. Since this approach is not available in the current literature and has never been used previously, this research will make the first attempt to develop an entire selection protocol methodology process from the very beginning. The adopted approach in order to achieve the desired objective utilizes the Trend Analysis (TA) and the Filtering Analysis (FA). The descriptions of these two approaches are explained in more detail in section „4.3 Methodological

Procedures'. Although the TA is a well-known technique and its application is very wide, it has not been utilized for the selection of the major categories for further analysis in the international trade flow between Australia and the RoW. Furthermore, the FA that will be developed in this chapter will significantly improve the way of selecting the major trading categories and the major trading countries in respect to the Australian TD.

Once this framework is developed and applied for selecting the relevant categories and trading partners for TD analysis, it will be the first of its kind in the current literature. This will make this study unique and distinctive as the formal selection process has not been applied in any previous studies undertaken in this area.

The structure of this chapter consists of 4 distinct stages and these stages are covered in 11 sections. It begins with Section 4.2 data and data sources; Section 4.3 methodological procedures followed by Section 4.4 that describes the trends in the Australian trading position in respect to the X, M and Net Export (NX). Section 4.5 presents the STAGE ONE of the selection protocol of the major trading categories STEP ONE; Section 4.6 describes the trends in the Australian trading position in respect to trading countries and Section 4.7 presents STAGE TWO of the selection protocol of the major TD countries STEP ONE. The summary of the selection of the major trading categories and the major TD countries STEP ONE is summarized in Section 4.8, while Section 4.9 presents the STAGE THREE of the selection protocol of the major trading categories STEP TWO and Section 4.10 presents STAGE FOUR of the selection of the major TD countries STEP TWO. Finally, Section 4.11 summarizes the selection of the major trading categories and the major TD countries STEP TWO and Section 4.12 presents the conclusion and the overall summary of the major findings of the selection process of the major TD trading categories and major TD countries.

4.2 DATA AND DATA SOURCES

In order to accomplish the objective stated in the introduction, an in-depth examination of all X and M of the goods and services categories between Australia and the RoW between 1990-2006 are examined in detail, using the data from Trade Data International (TDI[53]) and the ABS.

Due to the unique features of the trade data available from the TDI, the preferred source of the data for both goods and services was the data from the TDI. However, the trade data in the services is not available from the TDI, so consequently, the trade data in the goods was obtained from the TDI, while the data for the trade in services was obtained from the ABS.

The data obtained from the TDI is in many ways unique and distinctive compared to the data available from numerous government sources and several international institutions. The data from the TDI are classified according to the Harmonized Commodity Description and Coding System (HS), which is a classification according to the degree of processing, and is developed and maintained by the World Custom Organization (WCO), (WCO, 2008). Furthermore, the data from the TDI is collected on a monthly basis, expressed on Free on Board (FOB) values and the units are recorded in Australian Dollar Currency (AUD), mill.[54]. Additionally, all data from the TDI are available by X destination and M source country, while the X and M AUD values are accompanied by the X and M Quantity (QTY). The combined monetary values and the QTY of the X and M between Australia and all Separate Custom Entities (SCE[55]) in all goods, are the main distinctive features of the data from the TDI. This aspect of the data obtained from the TDI makes it unique and robust trade data, compared to the data available from many other government and international sources and provides one of a kind data for the vigorous international trade flow analysis. On the another hand, the data for the service categories obtained from the ABS are classified according on the Australian and New Zealand Standard Industrial Classification (ANZSIC), in quarterly intervals and are expressed in AUD, mill. The ANZSIC classification systems is developed and maintained by Australian and New Zealand governments according to the industrial statistical units and are used for the recording of the internationally comparable statistics, including the X and M data between these two countries (ABS, 2008h). The ANZSIC classification system is the

[53] The TDI is a private registered company in Melbourne, Victoria - Australia. The company has been operating since 2001; however, it was established in 1994 as a business unit within Victoria University, while the trade data from the TDI are available for the periods prior to official establishment. Finally, the data from the TDI is not publicly available; however, for the purpose of this research, it was obtained from the company's managing director Mr. Jim Lang at no cost..

[54] The TDI data are expressed in AUD units instead of AUD mill. and as a results, are free of rounding errors unlike the data from other sources.

[55] Although the Separate Custom Entities (SCE) and countries can have different meaning to different parties, distinction between the two is ignored and the reader is advised that SCE and the countries are used interchangeably.

industry based classification, and is closely related to the Standard Industrial Trade Classification (SITC), which classifies the industries according to the predominant activities and the economic function of the products and this classification is developed and maintained by the United Nations (UN) (UN, 2008b). The most common trade classifications of the tradable products in the world are the HS and SITC, and both of these systems are the commodity based classification, while the ANZSIC is the industry based classification (ABS, 2008i).

The main analysis of the goods in this chapter are based on the HS - Second Level of aggregation (HS-2) and the Fourth Level of the aggregation (HS-4) and the services are analysed based on ANZSIC - Main Divisional Level of the aggregation (ANZSIC-1) and the First Sub-divisional level of the aggregation (ANZSIC-2). Due to the lengthy names of the headings for the categories analysed in this chapter, the category codes are used instead of the entire headings in the text explanation[56]. The HS and ANZSIC trade classification for the goods and services correspondingly are used side by side. Using HS and ANZSIC side by side does not represent a problem, because the entire range of tradable goods are classified based on HS and the entire range of tradable services are classified based on ANZSIC. Consequently, these two different levels of the trade classification are used simultaneously. This approach would not be appropriate if some of the goods categories are classified based on HS, while some on ANZSIC or the SITC trade classification, however this is not the case and as a result, the adopted method is suitable.

The X and M trade data for the goods and services mentioned previously, are from two different sources, consequently care has been taken to ensure that both data sets are in the same units and in the same time intervals. This is critical, especially when the two series are analysed simultaneously, which is the case in this chapter. Hence, all values and the time intervals have been converted into the same units before the commencement of the analysis.

The data from the TDI are expressed on monthly intervals and in AUD units, while the data from ABS for services are on the quarterly intervals and expressed in AUD, mill. This has lead to the one option; the data for the goods from TDI are converted

[56] For a specific category name based on the category code, refer to the Australian Bureau of Statistics (ABS) website: http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/1233.0Jan%202007?OpenDocument - for HS level of aggregation and http://www.abs.gov.au/AUSSTATS/abs@.nsf/Latestproducts/7CD8AEBBA7225C4ECA25697E0018FAF3?opendocument - for ANZSIC level of aggregation.

from monthly to a quarterly time-interval series and the values in AUD units are converted to AUD, mill. Furthermore, the QTY of the X and M of the goods are converted from single units to the Thousands („000s), although it does not present any problems because the QTY measurement for the services are not available. The conversion from the single QTY units to „000s of units has been conducted for the entire range of the X and M goods categories analysed, except in STAGE FOUR of the analysis, where this procedure was not necessary, due to the small volumes and the nature of the analysis. All generated statistics including graphs and tables are presented in sequential order of the analysis in the appendix tables and a detailed explanation of this protocol is in the following section.

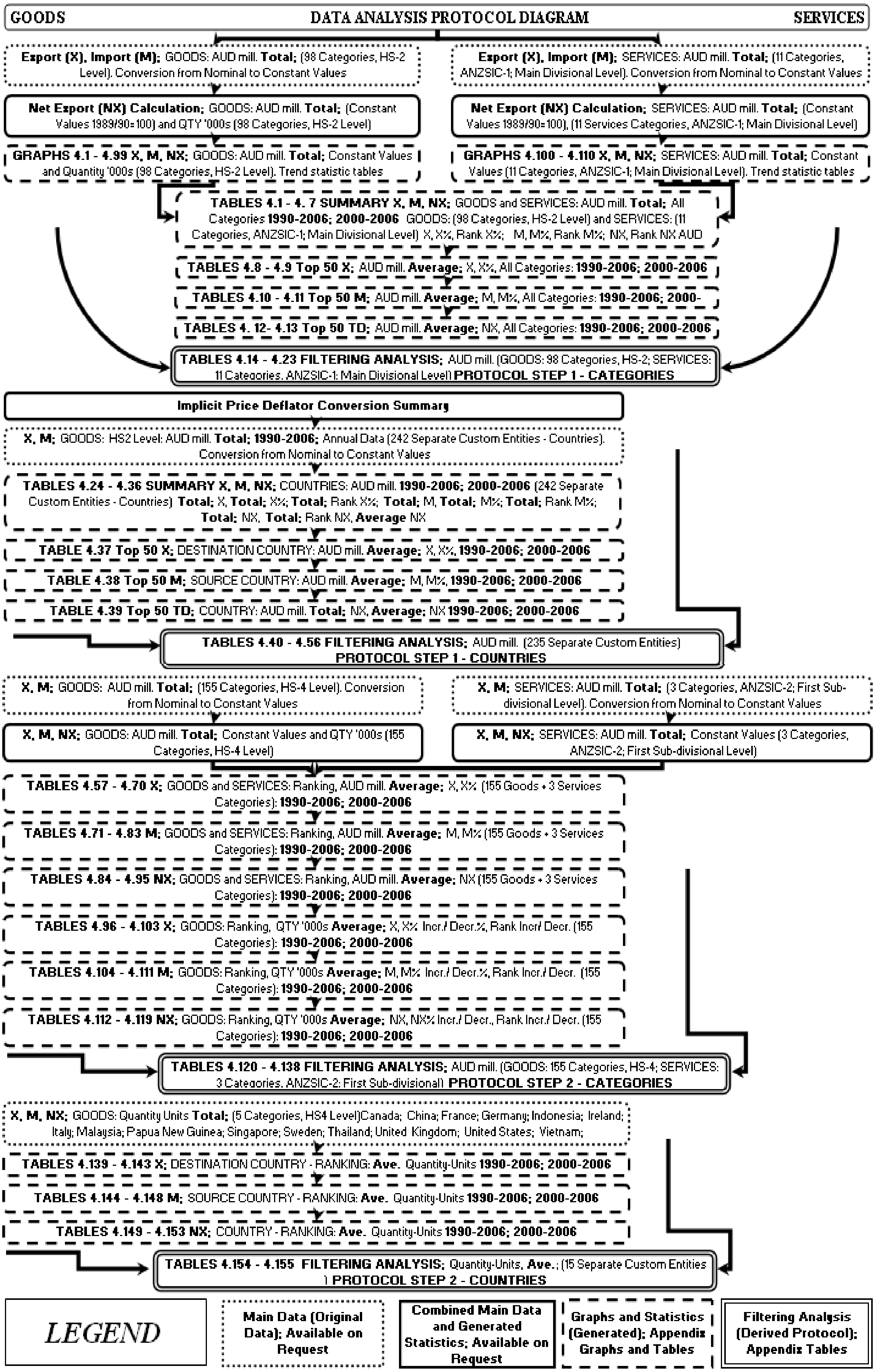
4.2.1 DATA ANALYSIS PROTOCOL AND APPENDIX TABLES

Generated Graphs and statistics for the X and M for the goods and the services between Australia and the RoW are presented in the Appendices. This chapter appendix consists of 110 graphs accompanied by the trend statistic tables and 155 tables. Due to the extent of the analysis in this chapter, an enormous volume of the data has been considered and analysed. This necessitated in developing the appendix tables' protocol diagram that is presented in Diagram 4.1. All generated graphs and tables are presented in sequential order for both the goods and services for quick referencing. While original data are not presented in the appendix tables, they are available on request. Diagram 4.1 shows the tables' flows for generated graphs, statistics and the protocols available in appendix that have been developed and analysed in this chapter. The Appendix Tables consists of four distinct stages, and each stage corresponds to the one segment of the selection protocol in this chapter. STAGE ONE and STAGE THREE consists of generated statistics and protocol associated with the identification of the major TD categories, while STAGE TWO and STAGE FOUR are associated with the identification of the major TD countries. All four stages of the analysis in this chapter are explained in more detail below.

4.2.1.1 ANALYSIS PROTOCOL – STAGE ONE

The Appendix Graphs 4.1-4.110 and Appendix Tables 4.1-4.23, represents the STAGE ONE - STEP ONE of the analysis of the tradable categories. This stage

Diagram: 4.1


GOODS
DATA ANALYSIS PROTOCOL DIAGRAM
SERVICES
Export (X), Import (M); GOODS: AUD mill. Total; (98 Categories, HS-2 Level). Conversion from Nominal to Constant Values
Export (X), Import (M); SERVICES: AUD mill. Total; (11 Categories, ANZSIC-1; Main Divisional Level). Conversion from Nominal to Constant Values
Net Export (NX) Calculation; GOODS: AUD mill. Total; (Constant Values 1989/90=100) and QTY '000s (98 Categories, HS-2 Level)
Net Export (NX) Calculation; SERVICES: AUD mill. Total; (Constant Values 1989/90=100), (11 Services Categories, ANZSIC-1; Main Divisional Level)
GRAPHS 4.1 - 4.99 X, M, NX; GOODS: AUD mill. Total; Constant Values and Quantity '000s (98 Categories, HS-2 Level). Trend statistic tables
GRAPHS 4.100 - 4.110 X, M, NX; SERVICES: AUD mill. Total; Constant Values (11 Categories, ANZSIC-1; Main Divisional Level). Trend statistic tables
TABLES 4.1 - 4. 7 SUMMARY X, M, NX; GOODS and SERVICES: AUD mill. Total; All Categories 1990-2006; 2000-2006 GOODS: (98 Categories, HS-2 Level) and SERVICES: (11 Categories, ANZSIC-1; Main Divisional Level) X, X%, Rank X%; M, M%, Rank M%; NX, Rank NX AUD
TABLES 4.8 - 4.9 Top 50 X; AUD mill. Average; X, X%, All Categories: 1990-2006; 2000-2006
TABLES 4.10 - 4.11 Top 50 M; AUD mill. Average; M, M%, All Categories: 1990-2006; 2000-
TABLES 4. 12- 4.13 Top 50 TD; AUD mill. Average; NX, All Categories: 1990-2006; 2000-2006
TABLES 4.14 - 4.23 FILTERING ANALYSIS; AUD mill. (GOODS: 98 Categories, HS-2; SERVICES: 11 Categories, ANZSIC-1; Main Divisional Level) PROTOCOL STEP 1 - CATEGORIES
Implicit Price Deflator Conversion Summary
X, M; GOODS: HS2 Level: AUD mill. Total; 1990-2006; Annual Data (242 Separate Custom Entities - Countries). Conversion from Nominal to Constant Values
TABLES 4.24 - 4.36 SUMMARY X, M, NX; COUNTRIES: AUD mill. 1990-2006; 2000-2006 (242 Separate Custom Entities - Countries) Total; X, Total; X%; Total; Rank X%; Total; M, Total; M%; Total; Rank M%; Total; NX, Total; Rank NX, Average NX
TABLE 4.37 Top 50 X; DESTINATION COUNTRY: AUD mill. Average; X, X%, 1990-2006; 2000-2006
TABLE 4.38 Top 50 M; SOURCE COUNTRY: AUD mill. Average; M, M%, 1990-2006; 2000-2006
TABLE 4.39 Top 50 TD; COUNTRY: AUD mill. Total; NX, Average; NX 1990-2006; 2000-2006
TABLES 4.40 - 4.56 FILTERING ANALYSIS; AUD mill. (235 Separate Custom Entities) PROTOCOL STEP 1 - COUNTRIES
X, M; GOODS: AUD mill. Total; (155 Categories, HS-4 Level). Conversion from Nominal to Constant Values
X, M; SERVICES: AUD mill. Total; (3 Categories, ANZSIC-2; First Sub-divisional Level). Conversion from Nominal to Constant Values
X, M, NX; GOODS: AUD mill. Total; Constant Values and QTY '000s (155 Categories, HS-4 Level)
X, M, NX; SERVICES: AUD mill. Total; Constant Values (3 Categories, ANZSIC-2; First Sub-divisional Level)
TABLES 4.57 - 4.70 X; GOODS and SERVICES: Ranking, AUD mill. Average; X, X% (155 Goods + 3 Services Categories): 1990-2006; 2000-2006
TABLES 4.71 - 4.83 M; GOODS and SERVICES: Ranking, AUD mill. Average; M, M% (155 Goods + 3 Services Categories): 1990-2006; 2000-2006
TABLES 4.84 - 4.95 NX; GOODS and SERVICES: Ranking, AUD mill. Average; NX (155 Goods + 3 Services Categories): 1990-2006; 2000-2006
TABLES 4.96 - 4.103 X; GOODS: Ranking, QTY '000s Average; X, X% Incr./ Decr.%, Rank Incr/ Decr. (155 Categories): 1990-2006; 2000-2006
TABLES 4.104 - 4.111 M; GOODS: Ranking, QTY '000s Average; M, M% Incr./ Decr.%, Rank Incr./ Decr. (155 Categories): 1990-2006; 2000-2006
TABLES 4.112 - 4.119 NX; GOODS: Ranking, QTY '000s Average; NX, NX% Incr./ Decr., Rank Incr./ Decr. (155 Categories): 1990-2006; 2000-2006
TABLES 4.120 - 4.138 FILTERING ANALYSIS; AUD mill. (GOODS: 155 Categories, HS-4; SERVICES: 3 Categories, ANZSIC-2; First Sub-divisional) PROTOCOL STEP 2 - CATEGORIES
X, M, NX; GOODS: Quantity Units Total; (5 Categories, HS4 Level)Canada; China; France; Germany; Indonesia; Ireland; Italy; Malaysia; Papua New Guinea; Singapore; Sweden; Thailand; United Kingdom; United States; Vietnam;
TABLES 4.139 - 4.143 X; DESTINATION COUNTRY - RANKING: Ave. Quantity-Units 1990-2006; 2000-2006
TABLES 4.144 - 4.148 M; SOURCE COUNTRY - RANKING: Ave. Quantity-Units 1990-2006; 2000-2006
TABLES 4.149 - 4.153 NX; COUNTRY - RANKING: Ave. Quantity-Units 1990-2006; 2000-2006
TABLES 4.154 - 4.155 FILTERING ANALYSIS; Quantity-Units, Ave.; (15 Separate Custom Entities) PROTOCOL STEP 2 - COUNTRIES
LEGEND
Main Data (Original Data); Available on Request
Combined Main Data and Generated Statistics; Available on Request
Graphs and Statistics (Generated); Appendix Graphs and Tables
Filtering Analysis (Derived Protocol); Appendix Tables

represent the analysis of the X, M and NX, in AUD, mill. and QTY „000s[57] between Australia and the RoW for all 98 goods categories based on HS-2 and 11 service categories based on ANZSIC-1 level of aggregation. An analysis covers both the Long Term (LT) period between 1990 and 2006 and the Short Term (ST) period between 2000 and 2006[58], employing the quarterly time-series data. The chronological analysis protocol in this chapter is explained in the following order:

- The data analysis begins with the conversion from nominal to constant values for all 98 goods categories[59]. The index numbers used for the conversions are from the ABS (2007a) Catalogue 6457, Tables 7 and 9 for the X, and the Catalogue 6457, Tables 1, 3 and 12 for the M price indices. The X and M price indices obtained from the ABS follows the SITC system, and the data from the TDI follows the HS classification system. This has necessitated to assigning the right index numbers to the right categories, and the entire process of assigning the right index number to the specific category has been conducted so that the closest corresponding index heading from SITC has been assigned for each HS category. Furthermore, when a heading was not available, the index number for *'All groups'* has been used instead. An example of such a category is the *'06: -Live trees and other plants; bulbs, roots and the like; cut flowers and ornamental foliage'*. This category did not have a corresponding index number according to the SITC system, neither for the X nor for the M, so consequently the *'All Group'* index number from the SITC has been used for both the X and the M values.

- Once the values have been converted from nominal to constant values, the NX between Australia and the RoW was calculated for all categories for both the AUD, mill. and the QTY „000s units. The main reason why the X, M and NX for the QTY are included, is to observe the trade flows from a different perspective. The X levels measured by QTY, unlike the monetary values are not influenced by the price fluctuations for any goods category; therefore, it is a true representation on the X and M volumes. This approach is useful in

[57] The QTY are not applicable for the service categories.
[58] The LT and ST time span approach facilitates the study of the trade patterns in these two periods side-by-side.
[59] Based on HS-2 level of aggregation for the goods, category 77 is not available neither for the X nor for the M: therefore, despite being listed as 99 categories, only 98 categories are available and analysed.

particular when the Terms of Trade (TOT[60]) is concealing the actual magnitude of the X and M volume flows.

- Appendix Graphs 4.1-4.99[61] represents the graphs and estimated statistics in the constant AUD, mill. values and QTY '000s for the X, M and NX between Australia and the RoW for all 98 goods categories. The graphs are accompanied by the trend statistics tables, which shows the trend regression statistics together with the coefficient values and their significance for both AUD values and QTY.
- Equivalent procedure of conversion from nominal to constant values for X and M carried-out for the goods is conducted for all 11 service categories. The index numbers used for the conversions are obtained from the ABS, Catalogue 5302, Table 18 for the service credits (X) (ABS, 2007b), and the index numbers Catalogue 5302, Table 19 for the service debits (M) (ABS, 2007c).
- Once the X and M values for the service categories have been converted from nominal to constant values, the NX in AUD, mill. between Australia and the RoW for all 11 service categories was calculated.
- Appendix Graphs 4.100-4.110 represents the graphs generated statistics in constant AUD, mill. values for the X, M and NX between Australia and the RoW for all 11 service categories. The graphs are accompanied by the trend statistics tables, which shows the trend regression statistics together with the coefficient values and their statistical significance measured in the AUD values.
- Appendix Tables 4.1-4.7 represents the generated statistics summary in constant AUD mill. values for the X, M and NX between Australia and the RoW for all 98 goods and 11 service categories. All values are expressed in total AUD, mill. and the analysis is conducted for both the LT and the ST. This summary includes statistics for the total X, M and NX values and their corresponding ranks and the X and M percentages of the total. The ranks for

[60] TOT is the ratio of the monetary price of the exports to the monetary price of the imports; increases in the TOT indicate that the relative price of imports requires relatively less exports in order to achieve the trade balance.
[61] Category 77 is not available either for the X nor for the M: therefore, despite being listed as 99 graphs, only 98 graphs are available. For consistency, Graph 4.77 is not presented, while the rest of the graphs prior to and after the category HS-2: 77, each graph number corresponds to the category code according HS-2 level of aggregation.

the X and M are in descending order, while the rank for the NX is in ascending order.

- Appendix Tables 4.8-4.9 represents the generated statistics summary in constant AUD, mill. values for the Top 50 X categories and their corresponding percentages between Australia and the RoW. All values are expressed in the quarterly average AUD, mill. and in total percentage values. The entire 98 goods and 11 service categories are included in the analysis and the summary shows the Top 50 categories, for both the LT and the ST.
- Appendix Tables 4.10-4.11 represents the generated statistics summary in constant AUD, mill. values for the Top 50 M categories and their corresponding percentages between Australia and the RoW. All values are expressed in the quarterly average AUD, mill. and in total percentage values. The entire 98 goods and 11 service categories are included in the analysis and the summary shows the Top 50 categories, for both the LT and the ST.
- Appendix Tables 4.12-4.13 represents the generated statistics summary in constant values AUD, mill., for the Top 50 TD categories between Australia and the RoW. All values are expressed in the quarterly average AUD, mill. The entire 98 goods and 11 service categories are included in the analysis and the summary shows the Top 50 categories, for both the LT and the ST.
- Appendix Tables 4.14-4.23 represents the FA „PROTOCOL STEP ONE - CATEGORIES'. The entire 98 goods and 11 service categories are included in the analysis and the protocol shows which goods and services categories did not satisfy the selection criteria and as a result excluded from further examination, and which categories did satisfy all the selection criteria and are selected for further analysis.

4.2.1.2 ANALYSIS PROTOCOL – STAGE TWO

The second stage of the analysis in Appendix Tables 4.24-4.56 represents STAGE TWO - STEP ONE of the analysis of the Australian trading countries. The analysis in this stage are in respect to the X, M and NX in AUD, mill. between Australia and the

RoW (242 SCE), in all goods categories[62]. An analysis covers both the LT and the ST, employing the annual time-series data.

- The first task in this stage is to convert the annual X and M time-series data between Australia and 242 SCE from nominal to constant values. The „Implicit Price Deflator Conversion Summary' represents the conversions of the base year from 2006 to 1990. The original indices were obtained from the ABS (2007d) Catalogue 5302, Table 63 for the goods credits (X) and Table 64 for the goods debits (M) (ABS, 2007e). The base year for this X and M indices is 2006 where 2006=100, however, the base year for earlier analysis conducted in this chapter is 1989/1990, where 1989/90=100. In order to preserve the consistency and comparability with the analysis so far, the original base year has been converted from 2006=100 to 1990=100. The conversion factor has been calculated by dividing 100 with the original index value in the year 1990. Once this conversion factor for both the X (1.31) and for the M (0.95) is calculated, then it is used to multiply the existing index in every single annual period and the value calculated corresponds to a new index number with a new base year, 1990=100. This newly created annual X and M indices are used for converting the nominal X and M values for all 242 SCE in the world.

- These transformed index numbers for X and M with a base year 1990=100, has been used subsequently for conversion of the nominal X and M data to a constant values for all 242 SCE in the world.

- Appendix Tables 4.24-4.36 represents the generated statistics summary in the constant AUD, mill. values for the X, M and NX, between Australia and 242 SCE[63] in the world. All values are expressed in total AUD, mill. and analysis

[62] After numerous attempts to obtain the trade data for services, between Australian and RoW on the country level, this has not been successful. I have been advised on December 19, 2007, by an e-mail from Anne-Marie Boyd – (National Client Services) and Andrew Tomadini (Macroeconomic Integration and Innovation Group - ABS), that the trade data for the services based on the country level are very limited and mostly unavailable due to confidentiality. Due to this, the X, M and NX for the analysis on a country level are undertaken for the goods only.

[63] Some of the SCE taken into consideration are non-existent anymore, such as the USSR and Czechoslovakia and some SCE have been newly created such as Slovenia, Ukraine and East Timor. However, since the trade volumes between Australia and these SCE are negligible; the impact of these non-existing and newly created SCE did not influence the selection of the major Australian trading countries. Furthermore, all countries which have been examined have been viewed as SCE despite being listed as one country on some occasions. Some examples of this are the French Antilles, French Guiana, French Polynesia and French South Antarctic Terr, which belongs to one country France and United States Miscellaneous Pacific Island which belongs to the United States. Despite that these SCE are internationally listed as one country, these SCE has been viewed as a separate X and M countries, and in fact they are separate geographical location which would result that the tastes, preferences and the state of the technology to be likely different compared to their mainland country location. Due to these particulars, the X and M volume are likely to be influenced by these facts, consequently, treating them as separate countries is considered appropriate. Furthermore,

are conducted both for the LT and the ST. This summary includes statistics for the total X, M and NX values and their corresponding ranks and the X and M percentages of the total. The ranks for the X and M are in descending order, while the rank for the NX is in ascending order.

- Appendix Table 4.37 represents the generated statistics summary in constant AUD, mill. values for the Top 50 Australian X and X percentage destination countries. All values are expressed on average AUD, mill. and in the total percentage values. All 242 SCE are included in the analysis and the summary shows the Top 50 countries, for both the LT and the ST.
- Appendix Table 4.38 represents the generated statistics summary in constant AUD, mill. values for the Top 50 Australian M and M percentage source countries. All values are expressed on average AUD, mill. and in the total percentage values. All 242 SCE are included in the analysis and the summary shows the Top 50 countries, for both the LT and the ST.
- Appendix Table 4.39 represents the generated statistics summary in constant AUD, mill. values for the Top 50 Australian TD countries. The values are expressed in AUD, mill. both for the total NX and the average NX. All 242 SCE are included in the analysis and the summary shows the Top 50 countries, for both the LT and the ST.
- Appendix Tables 4.40-4.56 represents the FA „PROTOCOL STEP ONE - COUNTRIES'. All 242 SCE are included in the analysis and the protocol shows which SCE did not satisfy all the selection criteria and as a result are excluded from further examination, and which SCE did satisfy all the selection criteria and are selected for the further analysis.

4.2.1.3 ANALYSIS PROTOCOL – STAGE THREE

Appendix Tables 4.57-4.138 represents the STAGE THREE - STEP TWO of the analysis of the tradable categories. An analysis in this stage are in respect to the X, M and NX, in AUD, mill. and the QTY „000s[64], between Australia and the RoW in 4 selected goods and 1 service categories according to the FA, „PROTOCOL STEP

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there are few destination of the X destination and the M source locations which are not defined such as Country not available and Country not listed, however the X to and M from these location are again negligible and has not been able to influence significantly the selection of the major trading countries.

[64] The QTY are not applicable for the service categories.

ONE - CATEGORIES' presented in the Appendix Tables 4.1-4.23. These 4 categories are disaggregated based on HS-4 level of aggregation for the goods and ANZSIC-2 for the services. This procedure has generated 155 goods and 3 services categories that are analysed in this section. An analysis covers both the LT and the ST, employing the quarterly time-series data.

- The first step is to convert from the nominal to the constant values for all 155 goods categories. The index numbers used for the conversions are from the ABS (2007f) Catalogue 6457, Tables 7 and 9 for the X and the Catalogue 6457, Tables 1, 3 and 12 for the M price indices (ABS, 2007g). The process of assigning the right index numbers to particular X and M category was carried-out according to the same principles applicable to HS-2 level of aggregation, explained before.

- Once the values were converted from nominal to constant values the NX measured in AUD, mill. and the QTY „000s between Australia and the RoW was calculated for all categories.

- The same procedure of conversion from nominal to constant values for X and M carried-out for the goods is conducted for all 3 service categories. The index numbers used for the conversions are obtained from the ABS (2007b; 2007c), Catalogue 5302, Table 18 for X and Catalogue 5302, Table 19 for M values respectively.

- Once these X and M values for the service categories were converted from nominal to constant values, the NX in AUD, mill. between Australia and the RoW for all 3 service categories was calculated.

- Appendix Tables 4.57-4.70 represents the generated statistics summary in the constant AUD, mill. values for all 158 goods and services categories. These tables illustrate the ranking for the X and X percentage for all 158 categories between Australia and the RoW. All values are expressed in average AUD, mill. and in the total percentages, while the rankings are in descending order, for both the LT and the ST.

- Appendix Tables 4.71-4.83 represents the generated statistics summary in the constant AUD, mill. values for all 158 goods and services categories. These tables represent the ranking of M and M percentage for all 158 categories between Australia and the RoW. All values are expressed in average AUD, mill. and in the total percentages, while the rankings are in descending order, for both the LT and the ST.

- Appendix Tables 4.84-4.95 represents the generated statistics summary in the constant AUD, mill. values for all 158 goods and services categories. These tables represent the ranking of NX categories between Australia and the RoW. All values are expressed in the average AUD, mill., while the rankings are in ascending order, for both the LT and the ST.
- Appendix Tables 4.96-4.103 represents the generated statistics summary for all 155 goods categories. These tables represents the LT and the ST X levels, X percentage increase/decrease in the two different time duration, Rank increase and Rank decrease, between Australia and the RoW. All values are expressed in average QTY „000s. The ranking in these tables are ranked by the Rank decrease between the LT and the ST in ascending order. This order shows the X categories with the largest decrease in the X percentage in the two different time duration, are on the top of the list.
- Appendix Tables 4.104-4.111 represents the generated statistics summary for all 155 goods categories. These tables represents the LT and the ST M levels, M percentage increase/decrease in the two different time duration, Rank increase and Rank decrease, between Australia and the RoW. All values are expressed in average QTY „000s. The ranking in these tables are ranked by the Rank decrease between the LT and the ST in ascending order. This order shows the M categories with the largest decrease in the M percentage in the two different time duration, are on the top of the list.
- Appendix Tables 4.112-4.119 represents the generated statistics summary for all 155 goods categories. These tables represents the NX for both the LT and the ST, NX percentage increase/decrease in the two different time duration, Rank increase and Rank decrease, between Australia and the RoW. All values are expressed in average QTY „000s. The ranking in these tables are ranked by the Rank decrease between the LT and the ST in ascending order. This ranking shows the NX categories with a largest decrease in TD percentage, are on the top of the list.

- Appendix Tables 4.120-4.138 represents the FA „PROTOCOL STEP TWO - CATEGORIES'. The entire 155 goods and 3 service categories are included in the analysis and the protocol shows which final goods and service categories did not satisfy all the selection criteria and as a result are excluded from further examination, and which categories did satisfy all of the selection criteria and are selected for further analysis.

4.2.1.4 ANALYSIS PROTOCOL – STAGE FOUR

Appendix Tables 4.139-4.155 represents STAGE FOUR - STEP TWO of the analysis of the trading countries. This stage represents the analysis of the average X, M and NX in QTY units between Australia and the 15 selected countries in the FA Appendix Tables 4.40-4.56 „PROTOCOL STEP ONE - COUNTRIES' in 5 goods categories based on HS-4 level of aggregation, which has been selected in the FA; Appendix Tables 4.120-4.138 „PROTOCOL STEP TWO - CATEGORIES'. An analysis covers both the LT and the ST, employing the quarterly time-series data.

- The first step in this last stage was to calculate the NX in QTY units between Australia and the 15 selected countries, in the 5 selected goods categories based on HS-4 level of aggregation.
- Appendix Tables 4.139-4.143 represents the generated statistics summary ranking for all 5 goods categories based on HS-4 level of aggregation. These tables show the ranking of the average X and the total X percentage in QTY units between Australia and the 15 selected countries. The entire 5 goods categories and 15 countries are included in the analysis and presented in descending order, for both the LT and the ST.
- Appendix Tables 4.144-4.148 represents the generated statistics summary ranking for all 5 goods categories based on HS-4 level of aggregation. These tables shows the ranking of the average M and total M percentage in QTY units between Australia and the 15 selected countries. The entire 5 goods categories and 15 countries are included in the analysis and presented in descending order, for both the LT and ST.
- Appendix Tables 4.149-4.153 represents the generated statistics summary ranking for all 5 goods categories based on HS-4 level of aggregation. These

tables show the ranking of the average NX in QTY units between Australia and the 15 selected countries. All 5 goods categories and 15 countries are included in the analysis and are presented in ascending order, for both the LT and the ST and;

- Appendix Tables 4.154-4.155 represents the FA „PROTOCOL STEP TWO – COUNTRIES'. Fifteen countries are included in the analysis and the protocol shows which countries did not satisfy all of the selection criteria and as a result are excluded from further examination, and which countries did satisfy all of the selection criteria and are selected for further analysis in this research.

This concludes the explanation of the Data Analysis Protocol Diagram, Appendix Graphs and Tables and the next section will comment on the methodological procedures used in this chapter.

4.3 METHODOLOGICAL PROCEDURES

In order to accomplish the objectives of selecting the major categories and corresponding trading countries associated with the growing TD in Australia, various techniques were utilized in this chapter. The two main techniques used in this chapter, are the TA and FA, which are accompanied by numerous graphs, tables and diagrams. The TA is a well-established concept in the current literature and is associated with the analysis of time as an independent variable, while the variable of interest in this case the X, M and NX volumes are the dependent variables, using a Simple Linear Regression Model (SLRM)[65], which is utilized in the selection process within the FA.

The FA, which is developed and used in this chapter is based on the elimination of the categories and the trading countries in the sequential order according to the defined selection criteria. The process in the FA consists of several phases of the selection criteria, and the categories and trading countries that satisfy the selection criteria are advanced to the next phase of the FA; while the categories and the trading partners that did not satisfy the selection criteria are excluded without further consideration. The categories or the trading countries that satisfy all of the selection criteria are the categories that will be investigated and analysed in the subsequent chapter in this research.

[65] Simple Linear Regression Model (SLRM) is a model that consists of only one independent variable and a straight line represents the function between independent and dependent variable.

4.4 TRENDS IN THE AUSTRALIAN TRADING POSITION – CATEGORIES

The trends analysed in this section are in respect to 98 goods categories based on HS-2 level of aggregation and 11 services categories based on ANZSIC-1 level of aggregation. Although the trends considered in this chapter are only the linear time trends over the LT, they are reasonable guidelines to establish the LT movement of the X, M and NX values between Australia and the RoW within the specified categories. Estimable models, for the X, M and NX, are presented in the Equations (4.1), (4.2) and (4.3), respectively:

$$X_{ij}^{t} = \alpha_0 + \alpha_1 T + \varepsilon^{t} \tag{4.1}$$

$$M_{ij}^{t} = \beta_0 + \beta_1 T + \varepsilon^{t} \tag{4.2}$$

$$NX_{ij}^{t} = \chi_0 + \chi_1 T + \varepsilon^{t} \tag{4.3}$$

where; $\alpha_0, \beta_0, \chi_0$ are the intercepts and $\alpha_1, \beta_1, \chi_1$ are trend coefficients to be estimated, T is the time trend, $'i'$ is the product category, $'j'$ is the country, $'t'$ is time and $'\varepsilon'$ is a random error.

While; $i = 1,2,...,n$ specifying categories,

$j = 1,2,...,k$ specifying countries and

$t = 1,2,...,l$ specifying time periods.

The complete list of the regression trend statistics are presented in appendix graphs; Appendix Graphs 4.1-4.99 for the goods and Appendix Graphs 4.100-4.110 for the service categories.

The selection of the trading categories and the countries for the economic investigation of the trade flows between Australia and the RoW have never been carried-out before in the current literature, therefore a systematic protocol needs to be constructed. In the systematic protocol, the first step is to create an easy reference point regarding the X, M and NX trends, their magnitude and their significance. Once this is accomplished, it will provide the point of reference for the categories and the countries during and after the selection process, as well as for measuring the effectiveness of the selection protocol developed in this chapter. The following sections will comment on the common and specific examination methodology for the

X, M and NX, as well as the key findings in respect to the X, M and NX between Australia and the RoW for all 109 goods and service categories.

4.4.1 TRADING CATEGORIES EXPORT, IMPORT AND NET EXPORTS - EXAMINATION METHODOLOGY

Examination of the X, M and NX of the trading categories are analysed from two perspectives which are the TA and the rankings. Firstly, the TA are carried-out according to the Equation 4.1-4.3 to obtain the Time-coefficient, its significance (t-ratio) and Coefficient of Determination (R^2). Once these are determined and estimated, the second step is to observe the rankings measured in their quarterly averages and total percentage values for both the LT and the ST. The TA and rankings analysis for the X, M and NX are in respect to 109 categories (98 goods categories based on HS-2 and 11 service categories based on ANZSIC-1 level of aggregation).

The X, M and NX TA were carried-out in order to classify the major X, M and NX categories, to identify their magnitude and the significance. The categories are ranked by AUD, mill. and not according to the QTY '000s, due to the rationale that ranking by QTY would be illogical because QTY is not comparable amongst the categories, however, they provide valuable additional information for the categories ranked. Furthermore, QTY is presented for the goods categories only, because QTY is not available for the service categories. The X and M tables, Table 4.1 and Table 4.3 represents the Top 20 X and M trends in descending order, in AUD, mill. and Table 4.5 represents the Top 20 NX trends for the categories analysed in ascending order. The descending order for X and M and the ascending order for NX ensures that the categories with the highest average X, M and TD measured in AUD, mill. values are ranked first. While these Tables 4.1, 4.3 and 4.5 list only the Top 20 categories, a complete list of all trend statistics for all 98 goods and 11 service categories are in the Appendix Graphs 4.1-4.110. These statistic tables consist of relevant regression statistics, which shows the intercept, the Time-coefficient, their significance and the R^2. Because the X, M and NX is analysed from both the AUD, mill. and QTY „000s perspective, interpretations are first made for AUD values and then for QTY.

Tables 4.2, 4.4 and 4.6 represents the Top 20 X, M and NX categories respectively, while Appendix Tables 4.8-4.13 consists of the Top 50 and Appendix Tables 4.1-4.7 consists of all 109 categories. Tables 4.2 and 4.4 represents the Top 20 X and M categories in AUD, mill. and the total percentage values[66] for the X and M in descending order, while Table 4.6 represents the Top 20 NX categories in AUD, mill. in ascending order. The descending rank order for the X and M and ascending rank order for the NX ensures that the categories with the highest average X, M and TD values are ranked first. Once the trend statistics and their ranking for the categories are established, it follows by a specific analyses for the X, M and NX.

4.4.2 AUSTRALIAN EXPORT TRENDS

The X trend assessment is critical in order to ensure that the categories which will be selected in this chapter are the categories which accounts for the increasing X volumes. While ensuring that the X volumes are increasing, this approach will ensure that the categories selected are within expanding and not a dying industry. This approach will uphold one of the objectives, and that is to analyse the industries in which Australia holds at least some competitive strength internationally.

Based on the AUD, mill., in Appendix Graphs 4.1-4.110, 14 out of 109 categories analysed, the X Time coefficient in AUD, mill. are not significant and out of 95 categories with a significant X Time-coefficient, 84 categories are significant at 1 percent, while the remaining 11 are significant at 5 percent. Those 84 categories with a Time-coefficient significant at a 1 percent level, 79 Time-coefficients are positive which shows an increase in the X volumes over-time, while 5 categories indicates that the Time-coefficients are negative, which show a decrease in the X volumes over-time. Furthermore, 84 categories with a significant Time-coefficients at 1 percent level of significance, 15 categories R^2 are between 81.1 and 94.2 percent, 26 categories R^2 are between 54.9 and 79.7 percent, while the remaining 43 categories R^2 are below 50 percent.

By observing the same X Time-coefficients measured in QTY „000s[67], 22 out of 98 categories that are analysed, the X Time-coefficient was not significant. Out of 74 categories with a significant X Time-coefficient, 64 categories are significant at 1 percent, 9 categories are significant at a 5 percent and 1 category significant at a 10 percent level of significance. The 64 categories with a Time-coefficient significant at a 1 percent level, all of the Time-coefficients are positive, which shows an increase in

[66] Total X percentage values = (Total X in the observed category/ Total X in all categories)*100 and
Total M percentage values = (Total M in the observed category/ Total M in all categories)*100
[67] QTY are applicable for the goods categories only, while the Time-coefficient for categories 98 and 99 are not calculated, due to the data unavailability.

the X volume over-time, except for the 9 categories where the Time-coefficient is negative. Furthermore, the 64 categories with a significant Time-coefficients at 1 percent level, 5 categories R^2 are between 80.4 and 90.95 percent, 25 categories R^2 are between 50.66 and 78.3 percent, while the remaining 34 categories R^2 are below 50 percent.

By observing category 27 ranked first in the Table 4.1, it shows that this category has the highest X Time-coefficient of 66.07 per quarter. This shows that the X LT trend is increasing in this category by AUD66.074 mill. per quarter on average. The t-ratio of 20.15 is significant at 1 percent level and R^2 means that time alone explains 86 percent of the X growth volumes in this category. In the same category 27, measured in the X QTY, the Time-coefficient is positive, and means that the QTY of X in this category increased by 40.58 mill. units per quarter. The t-ratio for the QTY is 5.59 and is significant at 1 percent level, while the R^2 value of 0.3215 means that time explains 32.2 percent in the growth of X QTY in this category for this period. By following the steps applied for category 27, the comments about the rest of the 19 categories in Table 4.1 can be made with a similar approach. Now that the X trend has been analysed for all 98 goods and 11 service categories, an important aspect of the X analysis is to observe the ranking measured in AUD, mill. values in all categories.

The top ranked category in Table 4.2 for both the LT and the ST is category 27. This category accounts for the quarterly X of AUD4,320.21 mill. or 13.5 percent of the total X in the LT, while in the ST, it accounts for an AUD5,794.97 mill. or 14.95 percent of the total X. It can be concluded, that category 27 is not only the top X category, it is also gaining a momentum in the significance for the total Australian X.

Furthermore, by observing Table 4.1 and Table 4.2, categories 27 and category 2, occupies the first two places, with a highly significant Time-coefficient, high R-square and accounts for a significant proportion of the Australian X. As a fact, these two categories combined accounts for 25.85 percent of the total X in the LT, while in the ST this percentage is even higher and accounts for 28.07 percent of the total X.

Table: 4.1

TOP 20 EXPORT CATEGORIES - TRENDS
HS-2 and ANZSIC-1; Main Divisional Level
AUD, mill. & Qty.* '000's; (March 1990:1 – December 2006:4)

* significant at the 1%, ** significance at 5%, ***significance at 10%, Prices 89/90

Rank	Category Code: - Name		Constant	t-ratio	Time-Coefficient	t-ratio	R^2
1	**27: - Mineral fuels, mineral oils and products of their distillation; bituminous substances; mineral waxes**	AUD	2,040.65	**15.68***	66.074	**20.15***	0.860
		Qty.	3,738,33	**12.98***	40,579.08	**5.592***	0.3215
2	**2: - Travel Services**	AUD	1,953.82	**27.72***	58.129	**32.73***	0.942
		Qty.	N/A	N/A	N/A	N/A	N/A
3	**26: - Ores, slag and ash**	AUD	820.03	**15.02***	29.687	**21.58***	0.876
		Qty.	21,764.3	**2.73***	2,458.46	**12.24***	0.694
4	**84: - Nuclear reactors, boilers, machinery and mechanical appliances; Parts thereof**	AUD	626.78	**14.48***	16.710	**15.33***	0.781
		Qty.	3,928.09	**7.923***	32.496	**2.60****	0.093
5	**9: - Other Business Services**	AUD	184.43	**6.990***	16.260	**25.61***	0.916
		Qty.	N/A	N/A	N/A	N/A	N/A
6	**87: - Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof**	AUD	25.79	0.877	15.209	**20.53***	0.865
		Qty.	-58.92	-0.236	51.818	**8.233***	0.507
7	**1: - Transportation Services**	AUD	1,254.08	**29.55***	14.115	**13.20***	0.725
		Qty.	N/A	N/A	N/A	N/A	N/A
8	**30: - Pharmaceutical products**	AUD	-77.83	**-3.61***	12.513	**23.03***	0.889
		Qty.	493.31	**1.7*****	110.025	**15.43***	0.783
9	**10. Cereals**	AUD	758.83	**10.11***	9.820	**5.191***	0.290
		Qty.	3,391.35	**10.48***	30.237	**3.710***	0.173
10	**22: - Beverages, spirits and vinegar**	AUD	-14.84	-0.889	9.768	**23.23***	0.891
		Qty.	7,652.02	**1.7*****	2,729.87	**23.82***	0.896
11	**98: - Special transactions not classified according to kind**	AUD	-26.05	-0.732	8.969	**10.01***	0.603
		Qty.	N/A	N/A	N/A	N/A	N/A
12	**02: - Meat and edible meat offal**	AUD	785.14	**31.24***	7.759	**12.25***	0.695
		Qty.	243,075	**31.26***	2,146.47	**10.96***	0.645
13	**28: - Inorganic chem..; organic or inorganic compounds of precious metals, of rare-earth metals, of radioactive elements …**	AUD	622.93	**30.60***	7.025	**13.70***	0.740
		Qty.	104,31	**15.56***	1,076.89	**6.378***	0.381
14	**76: - Aluminium and articles thereof**	AUD	641.95	**22.48***	6.442	**8.954***	0.549
		Qty.	309,771	**22.91***	2,662.56	**7.817***	0.481
15	**90: - Optical, photographic, cinematographic, measuring, checking, precision, medical or surgical instruments**	AUD	62.83	**7.042***	5.725	**25.47***	0.908
		Qty.	8442.45	**5.28***	0.379	0.01	0
16	**7: - Computer and Information Services**	AUD	-1.38	-0.111	5.259	**17.66***	0.839
		Qty.	N/A	N/A	N/A	N/A	N/A
17	**04: - Dairy produce; birds eggs; natural honey; edible products of animal origin, not elsewhere specified or included**	AUD	197.19	**11.37***	5.213	**11.93***	0.683
		Qty.	100,810	**4.022***	293.659	0.465	0.003
18	**85: - Electrical machinery and equipment and parts thereof; Sound recorders and reproducers, television image ….**	AUD	358.10	**10.95***	4.917	**5.964***	0.350
		Qty.	91,059.6	**3.491***	-589.1	-0.896	0.012
19	**71: - Natural or cultured pearls, precious and semi-precious stones, precious metals, metals clad with precious metal and ...**	AUD	1,298.53	**21.09***	4.527	**2.919***	0.114
		Qty.	102,169	**14.97***	1,862.67	**10.83***	0.64
20	**44: - Wood and articles of wood; Wood charcoal**	AUD	97.29	**17.95***	3.391	**24.83***	0.903
		Qty.	662.33	**5.345***	37.971	**12.16***	0.692

Source: Compiled from Trade Data International,(2007) and the ABS (2007h; 2007i; 2007b; 2007c; 2007g; 2007f)

*** The quantity units of measurement are according to the Harmonized Commodity Description and Coding System (HS) convention and for the specific unit of measurement for the specific category visit: http://www.wcoomd.org/home_pfoverviewboxes.htm**

Table: 4.2 (Part A)

TOP 20 EXPORT CATEGORIES HS-2 and ANZSIC-1; Main Divisional Level AUD, mill. Quarterly Average, % of the Total						
Rank	**1990-2006**			**2000-2006**		
	Category Code: - Name	**X, $m.**	**X,%**	**Category Code: - Name**	**X, $m.**	**X,%**
1	**27: - Mineral fuels, mineral oils and products of their distillation; bituminous substances; mineral waxes**	4,320.21	13.49	**27: - Mineral fuels, mineral oils and products of their distillation; bituminous substances; mineral waxes**	5,794.97	14.95
2	**2: - Travel Services**	3,959.26	12.36	**2: - Travel Services**	5,084.31	13.12
3	**99: - Combined confidential items and miscellaneous items**	2,550.15	7.96	**99: - Combined confidential items and miscellaneous items**	2,453.20	6.33
4	**26: - Ores, slag and ash**	1,844.22	5.76	**26: - Ores, slag and ash**	2,447.47	6.31
5	**1: - Transportation Services**	1,741.03	5.44	**1: - Transportation Services**	1,992.88	5.14
6	**71: - Natural or cultured pearls, precious and semi-precious stones, precious metals, metals clad with precious metal and articles thereof; Imitation jewellery; Coin**	1,454.71	4.54	**84: - Nuclear reactors, boilers, machinery and mechanical appliances; Parts thereof**	1,474.82	3.81
7	**84: - Nuclear reactors, boilers, machinery and mechanical appliances; Parts thereof**	1,203.28	3.76	**71: - Natural or cultured pearls, precious and semi-precious stones, precious metals, metals clad with precious metal and articles thereof; Imitation jewellery; Coin**	1,456.60	3.76
8	**51: - Wool, fine or coarse animal hair; Horsehair yarn and woven fabric**	1,125.14	3.51	**10: - Cereals**	1,266.05	3.27
9	**10: - Cereals**	1,097.62	3.43	**02: - Meat and edible meat offal**	1,205.09	3.11
10	**02: - Meat and edible meat offal**	1,052.81	3.29	**9: - Other Business Services**	1,079.43	2.78

Source: Compiled from Trade Data International, (2007) and the ABS (2007h; 2007i; 2007b; 2007c; 2007g; 2007f)

Table: 4.2 Continued (Part B)

TOP 20 EXPORT CATEGORIES HS-2 and ANZSIC-1; Main Divisional Level AUD, mill. Quarterly Average, % of the Total						
Rank	1990-2006			2000-2006		
	Category Code: - Name	X, $m.	X,%	Category Code: - Name	X, $m.	X,%
11	28: - Inorganic chemicals; organic or inorganic compounds of precious metals, of rare-earth metals, of radioactive elements or of isotopes	865.31	2.70	28: - Inorganic chemicals; organic or inorganic compounds of precious metals, of rare-earth metals, of radioactive elements or of isotopes	1,031.80	2.66
12	76: - Aluminium and articles thereof	864.21	2.70	51: - Wool, fine or coarse animal hair; Horsehair yarn and woven fabric	1,021.19	2.63
13	9: - Other Business Services	724.12	2.26	76: - Aluminium and articles thereof	1,001.61	2.58
14	87: - Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof	550.51	1.72	87: - Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof	893.18	2.30
15	85: - Electrical machinery and equipment and parts thereof; Sound recorders and reproducers, television image and sound recorders and reproducers, and parts and accessories of such articles	527.72	1.65	30: - Pharmaceutical products	624.10	1.61
16	52: - Cotton	420.34	1.31	85: - Electrical machinery and equipment and parts thereof; Sound recorders and reproducers, television image and sound recorders and reproducers, and parts and accessories of such articles	601.80	1.55
17	04: - Dairy produce; birds eggs; natural honey; edible products of animal origin, not elsewhere specified or included	377.03	1.18	22: - Beverages, spirits and vinegar	537.35	1.39
18	30: - Pharmaceutical products	353.88	1.10	98: - Special transactions not classified according to kind	485.79	1.25
19	72: - Iron and steel	329.49	1.03	04: - Dairy produce; birds eggs; natural honey; edible products of animal origin, not elsewhere specified or included	481.82	1.24
20	22: - Beverages, spirits and vinegar	322.15	1.01	52: - Cotton	460.25	1.19

Source: Compiled from Trade Data International, (2007) and the ABS (2007h; 2007i; 2007b; 2007c; 2007g; 2007f)

4.4.2.1 MAJOR EXPORT CATEGORIES

In respect to the categories listed in Table 4.2, the categories that have maintained their ranking for both the LT and the ST are categories 2 and 1 for the services and 27, 99, 26, 28 and 87 for the goods categories. The categories which have dropped in their ranking in the two different time duration are categories 71, 51, 76, 85, 52, 04 and 72 which all fall in the goods categories; while categories 84, 10, 02, 30, 22 and 98 for the goods and category 9 for services, has moved to a higher rankings. For further information in respect to the X ranking, for both for the LT and the ST, the Top 50 X categories are presented in Appendix Tables 4.8-4.9, while Appendix Tables 4.1-4.7 shows the rankings for all 109 categories, which have been analysed. Now that all of the X categories have been analysed and their X trends significance and ranking have been determined, a similar analysis will proceed with M categories analysis in the following section.

4.4.3 AUSTRALIAN IMPORT TRENDS

The M trend assessment is critical in order to ensure that the categories that are selected in this chapter are the categories which account for an increasing M volumes. By focusing on those M volumes that are considerably increasing, it will ensure that the categories selected for further analysis are the categories which are most likely to be significant contributors to a raising TD in Australia, and as such warrant attention.

Based on AUD, mill., in Appendix Graphs 4.1-4.110, 10 out of 107 categories[68] analysed, the M Time-coefficient in AUD, mill. are not significant. The remaining 97 categories with a significant M Time-coefficient, 90 categories are significant at 1 percent, 5 categories are significant at 5 percent and 2 categories are significant at 10 percent level of significance. Out of 90 categories with a Time-coefficient significant at a 1 percent level, for 81 categories the Time-coefficient are positive which show an increase of the M volumes over-time, while for 9 categories the Time-coefficient is negative which shows a decrease of the M volumes over-time in these categories. Furthermore, 90 categories with a significant Time-coefficients at 1 percent level, 26 categories R^2 are between 80.25 and 93.68 percent, 39 categories R^2 are between 50.19 and 79.8 percent, while the remaining 25 categories R^2 are below 50 percent.

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[68] Category 98 for goods and category 4 for the service categories are excluded from this analysis, due to data unavailability.

By observing category 27 in Table 4.3 which is ranked first, it shows that this category has the highest M Time-coefficient of 50.73 per quarter, which means that the Australian M in this category from the RoW is increasing by AUD50.73 mill. per quarter on average. The t-ratio of 12.72 is significant at 1 percent level and R^2 means that time variable alone explains 71 percent of the M volume growth in this category. The same category 27 measured in the M QTY, the Time-coefficient is positive, and shows that the QTY of the M in this category are increasing by 79.09 mill. per quarter on average. The t-ratio for QTY is 18.3 and is significant at 1 percent level, while the R^2 value of 0.835 means that time explains 83.5 percent in the growth of M QTY in this category for this period. Other 19 categories in Table 4.3 can be interpreted with a similar approach. Now that the M trend has been presented for all 97 goods and 10 service categories, an important aspect of the M analysis is to observe the ranking measured in AUD, mill. values in all categories.

The top M ranked category in the Table 4.4 for both the LT and the ST is category 84. This category accounts for quarterly average M of AUD3,242.93 mill. or 11.28 percent of the total M in the LT, while in the ST accounts for an AUD3,941.60 mill. or 10.69 percent of the total M. Category 84 is not only the top M category in both periods, but its' average M AUD value has increased, while the percentage of the total M for this category has decreased from 11.28 to 10.69 percent, between these two time duration.

Furthermore, while observing Table 4.3 and Table 4.4, 8 out of the Top 10 categories in Table 4.3 are in the Top 10 categories in Table 4.4 in the LT. These similarities is even more pronounced between these two tables in the ST; in the ST, 9 out of the Top 10 categories in Table 4.3 and are also in the Top 10 categories in Table 4.4. These facts are in line with the expected outcome, and the categories that accounts for the highest trend increase of M overtime, are likely to be the categories that account for the top M categories measured in AUD values. Further comments regarding the rest of the remaining categories can be made with a similar approach.

Table: 4.3

Rank	TOP 20 IMPORT CATEGORIES - TRENDS HS-2 and ANZSIC-1; Main Divisional Level AUD, mill. & Qty.* '000's; (March 1990:1 – December 2006:4) * significant at the 1%, ** significance at 5%, ***significance at 10%, Prices 89/90						
	Category Code: - Name		**Constant**	**t-ratio**	**Time-Coefficient**	**t-ratio**	**R^2**
1	**27: - Mineral fuels, mineral oils and products of their distillation; bituminous substances; mineral waxes**	AUD	-91.867	-0.580	50.731	**12.72***	0.710
		Qty.	4,497,758	**26.22***	79,090.54	**18.30***	0.835
2	**85: - Electrical machinery and equipment and parts thereof; Sound recorders and reproducers, television image ….**	AUD	960.357	**13.48***	43.491	**24.23***	0.899
		Qty.	499,252	**12.80***	11,743.24	**11.95***	0.684
3	**87: - Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof**	AUD	693.003	**10.30***	40.795	**24.09***	0.898
		Qty.	1,813.94	**11.11***	41.038	**9.976***	0.601
4	**84: - Nuclear reactors, boilers, machinery and mechanical appliances; Parts thereof**	AUD	1,838.37	**16.48***	40.712	**14.48***	0.761
		Qty.	50,826.6	**16.00***	835.761	**10.44***	0.623
5	**1: - Transportation Services**	AUD	1,135.96	**21.86***	34.509	**26.36***	0.913
		Qty.	N/A	N/A	N/A	N/A	N/A
6	**2: - Travel Services**	AUD	1,460.52	**19.07***	29.807	**15.45***	0.783
		Qty.	N/A	N/A	N/A	N/A	N/A
7	**30: - Pharmaceutical products**	AUD	-139.675	**-3.70***	25.201	**26.52***	0.914
		Qty.	150,635	**3.207***	-1,204.46	-1.02	0.016
8	**90: - Optical, photographic, cinematographic, measuring, checking, precision, medical or surgical instruments ...**	AUD	378.821	**15.27***	13.850	**22.16***	0.882
		Qty.	41,147.5	**3.755***	656.59	**2.38****	0.079
9	**71: - Natural or cultured pearls, precious and semi-precious stones, precious metals, metals clad with precious metal and articles,**	AUD	171.449	**3.334***	12.846	**9.916***	0.598
		Qty.	2,691.59	**7.671***	-15.635	**-2*****	0.045
10	**39: - Plastics and articles thereof**	AUD	335.103	**25.58***	8.045	**24.38***	0.900
		Qty.	880891.1	**3.659***	-8938.699	-1.474	0.032
11	**94: - Furniture; Bedding, cushions and similar stuffed furnishings; Lamps and lighting fittings, not elsewhere specified ….**	AUD	-8.457	-0.423	7.735	**15.36***	0.781
		Qty.	398.074	0.8154	257.94	**20.97***	0.870
12	**62: - Articles of apparel and clothing accessories, not knitted or crocheted**	AUD	61.397	**5.903***	5.874	**22.42***	0.884
		Qty.	19,714.4	**9.038***	991.79	**18.05***	0.832
13	**73: - Articles of iron or steel**	AUD	168.484	**23.22***	5.640	**30.86***	0.935
		Qty.	1,337,198	**8.294***	6,412.29	1.579	0.036
14	**29: - Organic chemicals**	AUD	335.830	**19.75***	5.559	**12.98***	0.718
		Qty.	132,196	**8.908***	45.396	0.121	0.000
15	**48: - Paper and paperboard; Articles of paper pulp, of paper or of paperboard**	AUD	296.337	**24.31***	5.317	**17.31***	0.820
		Qty.	13651.86	**16.11***	211.372	**9.897***	0.598
16	**61: - Articles of apparel and clothing accessories, knitted or crocheted**	AUD	49.529	**4.074***	4.946	**16.15***	0.798
		Qty.	35,080.4	**9.191***	1,919.04	**19.96***	0.858
17	**95: - Toys, games and sports requisites; Parts and accessories thereof**	AUD	71.030	**4.179***	4.771	**11.14***	0.653
		Qty.	115,133	**8.62***	3.561	0.011	0.000
18	**7: - Computer and Information Services**	AUD	-20.516	**-2.0****	4.623	**19.1***	0.859
		Qty.	N/A	N/A	N/A	N/A	N/A
19	**40: - Rubber and articles thereof**	AUD	161.858	**24.86***	4.319	**26.33***	0.913
		Qty.	42,085.4	**5.794***	3856.203	**21.07***	0.871
20	**8: - Royalties and Licence Fees**	AUD	330.936	**20.86***	4.271	**10.69***	0.634
		Qty.	N/A	N/A	N/A	N/A	N/A

Source: Compiled from Trade Data International, (2007) and the ABS (2007h; 2007i; 2007b; 2007c; 2007g; 2007f)

*** The quantity units of measurement are according to the Harmonized Commodity Description and Coding System (HS) convention and for the specific unit of measurement for the specific category visit: http://www.wcoomd.org/home_pfoverviewboxes.htm**

Table: 4.4 (Part A)

TOP 20 IMPORT CATEGORIES HS-2 and ANZSIC-1; Main Divisional Level AUD, mill. Quarterly Average, % of the Total						
Rank	1990-2006			2000-2006		
	Category Code: - Name	M, $m.	M,%	Category Code: - Name	M, $m.	M,%
1	84: - Nuclear reactors, boilers, machinery and mechanical appliances; Parts thereof	3,242.93	11.28	84: - Nuclear reactors, boilers, machinery and mechanical appliances; Parts thereof	3,941.60	10.69
2	2: - Travel Services	2,488.87	8.66	85: - Electrical machinery and equipment and parts thereof; Sound recorders and reproducers, television image and sound recorders and reproducers, and parts and accessories of such articles	3,314.04	8.99
3	85: - Electrical machinery and equipment and parts thereof; Sound recorders and reproducers, television image and sound recorders and reproducers, and parts and accessories of such articles	2,460.80	8.56	2: - Travel Services	3,068.47	8.32
4	1: - Transportation Services	2,326.50	8.09	1: - Transportation Services	2,997.10	8.13
5	87: - Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof	2,100.42	7.31	87: - Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof	2,914.26	7.90
6	27: - Mineral fuels, mineral oils and products of their distillation; bituminous substances; mineral …	1,658.35	5.77	27: - Mineral fuels, mineral oils and products of their distillation; bituminous substances; mineral …	2,735.75	7.42
7	99: - Combined confidential items and miscellaneous items	1,173.99	4.08	99: - Combined confidential items and miscellaneous items	1,360.80	3.69
8	9: - Other Business Services	888.67	3.09	30: - Pharmaceutical products	1,270.78	3.45
9	90: - Optical, photographic, cinematographic, measuring, checking, precision, medical or surgical instruments and apparatus; Parts and accessories thereof	856.64	2.98	90: - Optical, photographic, cinematographic, measuring, checking, precision, medical or surgical instruments and apparatus; Parts and accessories thereof	1,122.90	3.05
10	30: - Pharmaceutical products	729.75	2.54	71: - Natural or cultured pearls, precious and semi-precious stones, precious metals, metals clad with precious metal and articles thereof; Imitation jewellery; Coin	849.08	2.30

Source: Compiled from Trade Data International, (2007) and the ABS (2007h; 2007i; 2007b; 2007c; 2007g; 2007f)

Table: 4.4 Continued (Part B)

TOP 20 IMPORT CATEGORIES **HS-2 and ANZSIC-1; Main Divisional Level** **AUD, mill. Quarterly Average, % of the Total**						
Rank	**1990-2006**			**2000-2006**		
	Category Code: - Name	**M, $m.**	**M,%**	**Category Code: - Name**	**M, $m.**	**M,%**
11	**71: - Natural or cultured pearls, precious and semi-precious stones, precious metals, metals clad with precious metal and articles thereof; Imitation jewellery; Coin**	614.64	2.14	**9: - Other Business Services**	823.18	2.23
12	**39: - Plastics and articles thereof**	612.64	2.13	**39: - Plastics and articles thereof**	768.08	2.08
13	**29: - Organic chemicals**	527.61	1.84	**29: - Organic chemicals**	620.85	1.68
14	**88: - Aircraft, spacecraft, and parts thereof**	497.42	1.73	**88: - Aircraft, spacecraft, and parts thereof**	603.62	1.64
15	**48: - Paper and paperboard; Articles of paper pulp, of paper or of paperboard**	479.78	1.67	**48: - Paper and paperboard; Articles of paper pulp, of paper or of paperboard**	577.35	1.57
16	**8: - Royalties and Licence Fees**	478.28	1.66	**8: - Royalties and Licence Fees**	552.21	1.50
17	**73: - Articles of iron or steel**	363.07	1.26	**73: - Articles of iron or steel**	471.74	1.28
18	**40: - Rubber and articles thereof**	310.86	1.08	**94: - Furniture; Bedding, cushions and similar stuffed furnishings; Lamps and lighting fittings, not elsewhere specified or included; Illuminated signs, illuminated name-plates and the like; Prefabricated buildings**	417.54	1.13
19	**3: - Communication Services**	290.88	1.01	**40: - Rubber and articles thereof**	397.28	1.08
20	**62: - Articles of apparel and clothing accessories, not knitted or crocheted**	264.03	0.92	**62: - Articles of apparel and clothing accessories, not knitted or crocheted**	384.33	1.04

Source: Compiled from Trade Data International, (2007) and the ABS (2007h; 2007i; 2007b; 2007c; 2007g; 2007f)

4.4.3.1 MAJOR IMPORT CATEGORIES

The Top 10 M categories in Table 4.4, account for 62.36 percent of the total M in the LT, while the Top 10 M categories in the ST, accounts for 63.94 percent of the total M. In respect to the categories listed in Table 4.4, the categories that have maintained their ranking in both the LT and the ST, are categories 84, 05, 27, 99, 90, 39, 29, 88, 48, 73 and 62 for the goods, and 1 and 8 for the service categories. The categories, which have dropped in ranking between the two different time duration, are categories 40 for the goods, and 2, 3 and 9 for the service categories, while categories 85, 30 and 71, all goods categories, has moved to higher rankings. For further information in respect to the M ranking for both for the LT and the ST, the Top 50 M categories is presented in Appendix Tables 4.10-4.11, while Appendix Tables 4.1-4.7 shows the rankings for all 109 categories, which has been analysed. Now that all of the X and M categories are analysed and their trends, significance and rankings have been determined, a similar analysis will proceed with the NX analysis for the categories in the following section.

4.4.4 AUSTRALIAN NET EXPORT TRENDS

The NX trends analyses is critical in order to ensure that the categories that are selected in this chapter are the categories that account for a significant TD. While selecting the highest TD categories, it will ensure that the categories selected for further analysis are the categories that warrant attention.

Based on the AUD, mill., in Appendix Graphs 4.1-4.110, out of 107[69] categories analysed, 12 categories that are not significant either on 1, 5 nor on a 10 percent level of significance. Out of 95 categories with a significant NX Time-coefficient, 87 categories are significant at 1 percent, 6 categories are significant at 5 percent and 2 categories are significant at 10 percent level of significance. Out of the 87 categories with the Time-coefficient significant at a 1 percent level, for 32 categories the Time-coefficients is positive which means an improvements in the trade balance over-time, while for 55 categories the Time-coefficient is negative, which means a deterioration in the trade balance in that categories. Furthermore, 87 categories with a significant Time-coefficients at 1 percent level, 13 categories R^2 are between 81.04 and 89.92

[69] Category 98 for goods and category 4 for the service categories are excluded from this analysis, due to data unavailability.

percent, 32 categories R^2 are between 50.25 and 78.03 percent, while the remaining 42 categories R^2 are below 50 percent.

By observing the same NX Time-coefficients for all 96[70] goods categories measured in the QTY „000s, the NX Time-coefficient is not significant for 28 out of 96 categories. Out of 68 categories with a significant NX Time-coefficient, 62 are significant at 1 percent, 4 are significant at 5 percent and 2 are significant at 10 percent level of significance. Those 62 categories with a NX Time-coefficient significant at a 1 percent level, 18 categories Time-coefficients are positive, which means an improvement in the trade balance, while 44 categories NX Time-coefficient are negative, which means a deterioration in the trade balance in that category over-time. Furthermore, 62 categories with a significant NX Time-coefficients at 1 percent level, 5 categories R^2 are between 82.79 and 86.67 percent, 21 categories R^2 are between 50.76 and 79.61 percent, while the remaining 36 categories R^2 are below 50 percent. Finally, by observing the negative NX Time-coefficient which are significant at a 1 percent level; both for in the AUD, mill. (52 categories) and QTY „000s (44 categories), 33 categories; 34, 40, 56, 85, 62, 82, 94, 42, 21, 33, 68, 61, 64, 70, 38, 09, 65, 84, 69, 48, 92, 72, 19, 20, 57, 91, 43, 67, 16, 45, 51 49 and 05, are in both cases with a negative NX Time-coefficients both in AUD, mill. and the QTY „000s, while the rest of the categories in this group have the opposite trends.

By observing Table 4.5 which shows the Top 20 NX categories, category 85 has the highest negative NX Time-coefficient of -38.575 per quarter. This shows that the TD with the RoW in this category is growing by AUD38.58 mill. per quarter on average. The t-ratio of -20.3 is significant at 1 percent level and R^2 means that the time variable alone explains 86.2 percent of TD growth in this category. The same category 85 measured in the NX QTY, the Time-coefficient is also negative and shows that the QTY TD in this category is increasing by 12.33 mill. per quarter. The t-ratio for the QTY is -11.1 and is significant at 1 percent level of significance, while the R^2 shows that time explains 65 percent in the growth of the TD in QTY in this category. Comments regarding the remaining categories can be made with a similar approach. Now that the NX trend has been presented for all 97 goods and 10 service categories, an important aspect of the NX analysis is to observe the ranking measured in AUD, mill. values in all categories.

[70] Category 98 and 99 are excluded from this analysis, due to data unavailability.

Table: 4.5

TOP 20 NET EXPORT CATEGORIES - TRENDS

HS-2 and ANZSIC-1; Main Divisional Level

AUD, mill. & Qty.* '000's; (March 1990:1 – December 2006:4)

*** significant at the 1%, ** significance at 5%, ***significance at 10%, Prices 89/90**

Rank	Category Code: - Name		Constant	t-ratio	Time-Coefficient	t-ratio	R^2
1	85: - Electrical machinery and equipment and parts thereof; Sound recorders and reproducers, television image ….	AUD	-602.258	**-7.99***	-38.575	**-20.3***	0.862
		Qty.	-408,193	**-9.24***	-12,332.30	**-11.1***	0.650
2	87: - Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof	AUD	-667.212	**-9.50***	-25.585	**-14.5***	0.760
		Qty.	-1,872.85	**-6.42***	10.780	1.467	0.032
3	84: - Nuclear reactors, boilers, machinery and mechanical appliances; Parts thereof	AUD	-1,211.6	**-12.4***	-24.002	**-9.75***	0.590
		Qty.	-46,899	**-14.1***	-803.266	**-9.61***	0.583
4	1: - Transportation Services	AUD	118.118	**1.8*****	-20.394	**-12.3***	0.698
		Qty.	N/A	N/A	N/A	N/A	N/A
5	99: - Combined confidential items and miscellaneous items	AUD	2,079.40	**8.947***	-20.383	**-3.48***	0.155
		Qty.	N/A	N/A	N/A	N/A	N/A
6	30: - Pharmaceutical products	AUD	61.846	**2.26****	-12.687	**-18.4***	0.837
		Qty.	-150,142	**-3.19***	1,314.48	1.108	0.018
7	71: - Natural or cultured pearls, precious and semi-precious stones, precious metals, metals clad with precious metal and ….	AUD	1,127.10	**20.40***	-8.319	**-5.98***	0.351
		Qty.	99,477.2	**14.46***	1,878.31	**10.84***	0.640
8	90: - Optical, photographic, cinematographic, measuring, checking, precision, medical or surgical instruments ...	AUD	-315.990	**-11.9***	-8.125	**-12.2***	0.692
		Qty.	-32,705	**-2.89***	-656.22	**-2.3****	0.075
9	94: - Furniture; Bedding, cushions and similar stuffed furnishings; Lamps and lighting fittings, not elsewhere specified ….	AUD	27.841	1.3826	-7.250	**-14.3***	0.756
		Qty.	-302.835	-0.64	-245.299	**-20.7***	0.867
10	39: - Plastics and articles thereof	AUD	-245.398	**-18.8***	-6.639	**-20.2***	0.861
		Qty.	-928,723	**-3.77***	22,769.57	**3.67***	0.170
11	17: - Sugars and sugar confectionery	AUD	382.026	**9.012***	-5.822	**-5.45***	0.310
		Qty.	94,797.5	**3.746***	175.527	0.276	0.001
12	62: - Articles of apparel and clothing accessories, not knitted or crocheted	AUD	-27.006	**-2.4****	-5.645	**-20.2***	0.860
		Qty.	-14,710	**-5.01***	-1,067.07	**-14.4***	0.759
13	29: - Organic chemicals	AUD	-280.978	**-18.0***	-5.602	**-14.2***	0.754
		Qty.	-118,567	**-7.84***	-157.608	-0.414	0.003
14	72: - Iron and steel	AUD	268.990	**10.14***	-5.455	**-8.17***	0.503
		Qty.	843.0338	**14.45***	-9.363	**-6.37***	0.381
15	51: - Wool, fine or coarse animal hair; Horsehair yarn and woven fabric	AUD	1,257.680	**23.02***	-4.899	**-3.56***	0.161
		Qty.	180,055	**25.10***	-1,152.75	**-6.38***	0.381
16	73. Articles of iron or steel	AUD	-65.714	**-7.60***	-4.672	**-21.4***	0.874
		Qty.	-1,314,082	**-8.15***	-5,932.64	-1.460	0.031
17	61: - Articles of apparel and clothing accessories, knitted or crocheted	AUD	-20.634	-1.481	-4.476	**-12.8***	0.711
		Qty.	-33,023.2	**-8.64***	-1,881.63	**-19.6***	0.853
18	40: - Rubber and articles thereof	AUD	-129.938	**-17.3***	-4.146	**-21.9***	0.879
		Qty.	-38,763.9	**-5.24***	-3758.51	**-20.2***	0.860
19	95: - Toys, games and sports requisites; Parts and accessories thereof	AUD	-69.659	**-4.45***	-3.489	**-8.84***	0.542
		Qty.	-114,429	**-8.57***	2.048	0.006	0.00
20	48: - Paper and paperboard; Articles of paper pulp, of paper or of paperboard	AUD	-261.625	**-18.2***	-3.166	**-8.72***	0.535
		Qty.	-2,772.08	-1.342	-209.699	**-4.03***	0.197

Source: Compiled from Trade Data International, (2007) and the ABS (2007h; 2007i; 2007b; 2007c; 2007g; 2007f)

*** The quantity units of measurement are according to the Harmonized Commodity Description and Coding System (HS) convention and for the specific unit of measurement for the specific category visit: http://www.wcoomd.org/home_pfoverviewboxes.htm**

Table: 4.6 (Part A)

TOP 20 TRADE DEFICIT CATEGORIES HS-2 and ANZSIC-1; Main Divisional Level AUD, mill. Quarterly Average				
Rank	**1990-2006**		**2000-2006**	
	Category Code: - Name	**NX, $m.**	**Category Code: - Name**	**NX, $m.**
1	**84: - Nuclear reactors, boilers, machinery and mechanical appliances; Parts thereof**	-2,039.65	**85: - Electrical machinery and equipment and parts thereof; Sound recorders and reproducers, television image and sound recorders and reproducers, and parts and accessories of such articles**	-2,712.24
2	**85: - Electrical machinery and equipment and parts thereof; Sound recorders and reproducers, television image and sound recorders and reproducers, and parts and accessories of such articles**	-1,933.08	**84: - Nuclear reactors, boilers, machinery and mechanical appliances; Parts thereof**	-2,466.79
3	**87: - Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof**	-1,549.91	**87: - Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof**	-2,021.08
4	**90: - Optical, photographic, cinematographic, measuring, checking, precision, medical or surgical instruments and apparatus; Parts and accessories thereof**	-596.31	**1: - Transportation Services**	-1,004.22
5	**1: - Transportation Services**	-585.47	**90: - Optical, photographic, cinematographic, measuring, checking, precision, medical or surgical instruments and apparatus; Parts and accessories thereof**	-737.89
6	**39: - Plastics and articles thereof**	-474.43	**30: - Pharmaceutical products**	-646.68
7	**29: - Organic chemicals**	-474.24	**39: - Plastics and articles thereof**	-607.05
8	**30: - Pharmaceutical products**	-375.87	**29: - Organic chemicals**	-571.03
9	**48: - Paper and paperboard; Articles of paper pulp, of paper or of paperboard**	-370.85	**88: - Aircraft, spacecraft, and parts thereof**	-444.63
10	**88: - Aircraft, spacecraft, and parts thereof**	-349.59	**48: - Paper and paperboard; Articles of paper pulp, of paper or of paperboard**	-424.58

Source: Compiled from Trade Data International, (2007) and the ABS (2007h; 2007i; 2007b; 2007c; 2007g; 2007f)

Table: 4.6 Continued (Part B)

TOP 20 TRADE DEFICIT CATEGORIES HS-2 and ANZSIC-1; Main Divisional Level AUD, mill. Quarterly Average				
Rank	**1990-2006**		**2000-2006**	
	Category Code: - Name	**NX, $m.**	**Category Code: - Name**	**NX, $m.**
11	**8: - Royalties and Licence Fees**	-342.27	**8: - Royalties and Licence Fees**	-375.50
12	**40: - Rubber and articles thereof**	-272.98	**94: - Furniture; Bedding, cushions and similar stuffed furnishings; Lamps and lighting fittings, not elsewhere specified or included; Illuminated signs, illuminated name-plates and the like; Prefabricated buildings**	-371.33
13	**73: - Articles of iron or steel**	-226.89	**40: - Rubber and articles thereof**	-359.23
14	**94: - Furniture; Bedding, cushions and similar stuffed furnishings; Lamps and lighting fittings, not elsewhere specified or included; Illuminated signs, illuminated name-plates and the like; Prefabricated buildings**	-222.27	**62: - Articles of apparel and clothing accessories, not knitted or crocheted**	-342.36
15	**62: - Articles of apparel and clothing accessories, not knitted or crocheted**	-221.74	**73: - Articles of iron or steel**	-322.83
16	**95: - Toys, games and sports requisites; Parts and accessories thereof**	-190.02	**61: - Articles of apparel and clothing accessories, knitted or crocheted**	-270.92
17	**61: - Articles of apparel and clothing accessories, knitted or crocheted**	-175.05	**95: - Toys, games and sports requisites; Parts and accessories thereof**	-256.53
18	**9: - Other Business Services**	-164.55	**64: - Footwear, gaiters and the like; Parts of such articles**	-193.73
19	**49: - Printed books, newspapers, picture and other articles of the printing industry; Manuscripts, typescripts and plans**	-160.36	**49: - Printed books, newspapers, picture and other articles of the printing industry; Manuscripts, typescripts and plans**	-169.76
20	**64: - Footwear, gaiters and the like; Parts of such articles**	-146.28	**38: - Miscellaneous chemical products**	-157.49

Source: Compiled from Trade Data International, (2007) and the ABS (2007h; 2007i; 2007b; 2007c; 2007g; 2007f)

The top ranked TD category in Table 4.6 is category 84 in the LT, while the top TD category in the ST is category 85. These two categories occupy the first two places in both periods, category 84 occupies the first rank in the LT, while in the ST it has dropped to second place[71]. Category 85 occupies the second place in the LT, however, it has climbed to the top TD category in the ST. The average quarterly TD for category 84 is AUD2,039.65 mill. and AUD2,466.79 mill. per quarter in the LT and ST respectively. On the other hand, category 85 averaged a quarterly TD in the LT and ST of AUD1,933.08 mill. and AUD2,712.24 mill. respectively. This clearly indicates that the quarterly average of the TD for both these categories is noticeably increasing.

By observing Table 4.5 and Table 4.6, 7 of the Top 10 categories in Table 4.5 are also in the Top 10 categories in Table 4.6 in both the LT and the ST. This suggests that the categories that account for the highest increase of the TD trend overtime, are the categories that accounts for the top TD categories in AUD values, while these results are according to expected outcome.

4.4.4.1 MAJOR TRADE DEFICIT CATEGORIES

The Top 10 TD categories in Table 4.6 accounts for a quarterly average TD of AUD8,749.40 mill. and AUD11,636.19 in the LT and ST respectively. This is a difference for the Top 10 ranked TD categories of 33.03 percent in the two different time duration, which stipulates that the TD becomes more concentrated within fewer categories. While the TD becomes more concentrated within a fewer categories, some categories have maintained their ranking position in the two different time duration, and some have advanced to a higher ranking, while some have fallen in their ranking.

The categories listed in Table 4.6 that maintain their ranking both in the LT and the ST, are categories 87 and 49 for the goods, and category 8 for the service categories. The 9 categories which have dropped in their ranking in the two different time duration are categories 84, 90, 39, 29, 48, 40 73 and 95 for the goods, and 9 for the service categories, while categories 85, 30, 88, 94, 62, 61 and 64 for the goods, and 1 for the service categories have moved to higher rankings. For further information in

[71] Most of the Top TD categories listed in Table 4.6 are manufacturers' products, which is consistent with earlier finding in Chapter 3 that the Australian manufacturing sector is declining, hence TD levels in such categories are increasing.

respect to the TD ranking both for the LT and the ST, the Top 50 TD categories is presented in Appendix Tables 4.12-4.13, while Appendix Tables 4.1-4.7 shows the rankings for all 109 categories which have been analysed. Now that the X, M and NX for all categories have been analysed and their trends, significance, and ranking has been established, the first step in the identification of the major categories for further analysis will proceed in the next section.

4.5 IDENTIFICATION AND SELECTION OF MAJOR TRADING CATEGORIES, STEP ONE

The identification process of the categories which will be selected for further analysis are undertaken according to Diagram 4.2, and the selection protocol in this diagram contains 4 main phases. The first phase of the protocol refers to the LT and the last 3 phases to the ST. The entire selection process of the FA „PROTOCOL STEP ONE - CATEGORIES' is presented in the Appendix Tables 1.14-4.23 and generated data and the statistics used in this process are presented in Appendix Tables 4.1-4.13 and Appendix Graphs 4.1-4.110. The process of selection includes all 109 categories; 98 goods categories based on HS-2 and 11 service categories based on ANZSIC-1 level of aggregation. Diagram 4.2 represents the 4 main phases of the selection criteria which will be followed in this selection protocol. According to Diagram 4.2 the categories that will be selected for further analysis are the categories which satisfy all selection criteria; while the categories which do not satisfy all selection criteria will be excluded from further examination. The 3 main criteria that acted as the guiding principles when selection Diagram 4.2 was created, is a negative and significant NX trend, a substantial TD and a considerable X volume in the category under observation. However, before the analysis begins, comments about the structure of the selection criteria in Diagram 4.2 are presented next.

The first phase of the selection criteria is to identify a significant negative NX Time-coefficient. This criterion identifies the deteriorating trade balance category. A negative NX trends are observed from the point of the LT. If the NX Time-coefficient are negative and statistically significant measured in AUD, mill., the category is then progressed into the next phase of the selection criteria. However, if the category NX was negative but not significant on a 10 percent or a lower level of significance, the category was not instantly excluded from further analysis. Such a category was assessed based on NX QTY, which follows the same principles applied in the assessment based on AUD values. If such a category had a negative and statistically significant NX measured in the QTY, it was then progressed to the next phase of the selection criteria, which is the same at if it would be with a negative and significant NX measured in AUD values. This process has ensured that none of the categories with a negative and significant NX Time-coefficient, irrespective of whether it is measured in AUD or QTY values, are not excluded from further assessment. The categories that did not satisfy these criteria, either measured in AUD values nor QTY values are excluded from further assessment, while the category that did satisfy these selection criteria moved to the second phase of the selection.

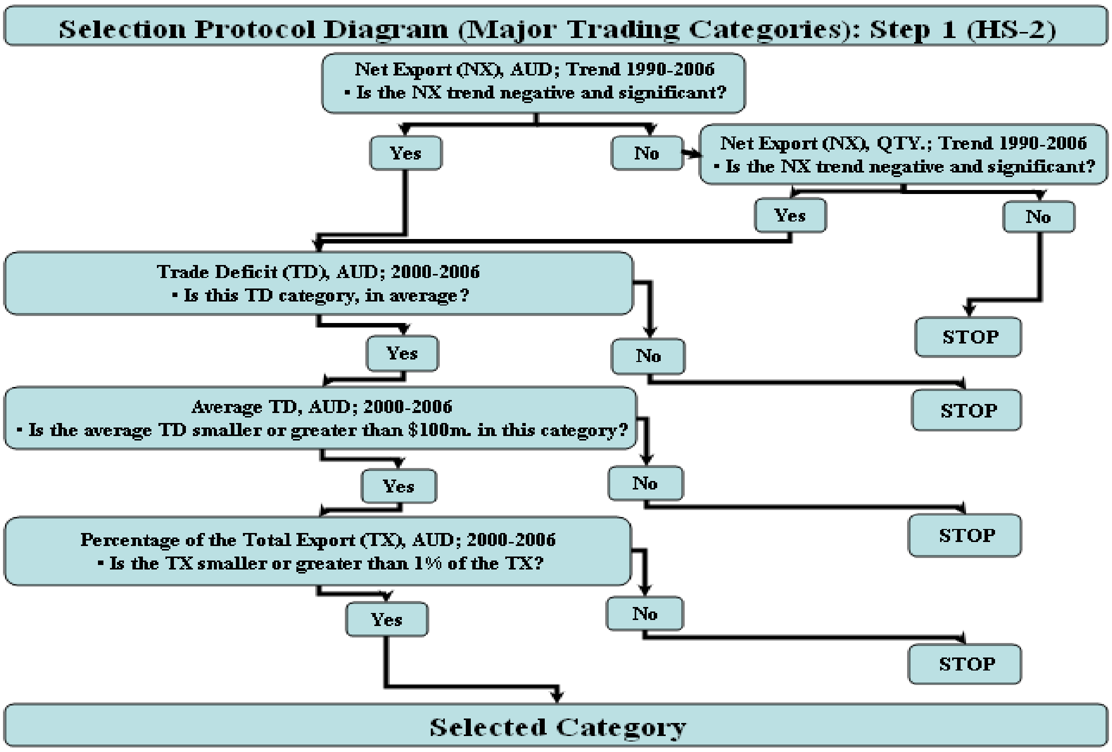
Once the category has progressed to the second phase of the selection protocol, this does not indicate that the category itself is a TD category, because even if the category had a negative and significant NX trend, the trade balance in that category can still be in surplus[72]. In order to ensure that the selected category is the deficit category, the second phase of the selection criteria is that the category must be the deficit category in the ST, on average. The ST focus ensures that trends that are more recent are the primary focus. The TD categories are then progressed into the next phase, while the categories that are not TD categories are excluded from further assessment.

Categories with a TD that has progressed into the third phase are not necessary the categories with a sizeable TD. In order to ensure that the selected category is with a sizeable TD, the criterion is that the TD is on average greater than AUD100 mill. in the ST. This procedure ensures that the categories selected are in the Top 50 TD categories. By observing Appendix Tables 4.12-4.13, the Top 50 TD categories, the quarterly average TD ranges from AUD2,712.24 mill. for category 85 to AUD20.97 for the category 65. By applying the criteria that the selected category quarterly average TD is in excess of AUD100 mill., it warrants that the categories that satisfy this selection criteria and do progress into the final phase of the selection protocol are in the Top 28 TD categories. The categories that satisfy this criterion are progressed into the final phase of the selection process, while the categories that did not are excluded from further assessment.

[72] This is due to the fact, that the NX Time-coefficient is negative and statistically significant for some categories, however, it has still not reached the point to constitute a deficit category. One of the example of such a scenario is when the initial X in the category has been considerably higher than the M, however, the X for whatever the reasons has started to decline relative to the M levels, while the X levels are still higher than M levels.

The final phase in the selection process presented in Diagram 4.2 is to ensure that the category selected is a competitive industry between Australia and the RoW producers. The selection criteria in this final phase is that the category percentage of the X in the ST must be greater than 1 percent of the total Australian X. This criterion guarantees that the category selected for further analysis accounts for a considerable X volumes by the Australian exporters. As such, this criterion enures that only internationally competitive categories are selected for further assessment. By observing Appendix Tables 4.8-4.9, it is apparent that in the ST, only the Top 20 X categories accounts for the total X higher than 1 percent, ranging from 14.95 to 1.19 percent. Based on this criterion, the selected category will certainly be in the Top 20 Australian X categories. Now that all phases of the selection process are explained, the FA of the selection protocol STEP ONE are undertaken.

Diagram: 4.2



The identification of the major categories for further analysis, according to Diagram 4.2 are presented in Appendix Tables 4.14-4.23. These tables shows all of the phases of the selection; which categories have been excluded from further assessment; which categories have progressed throughout all the phases of the selection criteria and are the selected categories for further analysis. In addition, these tables also shows at what specific phases of the selection process the categories that did not satisfy the selection criteria and have been excluded from further assessment.

According to Diagram 4.2, the selection analysis process in Appendix Tables 4.14-4.23 shows that the categories which did not have a negative and significant NX, either measured in the AUD nor the QTY[73] values and have been excluded from further assessment in the first phase, are in total 39 categories. The 30 goods and 9 services categories that are excluded in the first phase are the following categories; 01, 02, 04, 07, 08, 10, 11, 12, 22, 23, 26, 37, 44, 47, 50, 52, 53, 55, 58, 59, 60, 74, 75, 76, 79, 80, 81, 89, 97 and 98 for the goods; and 2, 3, 4, 5, 6, 7, 9, 10 and 11 for services. Furthermore, the categories that did not have the NX Time-coefficient negative and significant measured in AUD values, however, the NX are negative and significant measured in the QTY are the following 11 goods categories: 03, 14, 24, 25, 27, 28, 31, 35, 41, 54 and 18.

The categories that progressed into the second phase are assessed on whether the average TD exists in the category. The categories that did not have an average TD in the category are excluded in the second phase, and they are the following 13 goods categories; 03, 05, 06, 17, 25, 27, 28, 35, 41, 51, 71, 78 and 99.

The third phase of the selection protocol was to assess the remaining categories that had an average TD in the ST is greater than AUD100 mill. The categories that have a smaller TD than AUD100 mill. are the following 29 goods categories; 09, 13, 14, 15, 16, 18, 19, 20, 24, 32, 34, 36, 43, 45, 46, 54, 56, 57, 65, 66, 67, 68, 70, 72, 86, 91, 92, 93 and 96 which have been excluded from further assessment.

The final phase of the assessment for the categories which have progressed up to this phase, is to assess whether the total X in the ST in this category account for more than 1 percent of the total X. Out of the 28 remaining categories, 23 categories did not satisfy this criterion and are excluded from further examination and they are the following categories; 21, 29, 31, 33, 38, 39, 40, 42, 48, 49, 61, 62, 63, 64, 69, 73, 82, 83, 88, 90, 94 and 95 for the goods, and category 8 for the services.

The remaining 5 categories that have satisfied all selection criteria are the following categories:

[73] The QTY values are applicable for the goods categories only.

Goods, HS-2:

- **30: -** Pharmaceutical products
- **84: -** Nuclear reactors, boilers, machinery and mechanical appliances; Parts thereof
- **85: -** Electrical machinery and equipment and parts thereof; Sound recorders and reproducers, television image and sound recorders and reproducers, and parts and accessories of such articles
- **87: -** Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof

Services, ANZSIC-1:

- **1: -** Transportation Services

The trend statistics for these selected categories are presented in the next following 5 tables, Tables 4.7-4.11

The first table, Table 4.7 is reproduced from the Appendix Graph 4.30 and represents the numerical trend statistics for category 30.

Table: 4.7

TRENDS STATISTICS: CATEGORY 30 **AUD, mill. & Qty. (grams) '000's; (March 1990:1 – December 2006:4)** *** significant at the 1%, ** significance at 5%, ***significance at 10%, Prices 89/90**							
	Category Code: - Name		**Constant**	**t-ratio**	**Time-Coefficient**	**t-ratio**	**R^2**
1	**30: - Pharmaceutical products**	**Export, AUD**	-77.8291	**-3.61***	12.51331	**23.03***	0.889
		Import, AUD	-139.675	**-3.70***	25.20063	**26.52***	0.914
		Net Export, AUD	61.846	**2.26****	-12.6873	**-18.4***	0.837
		Export, Qty.	493.313	**1.7*****	110.025	**15.43***	0.783
		Import, Qty.	150,635	**3.207***	-1,204.46	-1.018	0.016
		Net Export, Qty.	-150,142	**-3.19***	1,314.482	1.1079	0.018

Source: Compiled from Trade Data International, (2007) and the ABS (2007h; 2007i; 2007b; 2007c; 2007g; 2007f)

By referring to Table 4.7, the X is on average growing by AUD12.51 mill. per quarter. The Time- coefficient is significant at 1 percent level of significance and explains for 88.9 percent of the growth in the total X in the LT. For the same period, the M in this category is increasing AUD25.2 mill. per quarter on average. It is apparent that the M trend is increasing faster than the X trend. Consequently, the TD is rising by AUD12.69 mill. per quarter on average. Both, M and NX Time-coefficients are significant at 1 percent level, while R^2 is 91.4 and 83.7 for M and NX respectively. By referring to QTY, the X is significant at 1 percent level with a positive Time-coefficient, which means an increase of the X QTY overtime on average by 0.11 mill. units per quarter. The M is negative and is decreasing by 1.2

mill., while the NX is increasing by 1.3 mill. units per quarter on average. These are interesting findings, because the NX in AUD, mill. is negative, while NX in QTY is positive, however NX measured in QTY is not significant.

The numerical trend summary for the second selected category 84, is presented in Table 4.8, which is reproduced from Appendix Graph 4.84

Table: 4.8

TRENDS STATISTICS: CATEGORY 84 **AUD, mill. & Qty. (number) '000's; (March 1990:1 – December 2006:4)** *** significant at the 1%, ** significance at 5%, ***significance at 10%, Prices 89/90**							
	Category Code: - Name		**Constant**	**t-ratio**	**Time-Coefficient**	**t-ratio**	R^2
2	**84: - Nuclear reactors, boilers, machinery and mechanical appliances; Parts thereof**	**Export, AUD**	626.781	**14.48***	16.70999	**15.32***	0.781
		Import, AUD	1,838.37	**16.48***	40.71191	**14.48***	0.760
		Net Export, AUD	-1,211.58	**-12.4***	-24.0019	**-9.75***	0.590
		Export, Qty.	3,928.09	**7.923***	32.49562	**2.60****	0.093
		Import, Qty.	50,826.6	**16.00***	835.7613	**10.44***	0.623
		Net Export, Qty.	-46,898.5	**-14.1***	-803.266	**-9.61***	0.583

Source: Compiled from Trade Data International, (2007) and the ABS (2007h; 2007i; 2007b; 2007c; 2007g; 2007f)

By referring to Table 4.8, the X is increasing by an average of AUD16.7 mill. per quarter on average, while Time-coefficient is significant at 1 percent level of significance and it explains 78.1 percent of the growth in the total X. For the same period, the M in this category is growing at AUD40.7 mill. per quarter on average. Furthermore, it is apparent that the M is increasing faster than the X, and as a result the TD is rising in this category, which is represented by a negative NX of AUD24 mill. per quarter on average. Both the M and the NX Time-coefficient are significant at 1 percent level, while R^2 is 76 and 59 for M and NX respectively. By referring to QTY, the X Time-coefficient is significant at 10 percent level, while the M and NX are significant at 1 percent level of significance. The Time-coefficient for QTY of X is positive, which shows an average increase of the X QTY overtime by 0.03 mill. units on average per quarter. The Time-coefficient for the QTY of M shows an increase in the M in this category by 0.84 mill. units per quarter on average, while the R^2 for the X and M is 9.3 and 62.3 percent respectively. The Time-coefficient for X QTY is significantly smaller than for that of the M, consequently the NX Time-coefficient is negative of 0.8 mill. units per quarter. Finally, the R^2 for the NX, QTY is 58.3 percent, which means that the Time-coefficient explains for more than half of the TD growth in this category.

The third selected category 85 is presented in Table 4.9, which is reproduced from Appendix Graph 4.85

Table: 4.9

TRENDS STATISTICS: CATEGORY 85 AUD, mill. & Qty. (number) '000's; (March 1990:1 – December 2006:4) * significant at the 1%, ** significance at 5%, ***significance at 10%, Prices 89/90							
	Category Code: - Name		**Constant**	**t-ratio**	**Time-Coefficient**	**t-ratio**	**R^2**
3	**85: - Electrical machinery and equipment and parts thereof; Sound recorders and reproducers, television image and sound recorders and reproducers, and parts and …**	**Export, AUD**	358.099	**10.95***	4.916501	**5.964***	0.350
		Import, AUD	960.357	**13.48***	43.49098	**24.23***	0.899
		Net Export, AUD	-602.258	**-7.99***	-38.5745	**-20.3***	0.862
		Export, Qty.	91,059.6	**3.491***	-589.099	-0.896	0.012
		Import, Qty.	499,252	**12.79***	11,743.24	**11.94***	0.684
		Net Export, Qty.	-408,193	**-9.24***	-12,332.3	**-11.1***	0.650

Source: Compiled from Trade Data International, (2007) and the ABS (2007h; 2007i; 2007b; 2007c; 2007g; 2007f)

By referring to Table 4.9, the X and M are increasing on average of AUD4.9 and AUD43.5 mill. per quarter on average respectively. At the same time, the TD in this category is rising on average by AUD38.57 mill. per quarter. All three X, M and NX are significant at 1 percent level of significance, while the R^2 for the X, M and NX is 35, 89.9 and 86.2 percent respectively. By referring to QTY, the X is not statistically significant, while M and NX are significant at 1 percent level. Based on QTY, the X is decreasing by 0.59 mill. units, while the M and TD are increasing on average by 11.74 and 12.3 mill. units per quarter respectively. Finally, the R^2 for the X, M and NX is 1.2, 68.4 and 65 percent respectively.

The fourth selected category 87, is presented in Table 4.10, which is reproduced from

Appendix Graph 4.87

Table: 4.10

TRENDS STATISTICS: CATEGORY 87 AUD, mill. & Qty. (number) '000's; (March 1990:1 – December 2006:4) * significant at the 1%, ** significance at 5%, ***significance at 10%, Prices 89/90							
	Category Code: - Name		**Constant**	**t-ratio**	**Time-Coefficient**	**t-ratio**	**R^2**
4	**87: - Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof**	**Export, AUD**	25.791	0.8772	15.209	**20.53***	0.865
		Import, AUD	693.003	**10.31***	40.795	**24.09***	0.898
		Net Export, AUD	-667.212	**-9.5***	-25.585	**-14.5***	0.759
		Export, Qty.	-58.915	-0.236	51.818	**8.233***	0.507
		Import, Qty.	1,813.94	**11.11***	41.038	**9.976***	0.601
		Net Export, Qty.	-1,872.85	**-6.42***	10.78	1.4673	0.032

Source: Compiled from Trade Data International, (2007) and the ABS (2007h; 2007i; 2007b; 2007c; 2007g; 2007f)

By referring to Table 4.10, the X and M is increasing by an average of AUD15.2 and AUD40.8 mill. per quarter on average respectively. At the same time, the TD in this category is increasing by AUD25.59 mill. per quarter on average. The X, M and NX are significant at 1 percent level of significance, while the R^2 is 86.5 for the X, 89.8 for the M and 75.9 for the NX. By referring to the QTY, the X and M is significant at 1 percent level, while the NX is not significant. The X and M is rising on average by

0.052 mill. and 0.04 mill. units per quarter respectively. The NX measured in QTY is positive, however, it is not significant. Furthermore, the R^2 measured in QTY for the X is 50.7 and M is 60.1 percent.

The fifth and final category selected is the category 1 and is presented in Table 4.11, which is reproduced from Appendix Graph 4.100.

Table: 4.11

TREND STATISTICS: CATEGORY 1 AUD, mill. & Qty. (hours) '000's; (March 1990:1 – December 2006:4) * significant at the 1%, ** significance at 5%, ***significance at 10%, Prices 89/90								
	Category Code: - Name		**Constant**	**t-ratio**	**Time-Coefficient**	**t-ratio**	**R^2**
5	**1: - Transportation Services**	**Export, AUD**	1,254.08	**29.55***	14.115	**13.19***	0.725
		Import, AUD	1,135.96	**21.86***	34.509	**26.36***	0.913
		Net Export, AUD	118.118	**1.8*****	-20.394	**-12.3***	0.698
		Export, Qty.	N/A	N/A	N/A	N/A	N/A
		Import, Qty.	N/A	N/A	N/A	N/A	N/A
		Net Export, Qty.	N/A	N/A	N/A	N/A	N/A

Source: Compiled from Trade Data International, (2007) and the ABS (2007h; 2007i; 2007b; 2007c)

According to Table 4.11, the X and M is increasing by an average of AUD14.12 and AUD34.51 mill. per quarter on average respectively. At the same time, the TD in this category is rising on average by AUD20.39 mill. per quarter. The X, M and NX are significant at 1 percent level of significance, while the R^2 for the X, M and NX is 72.5, 91.3 and 69.8 respectively.

Now that the five categories have been selected, it is important to summarize some of the key facts about these five selected categories, which are as follows:

- By referring to Tables 4.7-4.11, the combined LT X, M and NX trends for the period 1990-2006 in these five categories, are:
  - X is growing on average by an AUD63.46 mill. per quarter.
  - M is increasing on average by an AUD184.7 mill. per quarter and
  - TD is increasing on average by an AUD121.24 mill. per quarter.
- By referring to Table 4.2, the X values in AUD, mill. are:
  - Period 1990-2006 (LT); the X in these five categories accounts for 13.67 percent of the total Australian X.
  - Period 2000-2006 (ST); the X in these five categories accounts for 14.41 percent of the total Australian X.
    - This is a difference of 5.41 percent in the two different time duration.

- Period 1990-2006 (LT); the quarterly average X in these five categories accounts for an AUD4,376.4 mill.
- Period 2000-2006 (ST); the quarterly average X in these five categories accounts for an AUD5,586.7 mill.
  - This is a difference of 27.66 percent in the two different time duration.
- The top X rankings are:
  - Period 1990-2006 (LT); these five categories occupied the Top 18 positions (5^{th}, 7^{th}, 14^{th}, 15^{th} and 18^{th}).
  - Period 2000-2006 (ST); these five categories occupied the Top 16 positions (5^{th}, 6^{th}, 14^{th}, 15^{th} and 16^{th}).

- By referring to Table 4.4, the M values in AUD, mill. are:
  - Period 1990-2006 (LT); the M in these five categories accounts for 37.78 percent of the total Australian M.
  - Period 2000-2006 (ST); the M in these five categories accounts for 39.16 percent of the total Australian M.
    - This is a difference of 3.65 percent in the two different time duration.
  - Period 1990-2006 (LT); the quarterly average M in these five categories accounts for an AUD10,860.39 mill.
  - Period 2000-2006 (ST); the quarterly average M in these five categories accounts for an AUD14,438 mill.
    - This is a difference of 32.94 percent in the two different time duration.
  - The top M rankings are:
    - Period 1990-2006 (LT); these five categories occupied the Top 10 positions (1^{st}, 3^{rd}, 4^{th}, 5^{th} and 10^{th}).
    - Period 2000-2006 (ST); these five categories occupied the Top 8 positions (1^{st}, 2^{nd}, 4^{th}, 5^{th} and 8^{th}).
- By referring to Table 4.6, the TD values in AUD, mill. are:
  - Period 1990-2006 (LT); the quarterly average TD in these five categories accounts for an AUD6,484 mill.

- Period 2000-2006 (ST); the quarterly average TD in these five categories accounts for an AUD8,551 mill.
    - This is a difference of 31.88 percent in the two different time duration.
- The top TD rankings are:
    - Period 1990-2006 (LT); these five categories occupied the Top 8 positions (1st, 2nd, 3rd, 5th and 8th).
    - Period 2000-2006 (ST); these five categories occupied the Top 6 positions (1st, 2nd, 3rd, 4th and 6th).

Based on these summaries, the five selected categories in the ST accounts for more than 14 percent of the total Australian X, and this percentage is increasing. The M trends are even more pronounced, and these five categories in the ST account for almost 40 percent of the total Australian M, and this percentage is increasing. The only encouraging sign is that the percentage of the total X in these categories is increasing faster than the percentage of the total M levels. Finally, by observing the TD level in these five categories, it is apparent that the Australian TD is becoming more concentrated within these five categories. In the ST, these five categories selected are in the Top 6 TD categories in Australia. Now that the main categories are selected, identification of the major trading countries will be undertaken in the next section.

4.6 TRENDS IN THE AUSTRALIAN TRADING POSITION – COUNTRIES

The trends analysed in this section are in respect to the total X, M and NX between Australia and 242 SCE in the world. Due to data unavailability for the service sector[74] on a country level, all analysis is conducted based on the X and M flows in goods alone. Unlike for the identification of the major trading categories in STEP ONE, in this section the trend statistics and the graphs are not generated for all countries. Such an approach was not considered necessary, mainly because the majority of the countries would have a negligible X and M volumes with Australia. The adopted approach for the analysis in this section is the statistical data tables for the X, M and NX in AUD, mill. between Australia and 242 SCE. The statistics used are the X, M

[74] Because the X and M data are not available on a country level for the service sector, once the major trading countries are identified based on the goods X and M volumes, it will be assumed that trends in the services are likely to follow that for the trade in the goods.

and NX values and their percentages and all these values are summarized in Tables 4.12-4.14. Furthermore, all analyses in this section are based on annual time series data, for the period between 1990-2006 and all data are observed in AUD values only. The main data, generated statistics and selection protocol are presented in STAGE TWO - STEP ONE of the analysis of the trading countries in Appendix Tables 4.24-4.56.

As in the process of the identification of the major categories STEP ONE, this stage will follow alike systematic approach. The first step is to create an easy reference point regarding the X, M and NX between Australia and 242 SCE. Once this is accomplished, it will provide the point of reference during and after the selection of the SCE in this stage. The following sections will individually comment about the X, M and NX between Australia and major trading countries in more detail.

4.6.1 AUSTRALIAN EXPORT TRENDS

The X analysis is conducted in order to identify the X magnitude and classify the major X destination countries. This assessment is important in order to determine the X volumes trends and imply future X potential. Table 4.12 represents the Top 20 X

Table: 4.12

TOP 20 EXPORT DESTINATION COUNTRIES: AUSTRALIA AUD, mill. Quarterly Average, % of the Total						
Rank	**1990-2006**			**2000-2006**		
	Country	**X, $m.**	**X,%**	**Country**	**X, $m.**	**X,%**
1	**Japan**	4,930.9	19.88	**Japan**	5,650.5	18.56
2	**United States of America**	2,169.4	8.75	**United States of America**	2,740.9	9.00
3	**Republic of Korea**	1,760.1	7.10	**China**	2,557.4	8.40
4	**New Zealand**	1,663.5	6.71	**Republic of Korea**	2,285.4	7.51
5	**China**	1,513.2	6.10	**New Zealand**	2,184.7	7.18
6	**Singapore**	1,127.6	4.55	**United Kingdom**	1,416.7	4.65
7	**United Kingdom**	1,071.9	4.32	**Singapore**	1,206.9	3.96
8	**Taiwan**	982.87	3.96	**Taiwan**	1,169.2	3.84
9	**Hong Kong (Sar of China)**	763.57	3.08	**India**	1,027.5	3.38
10	**Indonesia**	695.37	2.80	**Indonesia**	803.82	2.64
11	**India**	608.38	2.45	**Hong Kong (Sar of China)**	788.64	2.59
12	**Malaysia**	523.59	2.11	**Thailand**	673.43	2.21
13	**Thailand**	482.26	1.94	**Malaysia**	589.00	1.93
14	**Country not available**	395.69	1.60	**Saudi Arabia**	479.57	1.58
15	**Italy**	385.07	1.55	**Canada**	452.29	1.49
16	**Canada**	376.31	1.52	**Italy**	441.93	1.45
17	**Germany**	332.66	1.34	**Netherlands**	438.86	1.44
18	**Netherlands**	317.53	1.28	**South Africa**	386.54	1.27
19	**Country Conf Alumina**	296.07	1.19	**Germany**	352.71	1.16
20	**France**	288.68	1.16	**France**	343.86	1.13

Source: Compiled from Trade Data International, (2007) and the ABS (2007d; 2007e)

destination countries in descending order, in the quarterly average AUD, mill. and the percentage of the total X for the LT and the ST. All two hundred and forty two SCE are analysed simultaneously, and only the Top 20 are presented here, whilst in Appendix Table 4.37, the Top 50 are listed and Appendix Tables 4.24-4.36 consists of all 242 SCE.

According to Table 4.12, the top ranked country for both the LT and the ST is Japan. Japan accounts for the quarterly average X of AUD4, 930.90 and AUD5, 650.50 mill. or 19.88 and 18.56 percent of total X in the LT and ST respectively. Based on these values, it is apparent that the percentage of the total Australian X to Japan has slightly decreased, however, measured in AUD values it is evident that between the LT and the ST, the average quarterly X values are higher by AUD719.60 mill., which is a difference of 14.6 percent in the two different time duration. Further comments regarding the remaining countries in Table 4.12 can be made with a similar approach.

4.6.1.1 MAJOR EXPORT DESTINATION COUNTRIES

Based on the top X countries in Table 4.12, Top 2 X countries for Australia are Japan and The United States of America, both for the LT and the ST. However, the overall percentage of the total Australian X to these 2 countries has decreased in the two different time duration, and this is because that most noticeably countries like China is becoming a more significant X destination country for Australia. China has increased its percentage as an X destination country for total Australian X from 6.1 to 8.4 percent, in the two different time duration.

Furthermore, according to Table 4.12, the countries that have maintained their ranking amongst the Top 20, both in the LT and the ST are Japan, The United States of America, Taiwan, Indonesia and France. The countries, which have dropped in their X destination ranking in the two different time duration, are The Republic of Korea, New Zealand, Singapore, Hong Kong (Sar of China), Malaysia, Italy, Germany, Country Conf Alumina and Country not Available[75]. Finally, the countries that have improved their status and have moved to upper rankings are China, The United Kingdom, India, Thailand, Canada and The Netherlands, while the 2 countries outside the Top 20 in the LT; South Africa and Saudi Arabia have become amongst the Top

[75] Country not Available is an indistinguishable country or territory and has dropped in ranking from 14th to the 174th place One of the reason for a decline in ranking is that the trade data including X data are employing better methods of collection, reporting and recording of the countries trade data. Accordingly, processes are more accurate and the trade volumes are assigned under specific countries, rather than remaining unclassified, and being recorded under the „Country not Available'.

20 X destination countries in the ST. For further information in respect to the X destination countries ranking for both for the LT and the ST, the Top 50 X destination countries is presented in Appendix Table 4.37, while Appendix Tables 4.24-4.36 shows the rankings for all 242 SCE that have been analysed. Now that all of the X destination countries have been presented and their ranking has been determined, a similar examination will proceed with the M source countries in the following section.

4.6.2 AUSTRALIAN IMPORT TRENDS

The M analysis is undertaken in order to identify the M magnitudes and to determine the major M source countries. This appraisal is an important requirement, in order to determine the M volumes trends and imply the M source country potential in the future. Table 4.13 represents the Top 20 M source countries in descending order, in the quarterly average AUD mill. values and the percentages of the total M for both the LT and the ST. All 242 SCE are analysed simultaneously, and only the Top 20 are presented here, while in the Appendix Table 4.38 the Top 50 M source countries are listed, while Appendix Tables 4.24-4.36 consists of all 242 SCE in the world.

Table: 4.13

TOP 20 IMPORT SOURCE COUNTRIES: AUSTRALIA
AUD, mill. Quarterly Average, % of the Total

Rank	1990-2006			2000-2006		
	Country	M, $m.	M, %	Country	M, $m.	M, %
1	United States of America	4,992.4	19.26	United States of America	6,236.2	17.13
2	Japan	3,319.9	12.81	Japan	4,115.2	11.30
3	China	2,203.4	8.50	China	4,066.5	11.17
4	Germany	1,451.9	5.60	Germany	1,983.5	5.45
5	United Kingdom	1,369.2	5.28	United Kingdom	1,671.1	4.59
6	Singapore	1,007.9	3.89	Singapore	1,607.0	4.41
7	New Zealand	995.90	3.84	Republic of Korea	1,303.4	3.58
8	Republic of Korea	878.72	3.39	New Zealand	1,288.1	3.54
9	Malaysia	755.31	2.91	Malaysia	1,267.9	3.48
10	France	729.54	2.81	France	1,087.3	2.99
11	Italy	718.96	2.77	Italy	1,038.4	2.85
12	Taiwan	709.19	2.74	Thailand	985.68	2.71
13	Indonesia	640.49	2.47	Indonesia	970.43	2.67
14	Thailand	560.28	2.16	Taiwan	884.71	2.43
15	Canada	385.31	1.49	Viet Nam	712.46	1.96
16	Sweden	381.37	1.47	Canada	490.46	1.35
17	Viet Nam	352.75	1.36	Sweden	472.43	1.30
18	Papua New Guinea	309.50	1.19	Ireland	423.50	1.16
19	Switzerland	275.50	1.06	Papua New Guinea	411.64	1.13
20	Hong Kong (Sar of China)	273.38	1.05	Switzerland	350.79	0.96

Source: Compiled from Trade Data International, (2007) and the ABS (2007d; 2007e)

According to Table 4.13, the top ranked countries for both the LT and the ST, are The United States of America, Japan, China, Germany, The United Kingdom and

Singapore. These 6 countries accounts for 55.34 percent of the total Australian M in goods in the LT, while the same 6 countries account for 54.22 percent of the total M to Australia in the ST. Although the percentage has decreased slightly in the two different time duration, these 6 countries still represent over half of the M from the RoW in both periods. Furthermore, these 6 countries account for the quarterly average M of AUD14,344.70 mill. in the LT, while in the ST the quarterly average of M from these 6 countries is higher and reaching AUD19,678.50 mill. This difference is equivalent to 37.14 percent in the two different time duration. By following a similar approach, the comments about the remaining countries in Table 4.13 can be made.

4.6.2.1 MAJOR IMPORT SOURCE COUNTRIES

According to Table 4.13, the Top 6 M source countries have maintained their ranking, however, some countries have increased their overall percentage share of the total M to Australia, while some of these 6 countries overall percentage share of the total M to Australia has decreased. Of the Top 6 countries, only the M shares from China and Singapore are higher, while for The United States of America, Japan, Germany and The United Kingdom, the overall M share is lower. The most noticeable decrease in the M share is the M originating from The United States of America, while the most noticeable increase in M share is the M originating from China.

Furthermore, in respect to the Top 20 M countries listed in Table 4.13, the countries that have maintained their ranking both in the LT and the ST, are The United States of America, Japan, China, Germany, The United Kingdom, Singapore, Malaysia, France, Italy and Indonesia. The countries that have dropped in their M source ranking in the two different time duration are New Zealand, Taiwan, Canada, Sweden, Papua New Guinea and Hong Kong (Sar of China). Finally, the countries that improved their status and has moved to upper rankings are Republic of Korea, Thailand, Vietnam and Switzerland, while the country outside the Top 20 in the LT, is Ireland and has become amongst the Top 20 M source country in the ST. For further information in respect to the M destination countries rankings both for LT and the ST, the Top 50 M source countries are presented in Appendix Table 4.38, while the Appendix Tables 4.24-4.36 shows the rankings for all 242 SCE, which has been analysed. Now that all M source countries have been presented and their ranking have been determined, a similar analysis will precede with the TD countries in the following section.

4.6.3 AUSTRALIAN NET EXPORT TRENDS

The NX trends analyses are carried-out in order to classify the major TD countries and to identify their magnitude. This assessment is critical in order to ensure that the countries that are selected in this section are the countries that account for a significant TD. While ensuring that the highest TD countries are selected, it will ensure that the countries selected for further analysis are the countries that warrant attention. Table 4.14 represents the Australian Top 20 TD countries for both the LT and the ST, in total and quarterly average TD in AUD mill. values. The ranking is in ascending order to ensure that the countries with the highest negative NX or highest TD are ranked first. All 242 SCE are included in the analysis and the Top 20 TD countries are presented here, whilst in the Appendix Table 4.39 Top 50 TD countries are listed and Appendix Tables 4.24-4.36 consists of all 242 SCE.

Table: 4.14

TOP 20 TRADE DEFICIT COUNTRIES: AUSTRALIA
AUD, mill. Total, Quarterly Average

Rank	1990-2006			2000-2006		
	Country	**Total**	**Average**	**Country**	**Total**	**Average**
1	**United States of America**	-191,963	-2,823.00	**United States of America**	-97,869	-3,495.25
2	**Germany**	-76,109	-1,119.25	**Germany**	-45,661	-1,630.75
3	**China**	-46,940	-690.25	**China**	-42,257	-1,509.25
4	**France**	-29,980	-441.00	**France**	-20,814	-743.25
5	**Italy**	-22,703	-333.75	**Malaysia**	-19,010	-679.00
6	**Sweden**	-22,303	-328.00	**Italy**	-16,701	-596.50
7	**United Kingdom**	-20,210	-297.25	**Viet Nam**	-15,449	-551.75
8	**Viet Nam**	-17,661	-259.75	**Sweden**	-11,449	-409.00
9	**Malaysia**	-15,756	-231.75	**Singapore**	-11,201	-400.00
10	**Ireland**	-13,711	-201.75	**Ireland**	-9,763	-348.75
11	**Aust Fishing Zone**	-12,212	-179.50	**Thailand**	-8,743	-312.25
12	**Switzerland**	-9,867	-145.00	**Switzerland**	-7,907	-282.50
13	**Austria**	-7,744	-114.00	**United Kingdom**	-7,123	-254.50
14	**Denmark**	-7,040	-103.50	**Aust Fishing Zone**	-6,786	-242.25
15	**Thailand**	-5,306	-78.00	**Austria**	-5,005	-178.75
16	**Finland**	-4,060	-59.75	**Denmark**	-4,792	-171.25
17	**Brunei Darussalam**	-3,938	-58.00	**Indonesia**	-4,665	-166.50
18	**Israel**	-3,612	-53.00	**Papua New Guinea**	-4,417	-157.75
19	**Norway**	-3,610	-53.00	**Brunei Darussalam**	-4,128	-147.50
20	**Puerto Rico**	-3,334	-49.00	**Norway**	-2,444	-87.25

Source: Compiled from Trade Data International, (2007) and the ABS (2007d; 2007e)

According to Table 4.14, the Top 4 TD countries for both LT and the ST, are The United States of America, Germany, China and France. These 4 countries account for the quarterly average TD of AUD5,073.50 mill. in the LT, while the same 4 countries account for the quarterly average TD of AUD7,378.50 mill. in the ST, which is higher by 45.4 percent in the two different time duration, and this shows the velocity of an increase in the Australian TD with these countries. Further comments regarding the remaining categories in Table 4.14 can be made with a similar approach.

4.6.3.1 MAJOR TRADE DEFICIT COUNTRIES

According to Table 4.14, the Top 4 TD countries have maintained their ranking, both in the LT and in the ST. Furthermore, additional countries within the Top 20 TD countries that have maintained their rankings are Ireland and Switzerland. For the rest of the TD countries in the Top 20, some country rankings have dropped, while some countries have advanced to a higher ranking. The country which has dropped in their TD ranking in the two different time duration are Italy, Sweden, The United Kingdom, Aust Fishing Zone, Austria, Denmark, Finland, Brunei Darussalam, Israel, Norway and Puerto Rico. Finally, the countries that have moved to upper rankings are Vietnam, Malaysia and Thailand, while the country outside the Top 20 in the LT Papua New Guinea, Indonesia and Singapore have emerged in the Top 20 TD countries in the ST. Singapore and Indonesia deserve special attention, because both countries in the LT are the net importers with Australia, however, in the ST, they emerged in the Top 17 TD countries, occupying the 9th and 17th place respectively. According to Appendix Tables 4.24-4.36, Indonesia has advanced with a NX ranking from 225th to 17th place, while Singapore has climbed from 232nd to the 9th place. These 2 countries in the LT have been Australia's trade surplus countries, with a quarterly average balance of a positive AUD174.58 mill., while in the ST these 2 countries account for the quarterly average TD of AUD566.66 mill.

For further information in respect to the TD countries ranking both for the LT and the ST, the Top 50 TD countries are presented in Appendix Table 4.39, while Appendix Tables 4.24-4.36 shows the rankings for all 242 SCE, which have been analysed. Now that all X destination, M source and major TD countries have been analysed and their rankings have been determined, the first step in the identification of the major TD countries is explained in the next section.

4.7 IDENTIFICATION AND SELECTION OF MAJOR TRADE DEFICIT COUNTRIES, STEP ONE

The identification process of the major TD countries that will be selected for further analysis is according to Diagram 4.3, and the selection protocol in this diagram consists of four main phases and all phases in the selection protocol refer to the ST.

This is because more recent trends are considered of higher significance than the LT trends. The entire process of the selection in the FA „PROTOCOL STEP ONE - COUNTRIES' are presented in Appendix Tables 4.40-4.56 and generated data and the statistics used originate from Appendix Tables 4.24-4.39. The process of selection includes the total X and M in goods between Australia and all 242 SCE. According to the analysis in Appendix Table 4.24-4.36, initially the 242 SCE have been analysed, however, in the selection process only 235[76] SCE are considered.

Diagram 4.3 represents all of the phases of the selection criteria which will be followed and used in this selection protocol. As in the selection of the major categories in STEP ONE, the same principles are applicable here in the selection of the major TD countries. The SCE that will be selected for further analysis are those that satisfy all selection criteria, while the SCE which do not satisfy all selection criteria, will be excluded from further examination. The three main criteria that acted as the guiding principles when Diagram 4.3 was created, was a substantial TD and considerable M and X between Australia and the country under examination. Diagram 4.2 and Diagram 4.3 have fundamental similarities; however, they are slightly different. The main difference is that, Diagram 4.3 unlike Diagram 4.2 gives considerable emphasises on the M, and this is because the M trends and volumes are fundamental factors that influences the magnitude of the TD levels. The four main selection criteria of the major TD countries in Diagram 4.3 are explained next.

The first phase is whether a country under examination is in the Top 50 TD countries, and this criterion ensures that only the top TD countries are selected. If the country under examination is in the Top 50 TD countries, then that country is progressed into the next phase of the selection protocol, and if not, it is then excluded from further assessment.

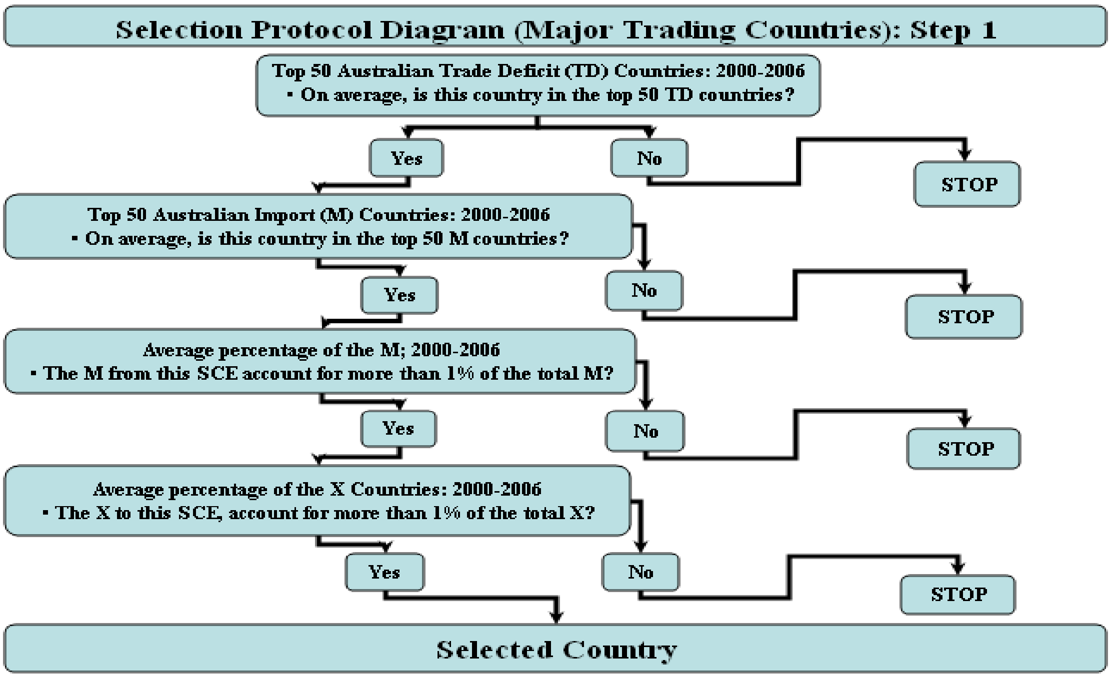
The countries that have progressed into the second phase of the selection protocol are examined in the second phase, on whether the average level of the M from that country is in the Top 50 M countries in the ST. This ensures that only the top M countries are considered in the further selection process and the ST placing more emphasis on a more recent development. The countries which the M level ranks are

[76] The remaining 7 SCE such as Antarctica, East Timor, Palestine, Wake Island and Western Sahara are not included in the FA, due to limited data availability, unspecified locations and data classification. However, regardless of exclusion of these SCE in the FA, their impact on the outcome was negligible, due to their small trading volumes with Australia.

amongst the Top 50 are progressed into the next phase, while countries that are outside the Top 50 M countries are excluded from further assessment.

The countries that have progressed into the third phase of the selection protocol were assessed whether the average M from that country is greater than 1 percent of the total M volumes. This selection criterion is mainly because even if the particular country is in the Top 50 M countries, it does not warrant that the M volume from that country is considerable (>1%). This criterion guarantees that countries progressing into the next phase accounts for a significant M volumes, and warrants further examination. By observing Table 4.13 and Appendix Table 4.38, it is apparent that only the Top 19 countries in the ST accounts for the total M higher than 1 percent, ranging from 17.3 to 1.13 percent. Based on this criterion, the selected country will certainly be amongst the Top 19 M source countries. The countries that satisfy this selection criterion are then progressed into the final phase of the selection criteria, while the countries that do not satisfy this selection criterion are excluded from further assessment.

Diagram: 4.3



The final phase of the selection protocol is to assess whether the average X from Australia to the country under examination is greater than 1 percent of the total X volumes. This criterion guarantees that the countries selected accounts for a significant X destination and that considerable markets exist within that country for the Australian produced products. This will ensure that the major TD country selected is the country where the prospects of an increasing Australian X volumes are sensible and the probability of the trade balance improvements with that country is realistic. Furthermore, this selection criterion will also justify a bilateral trade patterns analysis in respect to the Australian TD with that country. Based on these principles and selection criteria in Diagram 4.3, the FA of the selection protocol STEP ONE, is conducted next.

The identification of the major TD countries for further analysis, according to Diagram 4.3 are presented in Appendix Tables 4.40-4.56. These tables shows all phases of the selection, and which countries have been excluded from further assessment, and which TD countries have progressed throughout all the stages of the selection criteria and are the selected TD countries. Furthermore, these tables shows at what specific phase of the selection process the countries that have been excluded from further assessment that did not satisfy the specific selection criterion.

In the first phase of the selection criteria according to the Diagram 4.3, the selection analysis process in Appendix Tables 4.40-4.56, 185 out of 235 SCE are not in the Top 50 TD countries. These SCE have been excluded from further assessment in the first phase and the remaining 50 SCE that progressed to the next phase are listed in the Appendix Table 4.39, in the Top 50 TD countries.

The countries that progressed into the second phase are assessed whether they are in the Top 50 M countries. The 16 countries; Belarus, Costa Rica, Cote d Ivoire, Country not Available, Croatia, Czech Republic, Estonia, Gabon, Korea, Dem Peoples Rep., Marshall Islands, Panama, Peru, Samoa, Slovak Republic, Slovenia and Swaziland did not satisfy this selection criterion and have been excluded from further assessment.

The third phase of the selection protocol was to assess the percentage of the total M to Australia for the remaining countries; the criterion is whether the average M to Australia accounts for more than 1 percent of the total M from the RoW. In total, 19 countries did not satisfy this criterion and are excluded from further assessment. The following countries have been excluded in this phase: Argentina, Aust. Fishing Zone, Austria, Belgium-Luxembourg, Brazil, Brunei Darussalam, Denmark, Finland, Greece, Hungary, Israel, Mexico, Norway, Poland, Portugal, Puerto Rico, Qatar, Spain and Switzerland.

The final phase of the assessment for the countries which have progressed to this final phase of the selection protocol, is to assess whether the Australian total X to the country under examination accounts for more than 1 percent of the total Australian X. The 15 remaining countries have been examined against this criterion, and all 15 countries have satisfied this criterion and are the selected major TD countries. This finding is rather an interesting piece of information, which implies that the Australian major TD countries are in fact our major X destination countries also.

The 15 selected countries that satisfied all selection criteria in Diagram 4.3 are:

- Canada
- China
- France
- Germany
- Indonesia
- Ireland
- Italy
- Malaysia
- Papua New Guinea
- Singapore
- Sweden
- Thailand
- United Kingdom
- The United States of America and
- Vietnam

The following section will comment on the selected 15 countries regression trends, which have been generated according to Equation 4.1-4.3 in the Section 4.4 and these trends statistics are presented in Table 4.15

According to Table 4.15, the X Time-coefficients range from AUD792.83 mill. for China, followed by United States of America with AUD357.8 mill., while the lowest is Papua New Guinea with a negative AUD0.672 mill. per annum on average. Out of 15 selected countries, 9 countries have the Time-coefficient significant at 1 percent, 2 countries at 10 percent, while 4 countries, the X Time-coefficient is not significant at 1, 5 or at 10 percent level of significance. Furthermore, R^2 ranging from 86.1 percent

Table: 4.15

SELECTED TRADE DEFICIT COUNTRIES - TRENDS STATISTICS AUD, mill. (1990 – 2006; Annual Data)							
* significant at the 1%, ** significance at 5%, ***significance at 10%, Prices 1990							
	Country		**Constant**	**t-ratio**	**Time-Coefficient**	**t-ratio**	**R^2**
1	**Canada**	**X**	1,061.34	**7.459***	49.326	**3.552***	0.457
		M	780.96	**9.785***	84.468	**10.84***	0.887
		NX	280.37	1.684	-35.142	**-2.2****	0.238
2	**China**	**X**	-1,082.9	-1.286	792.826	**9.647***	0.861
		M	-3,925.9	**-2.3****	1,415.512	**8.647***	0.833
		NX	2,843	**3.198***	-622.686	**-7.18***	0.775
3	**France**	**X**	874.184	**4.605***	31.169	1.682	0.159
		M	556.353	1.655	262.412	**7.996***	0.810
		NX	317.831	1.032	-231.243	**-7.70***	0.798
4	**Germany**	**X**	1,199.11	**13.68***	14.615	1.708	0.163
		M	1,985.58	**7.434***	424.674	**16.29***	0.947
		NX	-786.471	**-2.7****	-410.059	**-14.3***	0.932
5	**Indonesia**	**X**	1,799.99	**7.506***	109.054	**4.660***	0.592
		M	177.265	0.881	264.971	**13.5***	0.924
		NX	1,622.72	**4.437***	-155.917	**-4.37***	0.559
6	**Ireland**	**X**	36.848	0.588	16.546	**2.71****	0.328
		M	-191.07	**-2.6****	131.479	**18.45***	0.958
		NX	227.916	**2.24****	-114.933	**-11.6***	0.899
7	**Italy**	**X**	1,166.74	**7.238***	41.5196	**2.64****	0.317
		M	635.574	**4.17***	248.917	**16.75***	0.949
		NX	531.162	**2.1*****	-207.397	**-8.18***	0.817
8	**Malaysia**	**X**	1,499.96	**7.709***	66.037	**3.478***	0.446
		M	-529.787	-1.607	394.552	**12.26***	0.909
		NX	2029.75	**4.546***	-328.515	**-7.54***	0.791
9	**Papua New Guinea**	**X**	1,075.81	**14.82***	-0.672	-0.095	0.001
		M	521.338	**3.255***	79.623	**5.094***	0.634
		NX	554.471	3.319*	-80.294	**-4.93***	0.618
10	**Singapore**	**X**	4,058.97	**8.079***	50.1667	1.0232	0.065
		M	-490.904	-0.702	502.512	**7.363***	0.783
		NX	4,549.88	**4.088***	-452.346	**-4.17***	0.536
11	**Sweden**	**X**	131.724	**6.485***	9.0909	**4.586***	0.584
		M	726.934	**6.775***	88.733	**8.474***	0.827
		NX	-595.21	**-5.78***	-79.642	**-7.93***	0.807
12	**Thailand**	**X**	566.4118	**3.099***	151.392	**8.490***	0.828
		M	-688.765	**-2*****	325.549	**9.465***	0.857
		NX	1255.177	**3.853***	-174.157	**-5.48***	0.667
13	**United Kingdom**	**X**	1,918.72	**4.559***	263.221	**6.409***	0.733
		M	3253.147	**9.653***	247.049	**7.512***	0.789
		NX	-1334.43	**-2.3****	16.1716	0.291	0.006
14	**United States of America**	**X**	5,457.34	**4.79***	357.799	**3.218***	0.408
		M	11,127.8	**11.01***	982.427	**9.956***	0.869
		NX	-5,670.41	**-7.92***	-624.628	**-8.94***	0.842
15	**Vietnam**	**X**	-114.228	-1.678	54.036	**8.132***	0.815
		M	-984.999	**-3.10***	266.221	**8.588***	0.831
		NX	870.772	**3.191***	-212.185	**-7.97***	0.809

Source: Compiled from Trade Data International,(2007) and the ABS (2007d; 2007e)

for China, followed by Thailand 82.8 and Vietnam with 81.5 percent, while the lowest is for Papua New Guinea with 0.1 percent. In overall, the Top 4 X Time-coefficient are China, The United States of America, The United Kingdom and Thailand which has a combined average X growth of AUD1,565.23 mill. per annum, while the remaining 11 countries accounts for less than one third of this figure. These 4 countries have a significant Time-coefficient at 1 percent level of significance and relatively high R^2 that suggests significant growth in the Australian X to these countries overtime.

Now that a few comments have been made about the X trends, this section will comment about the M trends. The M Time-coefficient range from AUD1,415.51 for China, followed by United States of America with AUD982.43 mill., while the lowest is for Papua New Guinea with AUD79.62 per annum on average. Furthermore, the Time-coefficient is significant at 1 percent level of significance for all 15 countries, while the R^2 range is from 95.8 for Ireland to the lowest 63.4 percent for Papua New Guinea. By observing the M trends, they are more significant than X trends and the Time-coefficient are much higher than X Time-coefficient, while the M trends R^2 are well above for those for the X trends.

The X and M trends determine the NX trends, and by referring to Table 4.15 the highest growth in TD, which is represented by a negative NX are The United States of America, China, Singapore and Germany, while the lowest is The United Kingdom interestingly with a positive NX. The NX Time-coefficient shows that the TD with The United States of America, China, Singapore and Germany is raising on average by AUD624.63, AUD622.69, AUD452.35 and AUD410.06 mill. per annum respectively. All NX Time-coefficient are significant at 1 percent level of significance except Canada, which is significant at 5 percent, while for The United Kingdom it is not significant. Finally, the R^2 for the NX ranges from 93.2 for Germany to 0.6 percent for The United Kingdom, while 13 out of 15 countries, the R^2 is higher than 53 percent.

Now that all of the fifteen selected countries have been analysed, a summary for some of the key facts about these fifteen countries are as follows:

- By referring to Tables 4.15, combined LT X, M and NX trends for the period 1990-2006, for these fifteen countries are:

    - X is growing on average by an AUD2,006.1 mill. per annum.
        - Equivalent to an AUD501.53 mill. per quarter.
    - M is increasing on average by an AUD5,719.1 mill. per annum.
        - Equivalent to an AUD1,429.78 mill. per quarter and
    - TD is increasing on average by an AUD3,713 mill. per annum.
        - Equivalent to an AUD928.25 mill. per quarter.

- By referring to Table 4.12, Appendix Table 4.37 and Appendix Tables 4.24-4.36, X values in AUD, mill. are:

    - Period 1990-2006 (LT); the X to these fifteen countries accounts for 38.01 percent of the total Australian X.
    - Period 2000-2006 (ST); the X to these fifteen countries accounts for 39.84 percent of the total Australian X.
        - This is a difference of 4.8 percent in the two different time duration.
    - Period 1990-2006 (LT); the annual average of the X to these fifteen countries accounts for an AUD37,705.35 mill.
        - Equivalent to a AUD9,426.34 mill. per quarter.
    - Period 2000-2006 (ST); the annual average of the X to these fifteen countries accounts for an AUD48,527.43 mill.
        - Equivalent to a AUD12,131.86 mill. per quarter.
            - This is a difference of 28.7 percent in the two different time duration.
    - The top X rankings are:
        - Period 1990-2006 (LT); these fifteen countries occupied Top 46 positions (2nd, 5th, 6th, 7th, 10th, 12th, 13th, 15th, 16th, 17th, 20th, 22nd, 34th, 41st and 46th).
        - Period 2000-2006 (ST); these fifteen countries occupied Top 44 positions (2nd, 3rd, 6th, 7th, 10th, 12th, 13th, 15th, 16th, 19th, 20th, 23rd, 26th, 39th and 44th).

- By referring to Table 4.13, Appendix Table 4.38 and Appendix Tables 4.24-4.36, M values in AUD, mill. are:

    - Period 1990-2006 (LT); the M from these fifteen countries accounts for 62.12 percent of the total Australian M.
    - Period 2000-2006 (ST); the M from these fifteen countries accounts for 64.35 percent of the total Australian M.
        - This is a difference of 2.23 percent in the two different time duration.
    - Period 1990-2006 (LT); the annual average of the M from these fifteen countries accounts for an AUD64,425.53 mill.
        - Equivalent to a AUD16,106.38 mill. per quarter.
    - Period 2000-2006 (ST); the annual average M from these fifteen countries accounts for an AUD93,697.71 mill.
        - Equivalent to a AUD23,424.43 mill. per quarter.
            - This is a difference of 45.44 percent in the two different time duration.
    - The top M rankings are:
        - Period 1990-2006 (LT); these fifteen countries occupied Top 22 positions (1st, 3rd, 4th, 5th, 6th, 9th, 10th, 11th, 13th, 14th, 15th, 16th, 17th, 18th and 22nd).
        - Period 2000-2006 (ST); these fifteen countries occupied Top 19 positions (1st, 3rd, 4th, 5th, 6th, 9th, 10th, 11th, 12th, 13th, 15th, 16th, 17th, 18th and 19th).

- By referring to Table 4.14, Appendix Table 4.39 and Appendix Tables 4.24-4.36, the TD values in AUD, mill. are:

    - Period 1990-2006 (LT); the annual average TD for these fifteen countries accounts for an AUD26,720.14 mill.
        - Equivalent to a AUD6,680.03 mill. per quarter.
    - Period 2000-2006 (ST); the annual average TD for these fifteen countries accounts for an AUD45,170.14 mill.
        - Equivalent to a AUD11,292.54 mill. per quarter.
            - This is a difference of 69.05 percent in the two different time duration.
    - The top TD rankings are:

- Period 1990-2006 (LT); these fifteen countries occupied the Top 232 positions (1st, 2nd, 3rd, 4th, 5th, 6th, 7th, 8th, 9th, 10th, 15th, 21st, 30th, 225th and 232nd).
- Period 2000-2006 (ST); these fifteen countries occupied the Top 27 positions (1st, 2nd, 3rd, 4th, 5th, 6th, 7th, 8th, 9th, 10th, 11th, 13th, 17th, 18th and 27th).

Based on these summaries, these fifteen selected countries in the ST accounts for more than 40 percent of the total Australian X, and this percentage is increasing. The M trends are even more pronounced; the M from these fifteen countries to Australia, in the ST accounts for more than 64 percent of the total Australian M, and this percentage is increasing. An encouraging sign is that the percentage of the total X between Australia and these fifteen countries is increasing slightly faster (4.8 percent) than the percentage of the total M (2.23 percent) from these countries. However, the not so encouraging fact is that the average X in AUD mill. values between LT and the ST is higher only by 28.7 percent, while the average M for the same periods is higher by 45.44 percent. Finally, by observing the TD level associated with fifteen selected countries, it is apparent that the Australian TD is becoming more concentrated with these fifteen countries. These fifteen selected countries are inside the Top 27 TD countries, while the same fifteen countries in the LT are in the Top 232. Finally, the Australian TD with these fifteen selected countries is higher in the ST compared to LT by a staggering 69 percent, which point out the significance of the intensification of the TD between Australia and these fifteen countries.

4.8 SUMMARY OF SELECTION PROTOCOL ONE

Based on the preceding analysis five major TD categories selected for further analysis are four goods categories based on HS-2 and one service category based on ANZSIC-1 level of aggregation:

Goods, HS-2:

- **30: -** Pharmaceutical products
- **84: -** Nuclear reactors, boilers, machinery and mechanical appliances; Parts thereof

- **85: -** Electrical machinery and equipment and parts thereof; Sound recorders and reproducers, television image and sound recorders and reproducers, and parts and accessories of such articles
- **87: -** Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof and

Services, ANZSIC-1

- **1: -** Transportation Services

In addition, the fifteen major TD countries selected for the further analysis are:

- Canada
- China
- France
- Germany
- Indonesia
- Ireland
- Italy
- Malaysia
- Papua New Guinea
- Singapore
- Sweden
- Thailand
- United Kingdom
- United States of America and
- Vietnam

The detailed and an in-depth analysis carried out for these five categories and fifteen selected countries have revealed the following facts:

- The TD time trend; 1990-2006 (LT), are increasing on average per quarter in:
    - Five categories: by AUD121.24 mill.
    - Fifteen countries: by AUD928.25 mill.
- The X, AUD values; 1990-2006 (LT), accounted for a quarterly average of:
    - Five categories: AUD4,376.4 mill.

- Fifteen countries: AUD9,426.34 mill.

- The X, AUD values; 2000-2006 (ST), accounted for a quarterly average of:
    - Five categories: AUD5,586.7 mill.
    - Fifteen countries: AUD12,131.86 mill.
- The M, AUD values; 1990-2006 (LT), accounted for a quarterly average of:
    - Five categories: AUD10,860.39 mill.
    - Fifteen countries: AUD16,106.38 mill.
- The M, AUD values; 2000-2006 (ST), accounted for a quarterly average of:
    - Five categories AUD14,438 mill.
    - Fifteen countries: AUD23,424.43 mill.
- The TD, AUD values; 1990-2006 (LT), accounted for a quarterly average of:
    - Five categories: AUD6,484 mill.
    - Fifteen countries: AUD6,680.03 mill.
- The TD, AUD values; 2000-2006 (ST), accounted for a quarterly average of:
    - Five categories: AUD8,551 mill.
    - Fifteen countries: AUD11,292.54 mill.
- The top TD rankings; for the period between 1990-2006 (LT):
    - Five categories: Occupied the Top 8 positions (1st, 2nd, 3rd, 5th and 8th).
    - Fifteen countries: Occupied the Top 232 positions (1st, 2nd, 3rd, 4th, 5th, 6th, 7th, 8th, 9th, 10th, 15th, 21st, 30th, 225th and 232nd).
- The top TD rankings; for the period between 2000-2006 (ST):
    - Five categories: Occupied the Top 6 positions (1st, 2nd, 3rd, 4th and 6th).
    - Fifteen countries: Occupied the Top 27 positions (1st, 2nd, 3rd, 4th, 5th, 6th, 7th, 8th, 9th, 10th, 11th, 13th, 17th, 18th and 27th).

Based on these findings, it is evident that the five categories selected for further analysis in the ST accounts for almost 15 percent of the total Australian X and almost 40 percent of the total Australian M, while being in the Top 6 TD categories. Furthermore, for the same period, the fifteen selected countries accounts for almost 40 percent of the total X destination countries and also accounts for more than 64 percent of the total M source countries, while these fifteen selected countries occupy the Top 27 TD countries.

Now that the major TD categories and the countries have been selected, two questions arises. What sub-categories based on HS-4 for the goods and ANZSIC-2 for the services level of aggregation, are the major TD categories? and How do the selected countries relate to the TD categories? In order to answer these questions, STEP TWO of the selection protocol for both the categories and the countries will be carried-out in the following sections.

4.9 SELECTION OF MAJOR TRADING CATEGORIES, STEP TWO

Following up on the analysis carried-out in the process of the identification of the major TD categories in STEP ONE, this section will examine these 5 categories based on a lower level of aggregation. This process is carried-out in order to determine which specific categories based on HS-4 and ANZSIC-2 level of aggregation for the goods and service categories respectively, are accountable for a substantial TD in Australia. Once this task is accomplished, it will be possible to focus more specifically on the categories that will be analysed in the following chapters.

Upon disaggregation of the 4 selected goods categories from the HS-2 to HS-4 level of aggregation it has generated 155 goods categories and once the same process has been carried-out for the selected service category from the ANZSIC-1 to ANZSIC-2 level of aggregation, it has generated 3 service categories. These 155 goods and 3 services categories are assessed based on the analysis carried-out in the Section 4.5 „Identification and Selection of Major Trading Categories, STEP ONE'. However, the analysis in this section are slightly different because it does not include the graphs and the trend statistics, since such a approach was not considered a necessary requirement for the precise selection of the sub-categories from the already selected categories. The main data, generated statistics and the selection protocol associated with the X, M and NX for these 158 categories are included in STAGE THREE; Appendix Tables 4.57-4.138.

Table 4.16 is a subset reproduction of the Appendix Tables 4.57-4.70, and shows the Top 20 X categories ranking in AUD, mill. and the percentages of total. The ranking are presented according to both the LT and the ST in the quarterly average AUD, mill. for all 158 categories. The X ranking in these tables are ranked in descending order, which shows the highest X categories values in AUD, mill. being ranked first. While Table 4.16 shows only the Top 20 X categories, the Appendix Tables 4.57-4.70 shows all 158 categories. In addition to the X AUD values, Appendix Tables 4.96-4.103 shows the ranking in the percentage changes for the X QTY „000 for all these 155 goods categories, which will be utilized in the selection protocol of the major TD categories, STEP TWO.

Table 4.17 is a subset of Appendix Tables 4.71-4.83, and shows the Top 20 M categories and total M percentage ranking for both the LT and the ST in the quarterly average AUD, mill. for all 158 categories. The M ranking in these tables are in descending order, and while Table 4.17 only shows the Top 20 M categories, the Appendix Tables 4.71-4.83 shows all 158 categories. In addition to the M AUD values, Appendix Tables 4.104-4.111 shows the ranking in the percentage changes for the M QTY „000 for all 155 goods categories which will be utilized in the selection protocol of the STEP TWO of the major TD categories.

Finally, Table 4.18 is the subset of Appendix Tables 4.84-4.95 and shows the Top 20 NX categories ranking for both the LT and the ST in the quarterly average AUD, mill. for all 158 categories. The NX ranking in these tables are in ascending order, which first ranks the categories with the highest quarterly average TD. Table 4.18 shows the Top 20 NX categories, while Appendix Tables 4.84-4.95 shows all 158 categories. In addition to the NX AUD values, Appendix Tables 4.112-4.119 shows the ranking in the percentage changes for the NX QTY „000 for all 155 goods categories which will be utilized in the selection protocol of the major TD categories, STEP TWO.

Now that Tables 4.16-4.18 and Appendix Tables 4.57-4.119 have been defined, the identification process of the major TD categories based on HS-4 and ANZSIC-2 level of aggregation are carried-out according to Diagram 4.4. The selection process in this diagram contains 5 main phases, which is one additional phase in comparisons with Diagram 4.2 used for the selection process of the major TD categories in STEP ONE. Despite an additional phase in Diagram 4.4, the focal principles of the selection criteria are equivalent with those used in Diagram 4.2. The main difference between these 2 selection criteria used in these diagrams is that Diagram 4.4 assesses the total

Table: 4.16 (Part A)

TOP 20 EXPORT CATEGORIES HS-4 and ANZSIC-2; Second Sub-divisional Level AUD, mill. Quarterly Average, % of the Total						
Rank	**1990-2006**			**2000-2006**		
	Category Code: - Name	**X**	**X%**	**Category Code: - Name**	**X**	**X%**
1	**1.1: - Passenger transportation**	1,344	27.9	**1.1: - Passenger transportation**	1,783	31.9
2	**1.3: - Other transportation**	595.6	12.4	**8703: - Motor cars and other motor vehicles principally designed for the transport of persons (other than public transport type), including station wagons and racing cars**	624.3	11.2
3	**8703: - Motor cars and other motor vehicles principally designed for the transport of persons (other than public transport type), including station wagons and racing cars**	361.1	7.49	**3004: - Medicaments (excluding goods of 3002, 3005 or 3006) consisting of mixed or unmixed products for therapeutic or prophylactic uses, put up in measured doses or in forms or packings for retail sale**	561.6	10.0
4	**3004: - Medicaments (excluding goods of 3002, 3005 or 3006) consisting of mixed or unmixed products for therapeutic or prophylactic uses, put up in measured doses or in forms or packings for retail sale**	310.1	6.43	**1.2: - Freight transportation**	214.4	3.83
5	**1.2: - Freight transportation**	246.9	5.12	**8473: - Parts and accessories (other than covers, carrying cases and the like) suitable for use solely or principally with office machines**	213.7	3.82
6	**8473: - Parts and accessories (other than covers, carrying cases and the like) suitable for use solely or principally with office machines**	235.5	4.88	**8708: - Parts and accessories of motor vehicles**	182.7	3.27
7	**8708: - Parts and accessories of motor vehicles**	132.3	2.74	**8471: - Automatic data processing machines and units thereof; magnetic or optical readers, machines for transcribing data onto data media in coded form and machines for processing such data, not elsewhere specified or included**	156.4	2.80
8	**8471: - Automatic data processing machines and units thereof; magnetic or optical readers, machines for transcribing data onto data media in coded form and machines for processing such data, not elsewhere specified or included**	114.7	2.38	**8407: - Spark-ignition reciprocating or rotary internal combustion piston engines**	119.3	2.13
9	**8407: - Spark-ignition reciprocating or rotary internal combustion piston engines**	96.83	2.01	**8517: - Electrical apparatus for line telephony or line telegraphy, including line telephone sets with cordless handsets and telecommunication apparatus for carrier-current line systems or for digital line systems; videophones**	95.00	1.70
10	**8517: - Electrical apparatus for line telephony or line telegraphy, including line telephone sets with cordless handsets and telecommunication apparatus for carrier-current line systems or for digital line systems; videophones**	96.14	1.99	**8431: - Parts suitable for use solely or principally lifting, loading, handling, moving, grading, levelling, scraping, excavating, tamping, compacting, extracting or boring machinery**	88.94	1.59

Source: Compiled from Trade Data International, (2007) and the ABS (2007h; 2007i; 2007b; 2007c; 2007g; 2007f)

Table: 4.16 Continued (Part B)

Rank	TOP 20 EXPORT CATEGORIES HS-4 and ANZSIC-2; Second Sub-divisional Level AUD, mill. Quarterly Average, % of the Total					
	1990-2006			**2000-2006**		
	Category Code: - Name	**X**	**X%**	**Category Code: - Name**	**X**	**X%**
11	**8479: - Machines and mechanical appliances having individual functions, not specified or included elsewhere**	69.09	1.43	**8479: - Machines and mechanical appliances having individual functions, not specified or included elsewhere**	86.02	1.54
12	**8431: - Parts suitable for use solely or principally lifting, loading, handling, moving, grading, levelling, scraping, excavating, tamping, compacting, extracting or boring machinery**	68.59	1.42	**8474: - Machinery for sorting, screening, grinding, mixing or kneading mineral substances, in solid form or for agglomerating, shaping or moulding solid other mineral products in powder or paste form or for forming foundry moulds of sand**	57.13	1.02
13	**8409: - Parts suitable for use solely or principally with spark-ignition reciprocating or rotary internal combustion piston engines or compression-ignition internal combustion piston engines (diesel or semi-diesel engines)**	49.88	1.03	**8413: - Pumps for liquids, whether or not fitted with a measuring device; liquid elevators**	55.29	0.99
14	**8536: - Electrical apparatus for switching or protecting electrical circuits, or for making connections to or in electrical circuits (eg switches, relays, fuses, surge suppressors, plugs, sockets, lampholders), for a voltage not exceeding 1,000 volts**	40.65	0.84	**8409: - Parts suitable for use solely or principally with spark-ignition reciprocating or rotary internal combustion piston engines or compression-ignition internal combustion piston engines (diesel or semi-diesel engines)**	53.08	0.95
15	**8474: - Machinery for sorting, screening, grinding, mixing or kneading mineral substances, in solid form or for agglomerating, shaping or moulding solid other mineral products in powder or paste form or for forming foundry moulds of sand**	38.85	0.81	**8525: - Transmission apparatus for radio-telephone, radio-telegraphy, radio-broadcasting or television, whether or not incorporating reception apparatus or sound recording or reproducing apparatus; tele cameras; still image video cameras & other video**	52.16	0.93
16	**8525: - Transmission apparatus for radio-telephone, radio-telegraphy, radio-broadcasting or television, whether or not incorporating reception apparatus or sound recording or reproducing apparatus; tele cameras; still image video cameras & other video**	38.49	0.80	**8421: - Centrifuges, including centrifugal dryers; filtering or purifying machinery and apparatus, for liquids or gases**	44.03	0.79
17	**8413: - Pumps for liquids, whether or not fitted with a measuring device; liquid elevators**	37.64	0.78	**8536: - Electrical apparatus for switching or protecting electrical circuits, or for making connections to or in electrical circuits (eg switches, relays, fuses, surge suppressors, plugs, sockets, lampholders), for a voltage not exceeding 1,000 volts**	43.70	0.78
18	**8544: - Insulated wire, cable and other insulated electric conductors, whether or not fitted with connectors; optical fibre cables, made up of individually sheathed fibres, whether or not assembled with electric conductors or fitted with connectors**	35.78	0.74	**8481: - Taps, cocks, valves and similar appliances for pipes, boiler shells, tanks, vats or the like, including pressure-reducing valves and thermostatically controlled valves**	40.14	0.72
19	**8421: - Centrifuges, including centrifugal dryers; filtering or purifying machinery and apparatus, for liquids or gases**	31.10	0.64	**8544: - Insulated wire, cable and other insulated electric conductors, whether or not fitted with connectors; optical fibre cables, made up of individually sheathed fibres, whether or not assembled with electric conductors or fitted with connectors**	36.55	0.65
20	**8524: - Records, tapes and other recorded media for sound or other similarly recorded phenomena, including matrices and masters for the production of records, but excluding photographic or cinematographic products**	30.43	0.63	**3002: - Human blood; animal blood for therapeutic, prophylactic, diagnostic uses; antisera & other blood fractions, & modified immunological products, whether or not obtained by biotechnological processes; vaccines, toxins, cultures of micro-organisms**	35.59	0.64

Source: Compiled from Trade Data International,(2007) and the ABS (2007h; 2007i; 2007b; 2007c; 2007g; 2007f)

Table: 4.17 (Part A)

TOP 20 IMPORT CATEGORIES HS-4 and ANZSIC-2; Second Sub-divisional Level AUD, mill. Quarterly Average, % of the Total						
Rank	1990-2006			2000-2006		
	Category Code: - Name	M	M%	Category Code: - Name	M	M%
1	1.2: - Freight transportation	1,152	10.6	8703: - Motor cars and other motor vehicles principally designed for the transport of persons (other than public transport type), including station wagons and racing cars	1,685	11.7
2	8703: - Motor cars and other motor vehicles principally designed for the transport of persons (other than public transport type), including station wagons and racing cars	1,145	10.5	1.2: - Freight transportation	1,530	10.6
3	1.1: - Passenger transportation	978.1	9.00	1.1: - Passenger transportation	1,248	8.64
4	8471: - Automatic data processing machines and units thereof; magnetic or optical readers, machines for transcribing data onto data media in coded form and machines for processing such data, not elsewhere specified or included	739.5	6.80	3004: - Medicaments (excluding goods of 3002, 3005 or 3006) consisting of mixed or unmixed products for therapeutic or prophylactic uses, put up in measured doses or in forms or packings for retail sale	1,071	7.42
5	3004: - Medicaments (excluding goods of 3002, 3005 or 3006) consisting of mixed or unmixed products for therapeutic or prophylactic uses, put up in measured doses or in forms or packings for retail sale	595	5.47	8471: - Automatic data processing machines and units thereof; magnetic or optical readers, machines for transcribing data onto data media in coded form and machines for processing such data, not elsewhere specified or included	917.1	6.35
6	8704: - Motor vehicles for the transport of goods	388	3.57	8525: - Transmission apparatus for radio-telephone, radio-telegraphy, radio-broadcasting or television, whether or not incorporating reception apparatus or sound recording or reproducing apparatus; tele cameras; still image video cameras & other video	563.3	3.90
7	8525: - Transmission apparatus for radio-telephone, radio-telegraphy, radio-broadcasting or television, whether or not incorporating reception apparatus or sound recording or reproducing apparatus; tele cameras; still image video cameras & other video	339.9	3.13	8704: - Motor vehicles for the transport of goods	513.4	3.55
8	8473: - Parts and accessories (other than covers, carrying cases and the like) suitable for use solely or principally with office machines	338.3	3.11	8517: - Electrical apparatus for line telephony or line telegraphy, including line telephone sets with cordless handsets and telecommunication apparatus for carrier-current line systems or for digital line systems; videophones	405.3	2.81
9	8708: - Parts and accessories of motor vehicles	301	2.77	8473: - Parts and accessories (other than covers, carrying cases and the like) suitable for use solely or principally with office machines	349.8	2.42
10	8517: - Electrical apparatus for line telephony or line telegraphy, including line telephone sets with cordless handsets and telecommunication apparatus for carrier-current line systems or for digital line systems; videophones	270.3	2.49	8708: - Parts and accessories of motor vehicles	349.2	2.42

Source: Compiled from Trade Data International, (2007) and the ABS (2007h; 2007i; 2007b; 2007c; 2007g; 2007f)

Table: 4.17 Continued (Part B)

TOP 20 IMPORT CATEGORIES HS-4 and ANZSIC-2; Second Sub-divisional Level AUD, mill. Quarterly Average, % of the Total						
Rank	1990-2006			2000-2006		
	Category Code: - Name	M	M%	Category Code: - Name	M	M%
11	1.3: - Other transportation	209.3	1.93	8528: - Reception apparatus for televion, whether or not incorporating radio-broadcast receivers or sound or video recording or reproducing apparatus; video monitors and video projectors	264.5	1.83
12	8542: - Electronic integrated circuits and microassemblies	182.7	1.68	1.3: - Other transportation	226.4	1.57
13	8528: - Reception apparatus for televion, whether or not incorporating radio-broadcast receivers or sound or video recording or reproducing apparatus; video monitors and video projectors	156.1	1.44	8542: - Electronic integrated circuits and microassemblies	213.2	1.48
14	8429: - Self-propelled bulldozers, angledozers, graders, levellers, scrapers, mechanical shovels, excavators, shovel loaders, tamping machines and road rollers	149.1	1.37	8429: - Self-propelled bulldozers, angledozers, graders, levellers, scrapers, mechanical shovels, excavators, shovel loaders, tamping machines and road rollers	199.4	1.38
15	8524: - Records, tapes and other recorded media for sound or other similarly recorded phenomena, including matrices and masters for the production of records, but excluding photographic or cinematographic products	137	1.26	8524: - Records, tapes and other recorded media for sound or other similarly recorded phenomena, including matrices and masters for the production of records, but excluding photographic or cinematographic products	147.1	1.02
16	8536: - Electrical apparatus for switching or protecting electrical circuits, or for making connections to or in electrical circuits (eg switches, relays, fuses, surge suppressors, plugs, sockets, lampholders), for a voltage not exceeding 1,000 volts	111.9	1.03	8544: - Insulated wire, cable and other insulated electric conductors, whether or not fitted with connectors; optical fibre cables, made up of individually sheathed fibres, whether or not assembled with electric conductors or fitted with connectors	139.3	0.96
17	8414: - Air or vacuum pumps, air or other gas compressors and fans; ventilating or recycling hoods incorporating a fan, whether or not fitted with filters	111.2	1.02	8481: - Taps, cocks, valves and similar appliances for pipes, boiler shells, tanks, vats or the like, including pressure-reducing valves and thermostatically controlled valves	129.5	0.90
18	8481: - Taps, cocks, valves and similar appliances for pipes, boiler shells, tanks, vats or the like, including pressure-reducing valves and thermostatically controlled valves	110.2	1.01	8536: - Electrical apparatus for switching or protecting electrical circuits, or for making connections to or in electrical circuits (eg switches, relays, fuses, surge suppressors, plugs, sockets, lampholders), for a voltage not exceeding 1,000 volts	128.6	0.89
19	8479: - Machines and mechanical appliances having individual functions, not specified or included elsewhere	104.6	0.96	8701: - Tractors (other than railway platform type tractors)	128.2	0.89
20	8544: - Insulated wire, cable and other insulated electric conductors, whether or not fitted with connectors; optical fibre cables, made up of individually sheathed fibres, whether or not assembled with electric conductors or fitted with connectors	100.9	0.93	8415: - Air conditioning machines, comprising a motor-driven fan and elements for changing the temperature and humidity, including those machines in which the humidity cannot be separately regulated	127.4	0.88

Source: Compiled from Trade Data International, (2007) and the ABS (2007h; 2007i; 2007b; 2007c; 2007g; 2007f)

Table: 4.18 (Part A)

TOP 20 NET EXPORT CATEGORIES HS-4 and ANZSIC-2; Second Sub-divisional Level AUD, mill. Quarterly Average				
Rank	1990-2006		2000-2006	
	Category Code: - Name	NX	Category Code: - Name	NX
1	1.2: - Freight transportation	-904.90	1.2: - Freight transportation	-1,315.95
2	8703: - Motor cars and other motor vehicles principally designed for the transport of persons (other than public transport type), including station wagons and racing cars	-783.61	8703: - Motor cars and other motor vehicles principally designed for the transport of persons (other than public transport type), including station wagons and racing cars	-1,060.79
3	8471: - Automatic data processing machines and units thereof; magnetic or optical readers, machines for transcribing data onto data media in coded form and machines for processing such data, not elsewhere specified or included	-624.83	8471: - Automatic data processing machines and units thereof; magnetic or optical readers, machines for transcribing data onto data media in coded form and machines for processing such data, not elsewhere specified or included	-760.68
4	8704: - Motor vehicles for the transport of goods	-366.97	8525: - Transmission apparatus for radio-telephone, radio-telegraphy, radio-broadcasting or television, whether or not incorporating reception apparatus or sound recording or reproducing apparatus; tele cameras; still image video cameras & other video	-511.14
5	8525: - Transmission apparatus for radio-telephone, radio-telegraphy, radio-broadcasting or television, whether or not incorporating reception apparatus or sound recording or reproducing apparatus; tele cameras; still image video cameras & other video	-301.42	3004: - Medicaments (excluding goods of 3002, 3005 or 3006) consisting of mixed or unmixed products for therapeutic or prophylactic uses, put up in measured doses or in forms or packings for retail sale	-509.67
6	3004: - Medicaments (excluding goods of 3002, 3005 or 3006) consisting of mixed or unmixed products for therapeutic or prophylactic uses, put up in measured doses or in forms or packings for retail sale	-284.94	8704: - Motor vehicles for the transport of goods	-484.62
7	8517: - Electrical apparatus for line telephony or line telegraphy, including line telephone sets with cordless handsets and telecommunication apparatus for carrier-current line systems or for digital line systems; videophones	-174.20	8517: - Electrical apparatus for line telephony or line telegraphy, including line telephone sets with cordless handsets and telecommunication apparatus for carrier-current line systems or for digital line systems; videophones	-310.32
8	8708: - Parts and accessories of motor vehicles	-168.63	8528: - Reception apparatus for televion, whether or not incorporating radio-broadcast receivers or sound or video recording or reproducing apparatus; video monitors and video projectors	-258.51
9	8542: - Electronic integrated circuits and microassemblies	-157.96	8542: - Electronic integrated circuits and microassemblies	-180.81
10	8528: - Reception apparatus for televion, whether or not incorporating radio-broadcast receivers or sound or video recording or reproducing apparatus; video monitors and video projectors	-152.44	8429: - Self-propelled bulldozers, angledozers, graders, levellers, scrapers, mechanical shovels, excavators, shovel loaders, tamping machines and road rollers	-176.24

Source: Compiled from Trade Data International, (2007) and the ABS (2007h; 2007i; 2007b; 2007c; 2007g; 2007f)

Table: 4.18 Continued (Part B)

Rank	TOP 20 NET EXPORT CATEGORIES HS-4 and ANZSIC-2; Second Sub-divisional Level AUD, mill. Quarterly Average			
	1990-2006		**2000-2006**	
	Category Code: - Name	**NX**	**Category Code: - Name**	**NX**
11	**8429:** **- Self-propelled bulldozers, angledozers, graders, levellers, scrapers, mechanical shovels, excavators, shovel loaders, tamping machines and road rollers**	-131.32	**8708:** **- Parts and accessories of motor vehicles**	-166.57
12	**8524:** **- Records, tapes and other recorded media for sound or other similarly recorded phenomena, including matrices and masters for the production of records, but excluding photographic or cinematographic products**	-106.54	**8473:** **- Parts and accessories (other than covers, carrying cases and the like) suitable for use solely or principally with office machines**	-136.09
13	**8473:** **- Parts and accessories (other than covers, carrying cases and the like) suitable for use solely or principally with office machines**	-102.82	**8701:** **- Tractors (other than railway platform type tractors)**	-120.06
14	**8414:** **- Air or vacuum pumps, air or other gas compressors and fans; ventilating or recycling hoods incorporating a fan, whether or not fitted with filters**	-95.64	**8524:** **- Records, tapes and other recorded media for sound or other similarly recorded phenomena, including matrices and masters for the production of records, but excluding photographic or cinematographic products**	-112.45
15	**8701:** **- Tractors (other than railway platform type tractors)**	-93.57	**8516:** **- Electric water and space heating apparatus and soil heating apparatus and electro-thermic hair-dressing apparatus, hand dryers and other appliances used for domestic purposes; electric heating resistors, other than carbon**	-108.76
16	**8527:** **- Reception apparatus for radio-telephony, radio-telegraphy or radio-broadcasting, whether or not combined, in the same housing, with sound recording or reproducing apparatus or a clock**	-90.78	**8414:** **- Air or vacuum pumps, air or other gas compressors and fans; ventilating or recycling hoods incorporating a fan, whether or not fitted with filters**	-105.87
17	**8481:** **- Taps, cocks, valves and similar appliances for pipes, boiler shells, tanks, vats or the like, including pressure-reducing valves and thermostatically controlled valves**	-81.53	**8527:** **- Reception apparatus for radio-telephony, radio-telegraphy or radio-broadcasting, whether or not combined, in the same housing, with sound recording or reproducing apparatus or a clock**	-104.16
18	**8516:** **- Electric water and space heating apparatus and soil heating apparatus and electro-thermic hair-dressing apparatus, hand dryers and other appliances used for domestic purposes; electric heating resistors, other than carbon**	-79.77	**8415:** **- Air conditioning machines, comprising a motor-driven fan and elements for changing the temperature and humidity, including those machines in which the humidity cannot be separately regulated**	-103.44
19	**8536:** **- Electrical apparatus for switching or protecting electrical circuits, or for making connections to or in electrical circuits (eg switches, relays, fuses, surge suppressors, plugs, sockets, lampholders), for a voltage not exceeding 1,000 volts**	-71.20	**8544:** **- Insulated wire, cable and other insulated electric conductors, whether or not fitted with connectors; optical fibre cables, made up of individually sheathed fibres, whether or not assembled with electric conductors or fitted with connectors**	-102.73
20	**8521:** **- Video recording or reproducing apparatus, whether or not incorporating a video tuner**	-67.13	**8481:** **- Taps, cocks, valves and similar appliances for pipes, boiler shells, tanks, vats or the like, including pressure-reducing valves and thermostatically controlled valves**	-89.37

Source: Compiled from Trade Data International, (2007) and the ABS (2007h; 2007i; 2007b; 2007c; 2007g; 2007f)

M level for the category under examination, while Diagram 4.2 does not. In addition to this main difference, other minor difference between Diagram 4.2 and 4.4 is that the selection protocol in Diagram 4.4 consists of additional NX QTY values for these categories. However, despite being slightly different, the fundamental aspects of both of the diagram's selection criteria are the same. The selection of the major TD categories are conducted in the same way as Diagram 4.2, and the categories which satisfy the selection criteria in the first phase are progressed into the next phase of the selection process. This process continues until all phases in the selection process are exhausted. The categories that do not satisfy the selection criteria are excluded from further assessment, while the categories that satisfy all selection criteria are the selected categories for further examination. Before the selection analysis commences, a few comments will be made about the selection criteria in Diagram 4.4

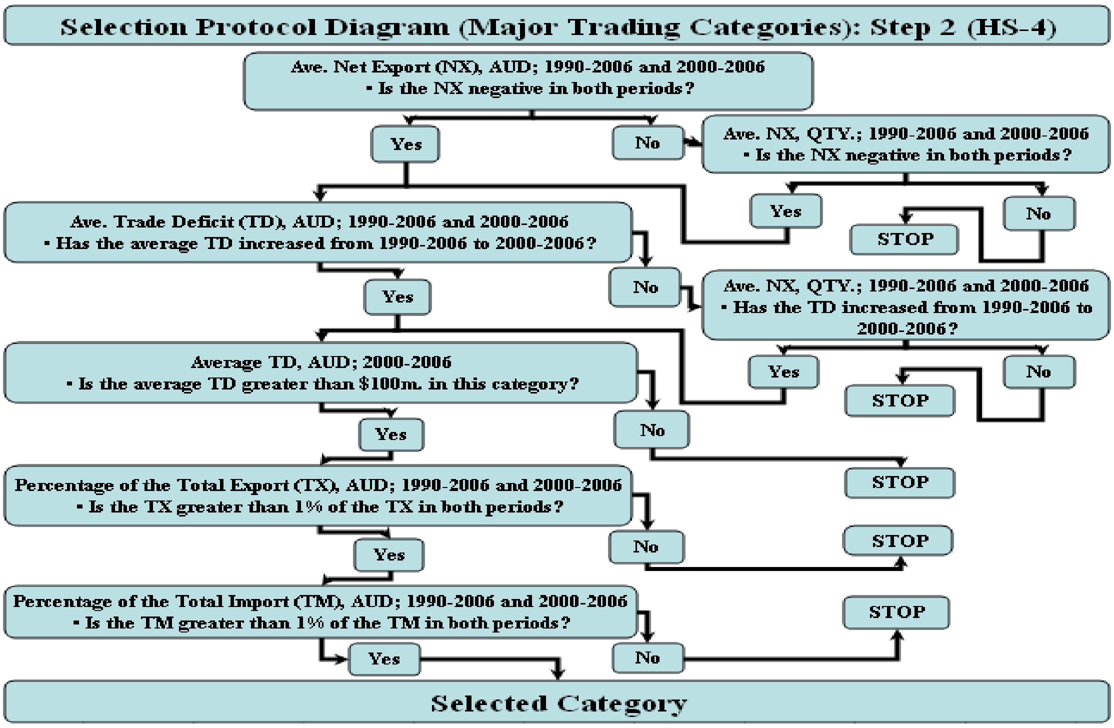
The first phase of the selection criteria in Diagram 4.4 is whether the NX category is negative in both the LT and the ST. This ensures that the TD in this category is persistent over the entire period of the analysis. Furthermore, this criterion assures that the categories progressing to the next phase are not just the recent and/ or former TD categories, but continual TD categories. Based on this assessment, the categories that satisfy this requirement progress into the next phase of the selection criteria. However, if the category under examination fails to satisfy this criterion, the category is not instantaneously excluded from further analysis. Such categories are assessed based on the NX QTY, which is the same principles that have been applied in the assessment measured in AUD values. If a category had a negative NX in both the LT and the ST based on the QTY, then is progressed into the second phase of the selection criteria, which is the same as if it would be with a negative NX based on AUD values. This process of the examination ensures that none of the categories with a negative NX, irrespective of whether it is measured in AUD or QTY values are included in further assessment. The categories which did not satisfy these criteria, either based on AUD nor QTY values, are excluded from further assessment, while the category which did satisfy these selection criteria has moved to the second phase of the selection.

Once the category has satisfied the criterion in the previous phase and is with a negative NX, measured in either AUD values or QTY or both, the TD in that category is not necessarily increasing. In order to ensure that the category selected is with an increasing TD, the second selection criterion is to assess whether the TD has increased in that category between the LT and the ST. This ensures that the TD in this category under assessment is increasing over-time, which warrants attention. Based on this assessment, the categories that satisfy this requirement progress into the next phase, while the categories that do not satisfy this criterion are assessed for the same criterion based on the QTY. This approach is identical to the previous phase of the assessment, which ensures that none of the categories with an increasing TD, irrespective whether it is based on AUD or QTY values, are not excluded from further analysis. The categories in which the TD is neither increasing, based on AUD values nor QTY values, are excluded from further assessment, while the category which did satisfy these selection criteria are progressed into the third phase of the selection.

Once it has been ensured that the category selected so far is with a persistent TD and that the TD for the category is increasing, it does not warrant that the TD in the category under assessment is substantial. In order to ensure that the selected category is with a substantial TD, the categories are examined on whether the quarterly average TD is greater than AUD100 mill. in the ST. By observing Table 4.18, this criterion ensures that the selected category is in the Top 19 TD categories, while the ST period between 2000 and 2006 ensures that more recent development are taken into consideration. The categories that satisfied this criterion are progressed into the fourth phase of the selection process, while the categories that did not, are being excluded from further assessment.

The criterion in the fourth phase of the selection protocol assesses whether the total X in both the LT and the ST is greater than 1 percent of the total X. By observing Table 4.16, this criterion ensures that the selected category is in the Top 12 X categories and accounts for a considerable X volumes in both periods. In addition, it also provides assurance that the categories progressed to the next phase of assessment are not just the recent and/ or former considerable X categories, but continuous and sizable X categories over both periods. Furthermore, this criterion is likely to reinsures that only competitive categories or their corresponding industries are selected for further analysis. The categories that satisfied this criterion are progressed into the final and fifth phase of the selection process, while the categories that did satisfy this criterion are excluded from further assessment.

Diagram: 4.4



The fifth phase of the selection criteria in Diagram 4.4 is to assess the categories that progressed into this phase, whether the total M in both the LT and the ST is greater than 1 percent of the total M. This criterion ensures that the selected categories for further analysis are not just the recent and/ or former considerable M categories, but sizable M categories over the both periods, which have considerable impact on the Australian M volumes. Furthermore, by observing Table 4.17, this criterion guarantees that the selected category is in the Top 15 M categories. Now that the main selection principles according to which the Diagram 4.4 have been structured are explained, the FA „PROTOCOL STEP TWO – CATEGORIES' which are presented in Appendix Tables 4.120-4.138 is explained next.

According to Diagram 4.4, the selection analysis process in Appendix Tables 4.120-4.138 shows the categories which did not have a negative NX for both periods, either based on the AUD nor QTY values, and have been excluded from further assessment in the first phase are in total 13 categories; 11 goods and 2 service categories. The excluded categories in this phase are the following categories: 8403, 8405, 8410, 8460, 8468, 8469, 8474, 8530, 8548, 8708 and 8709 for the goods and 1.1, and 1.3 for the services. Furthermore, the categories that did not have a negative NX in both period based on AUD, however, it has based on the QTY, and as a result have progressed into the next phase are the following 4 categories: 8407, 8442, 8478 and 8535.

The categories that progressed into the second phase are assessed whether the average TD has increased between the LT and the ST. The categories which did not record an increase in the TD in the two different time duration, based on neither AUD or QTY values and have been excluded from further assessment in this phase, are 29 goods categories in total. The following categories have been excluded: 8412, 8420, 8432, 8434, 8437, 8438, 8442, 8444, 8445, 8446, 8447, 8448, 8452, 8453, 8454, 8455, 8457, 8463, 8475, 8476, 8477, 8478, 8479, 8480, 8485, 8508, 8540, 8707 and 8714. Furthermore, the categories that did not record an increase in the TD in the two different time duration based on AUD, however, it has based on the QTY, and has progressed into the next phase, are the following 9 categories: 8413, 8423, 8425, 8458, 8519, 8532, 8533, 8541 and 8547.

The third phase of the selection is to assess whether the remaining categories in the selection process accounts for more then AUD100 mill. in the TD in the ST. The categories which accounted for less then the quarterly average TD of AUD100 mill. and are excluded from further assessment are the following 98 goods categories: 3001, 3002, 3003, 3005, 3006, 8401, 8402, 8404, 8406, 8407, 8408, 8409, 8411, 8413, 8416, 8417, 8418, 8419, 8421, 8422, 8423, 8424, 8425, 8426, 8427, 8428, 8430, 8431, 8433, 8435, 8436, 8439, 8440, 8441, 8443, 8449, 8450, 8451, 8456, 8458, 8459, 8461, 8462, 8464, 8465, 8466, 8467, 8470, 8472, 8481, 8482, 8483, 8484, 8501, 8502, 8503, 8504, 8505, 8506, 8507, 8509, 8510, 8511, 8512, 8513, 8514, 8515, 8518, 8519, 8520, 8521, 8522, 8523, 8526, 8529, 8531, 8532, 8533, 8534, 8535, 8536, 8537, 8538, 8539, 8541, 8543, 8545, 8546, 8547, 8702, 8705, 8706, 8710, 8711, 8712, 8713, 8715 and 8716.

In the fourth phase, the remaining categories are assessed on whether they accounted for more than 1 percent of the total X both in the LT and the ST. The categories that did not satisfy this criterion and are excluded from further assessment are the following 12 goods categories: 8414, 8415, 8429, 8516, 8524, 8525, 8527, 8528, 8542, 8544, 8701 and 8704.

The fifth and final phase of the analysis was to assess the remaining categories on whether they account for more than 1 percent of total M both in LT and the ST. All 6 remaining categories did satisfy this selection criterion, and this is merely an interesting finding because it suggests that the categories which accounts for more than 1 percent of the total X also accounts for more than 1 percent in the total M. This suggests that the Australian major X categories are in fact the major M categories at the same time, and this will be further examined and validated in Chapter 7 under Intra-Industry Trade (IIT) analysis.

The remaining six categories that have satisfied all selection criteria and are the selected categories for further analysis in this research are the following categories:

Goods, HS-4:

- **3004: -** Medicaments (excluding goods of 3002, 3005 or 3006) consisting of mixed or unmixed products for therapeutic or prophylactic uses, put up in measured doses or in forms or packings for retail sale
- **8471: -** Automatic data processing machines and units thereof; magnetic or optical readers, machines for transcribing data onto data media in coded form and machines for processing such data, not elsewhere specified or included
- **8473: -** Parts and accessories (other than covers, carrying cases and the like) suitable for use solely or principally with office machines
- **8517: -** Electrical apparatus for line telephony or line telegraphy, including line telephone sets with cordless handsets and telecommunication apparatus for carrier-current line systems or for digital line systems; videophones
- **8703: -** Motor cars and other motor vehicles principally designed for the transport of persons (other than public transport type), including station wagons and racing cars

Services, ANZSIC-2

- **1.2: -** Freight transportation

By observing these six selected categories, it is noticeable that each selected category based on HS-2 and ANZSIC-1 level of aggregation in STEP ONE of the selection process, have their representative based on HS-4 and ANZSIC-2 level of aggregation. This is again rather an interesting outcome. Now that the six categories are selected, it is important to summarize some of the key facts about the six selected categories, which are as follows:

- By referring to Table 4.16, the X values in AUD, mill. are:
    - Period 1990-2006 (LT); the X in these six categories accounts for 28.29 percent of the total Australian X in five selected categories, STEP ONE.
    - Period 2000-2006 (ST); the X in these six categories accounts for 33.35 percent of the total Australian X in five selected categories, STEP ONE.
        - This is a difference of 17.89 percent in the two different time duration.
    - Period 1990-2006 (LT); the quarterly average X in these six categories accounts for an AUD1,364.44 mill.
    - Period 2000-2006 (ST); the quarterly average X in these six categories accounts for an AUD1,865.4 mill.
        - This is a difference of 36.72 percent in the two different time duration.
    - The top X rankings are:
        - Period 1990-2006 (LT); these six categories occupied Top 10 positions (3rd, 4th, 5th, 6th, 8th and 10th).
        - Period 2000-2006 (ST); these six categories occupied Top 9 positions (2nd, 3rd, 4th, 5th, 7th and 9th).
- By referring to Table 4.17, the M values in AUD, mill. are:
    - Period 1990-2006 (LT); the M in these six categories accounts for 38.97 percent of the total Australian M in five selected categories, STEP ONE.
    - Period 2000-2006 (ST); the M in these six categories accounts for 41.3 percent of the total Australian M in five selected categories, STEP ONE.
        - This is a difference of 5.98 percent in the two different time duration.
    - Period 1990-2006 (LT); the quarterly average M in these six categories accounts for an AUD4,240.1 mill.
    - Period 2000-2006 (ST); the quarterly average M in these six categories accounts for an AUD5,958.2 mill.

- This is a difference of 40.52 percent in the two different time duration.
- The top M rankings are:
  - Period 1990-2006 (LT); these six categories occupied the Top 10 positions (1st, 2nd, 4th, 5th, 8th and 10th).
  - Period 2000-2006 (ST); these six categories occupied the Top 9 (1st, 2nd, 4th, 5th, 8th and 9th).

- By referring to Table 4.18, the TD values in AUD, mill. are:
  - Period 1990-2006 (LT); the quarterly average TD in these six categories accounts for an AUD2,875.3 mill.
  - Period 2000-2006 (ST); the quarterly average TD in these six categories accounts for an AUD4,093.5 mill.
    - This is a difference of 42.37 percent in the two different time duration.
  - The top TD rankings are:
    - Period 1990-2006 (LT); these six categories occupied the Top 13 positions (1st, 2nd, 3rd, 6th, 7th and 13th).
    - Period 2000-2006 (ST); these six categories occupied the Top 12 positions in the selected categories – STEP ONE (1st, 2nd, 3rd, 5th, 7th and 12th).

Based on these summaries, the six categories selected in the ST accounts for 33.4 percent out of 14.4[77] percent of the total Australian X, which is equivalent to 4.81 percent of the total Australian X. The M trends are even more pronounced, and these six categories in the ST account for 41.3 percent out of 39.16 percent of the total Australian M, which is equivalent to 16.17 percent of the total Australian M. Finally, by observing the average quarterly TD levels in these six categories, they accounted for AUD2,875.3 mill. in the LT, while in the ST, the same six categories account for an average quarterly TD of AUD4,093.5 mill. This highlights the fact mentioned earlier in this chapter, that an increasing TD in Australia is becoming more concentrated amongst the fewer categories and it is increasing at a rapid pace.

[77] Five categories that have been selected in the „Identification and Selection of Major Categories, STEP ONE' based on the HS-2 and the ANZSIC-1 level of aggregation accounted for 14.4 percent of the total Australian X. Furthermore, the 6 selected categories based on the HS-4 and the ANZSIC-2 level of aggregation are chosen out of 5 categories previously selected; hence 33.4 percent out of 14.4 percent.

This section concludes with the identification of the major TD categories that will be analysed in more detail in the following chapters. The final task in this chapter is to link these six major selected TD categories with the fifteen major selected TD countries and this task is carried out in the next section.

4.10 SELECTION OF MAJOR TRADE DEFICIT COUNTRIES, STEP TWO

An analysis and the selection of the major TD categories and the countries carried out so far, has resulted in the identification of 4 goods categories based on HS-2 and 1 service category based on ANZSIC-1 level of aggregation; 5 goods categories based on HS-4 and 1 service category based on ANZSIC-2 level of aggregation. The previous analysis has also resulted in the identification of 15 major TD countries, based on the X and M trends between Australia and all 242 SCE in the world. Because these analyses for the categories and the countries have been conducted independently, the last required constituent of this chapter is to link these 6 selected categories based on HS-4 and the ANZSIC-2 level of aggregation with the 15 selected countries. The main objective of this section is to establish the association of the selected TD categories with the selected TD countries. This task is achieved by identifying and selecting the countries with a strong association with the selected TD categories, while the countries with a marginal association will be excluded from further examination. Once this is accomplished, it will provide a coherent and comprehensive list of the categories and the countries that will be analysed in this research in the subsequent chapters.

The statistical data used in this section are the X, M and NX values in QTY units between Australia and the 15 selected TD countries for the 5[78] selected categories. A comprehensive list of generated statistics and protocols used in this section are presented in Appendix Tables 4.139-4.155, STAGE FOUR of the Appendix Tables. The data analysed in this section are the quarterly time series data, of the period between 1990-2006 and all data are in QTY units. The main reason why only QTY is used in this analysis is because QTY was considered the most efficient[79] way of

[78] The selected categories according to the HS-4 and ANZSIC-2 level of aggregation are 5 goods categories and 1 service category. However, as explained in the earlier sections in this chapter, the country trade statistics is not available for the service categories. Consequently, the analysis is embarking to the 5 goods categories only. Once this is accomplished, it will be assumed that the service category trade flows, follow-up the similar patterns as in the 5 goods categories analysed.

[79] The X and M QTY volumes can be compared amongst the various countries within certain categories relatively fast, without the necessary conversion from the nominal to the real values, unlike for the currency values which have to be converted prior the comparisons. Furthermore, QTY is the true measure of the X and M volumes, without being affected in the fluctuation in the Terms of Trade (TOT). Finally, the first stage of the selection of the major TD countries have been mainly based on monetary

establishing the links between the X and M between Australia and 15 selected countries in the 5 selected goods categories. Despite the fact that the QTY is not comparable amongst the categories, they are an accurate and unbiased[80] measure of the X and M volumes between the countries in individual categories, as long as they are expressed in the same QTY units; i.e. kg., meters (same grade), boxes or a single unit, for both the X and M volumes. Furthermore, QTY is analysed in single units, because for some countries in the some categories, the X or M volumes are only in the single digits. Finally, the X, M and the NX statistics for these 5 categories and 15 countries are presented in Appendix Tables 4.139-4.153

Appendix Tables 4.139-4.153 are reproduced in this section in Tables 4.19-4.33 for an easy reference. Five Tables 4.19-4.23 represents the X volumes and X percentage in the quarterly average QTY units for the 5 selected goods categories, and these tables correspond to Appendix Tables 4.139-4.143. The following 5 Tables 4.24-4.28 are corresponding to the Appendix Tables 4.144-4.148 and represents the M volumes and M percentage in the quarterly average QTY units for the 5 selected goods categories.

Finally, the last set of tables in this section are Tables 4.29-4.33, which are corresponding to the Appendix Tables 4.149-4.153 and represents the quarterly average NX in QTY units between Australia, and the 15 selected countries in the 5 goods categories. The first 2 sets of tables, Tables 4.19-4.28 for the X and M are ranked in descending order, while the third set of tables, Tables 4.29-4.33 for the NX is ranked in ascending order. This ranking ensures that the highest X, M and TD countries are ranked first. Now that the tables for the X, M and NX rankings for the 15 selected countries in the 5 selected goods categories are presented, the principles according to which Diagram 4.5 is structured is explained in the next section.

values, and by examining the selected TD countries in the second stage based on QTY, it will exemplify another dimension of the X and M flows analysis.

[80] This proposition is valid only under the assumption that the qualities of these goods categories are the same, however, such information is not available and this proposition has been assumed in this analysis.

Table: 4.19

CATEGORY 3004: EXPORT RANKING (HS-4) Qty. Units; Quarterly Average, % of the Total						
3004: - Medicaments (excluding goods of 3002, 3005 or 3006) consisting of mixed or unmixed products for therapeutic or prophylactic uses, put up in measured doses or in forms or packings for retail sale						
Rank	1990-2006			2000-2006		
	Country	X, Qty.	X,%	Country	X, Qty.	X,%
1	Singapore	198,470	23.26	Malaysia	434,856	27.41
2	Malaysia	196,196	22.99	Singapore	417,482	26.32
3	United Kingdom	136,092	15.95	United Kingdom	215,987	13.62
4	United States of America	60,677	7.11	United States of America	112,883	7.12
5	Vietnam	45,376	5.32	Thailand	84,521	5.33
6	Thailand	44,210	5.18	Germany	64,129	4.04
7	Papua New Guinea	41,823	4.90	Canada	53,218	3.35
8	Canada	36,308	4.25	China	44,072	2.78
9	Germany	26,907	3.15	Papua New Guinea	32,416	2.04
10	China	19,252	2.26	Vietnam	32,287	2.04
11	Ireland	12,233	1.43	Indonesia	24,730	1.56
12	Indonesia	11,973	1.40	Ireland	22,838	1.44
13	France	10,344	1.21	France	17,374	1.10
14	Sweden	6,905	0.81	Italy	15,507	0.98
15	Italy	6,638	0.78	Sweden	14,086	0.89

Source: Compiled from Trade Data International, (2007)

Table: 4.20

CATEGORY 8471: EXPORT RANKING (HS-4) Qty. Units; Quarterly Average, % of the Total						
8471: - Automatic data processing machines and units thereof; magnetic or optical readers, machines for transcribing data onto data media in coded form and machines for processing such data, not elsewhere specified or included						
	1990-2006			2000-2006		
Rank	Country	X, Qty.	X,%	Country	X, Qty.	X,%
1	Thailand	54,502	39.94	Thailand	130,388	42.71
2	United Kingdom	25,693	18.83	United Kingdom	58,629	19.20
3	Singapore	22,476	16.47	Singapore	42,812	14.02
4	Malaysia	10,865	7.96	Malaysia	24,109	7.90
5	Vietnam	5,461	4.00	Vietnam	13,134	4.30
6	China	5,132	3.76	China	11,424	3.74
7	France	3,807	2.79	France	8,840	2.90
8	Germany	1,919	1.41	Germany	3,520	1.15
9	Papua New Guinea	1,894	1.39	Indonesia	3,215	1.05
10	Indonesia	1,577	1.16	Papua New Guinea	3,199	1.05
11	Sweden	1,349	0.99	Sweden	3,185	1.04
12	Canada	787	0.58	Ireland	1,639	0.54
13	Ireland	754	0.55	Canada	958	0.31
14	Italy	254	0.19	Italy	268	0.09
15	United States of America	0	0.00	United States of America	0	0.00

Source: Compiled from Trade Data International, (2007)

Table: 4.21

CATEGORY 8473: EXPORT RANKING (HS-4) Qty. Units; Quarterly Average, % of the Total						
8473: - Parts and accessories (other than covers, carrying cases and the like) suitable for use solely or principally with office machines						
	1990-2006			2000-2006		
Rank	Country	X, Qty.	X,%	Country	X, Qty.	X,%
1	Singapore	626	100.00	Singapore	1,138	100.00
2	Canada	0	0.00	Canada	0	0.00
3	China	0	0.00	China	0	0.00
4	France	0	0.00	France	0	0.00
5	Germany	0	0.00	Germany	0	0.00
6	Indonesia	0	0.00	Indonesia	0	0.00
7	Ireland	0	0.00	Ireland	0	0.00
8	Italy	0	0.00	Italy	0	0.00
9	Malaysia	0	0.00	Malaysia	0	0.00
10	Papua New Guinea	0	0.00	Papua New Guinea	0	0.00
11	Sweden	0	0.00	Sweden	0	0.00
12	Thailand	0	0.00	Thailand	0	0.00
13	United Kingdom	0	0.00	United Kingdom	0	0.00
14	United States of America	0	0.00	United States of America	0	0.00
15	Vietnam	0	0.00	Vietnam	0	0.00

Source: Compiled from Trade Data International, (2007)

Table: 4.22

Rank	1990-2006			2000-2006		
	CATEGORY 8517: EXPORT RANKING (HS-4) Qty. Units; Quarterly Average, % of the Total. 8517: - Electrical apparatus for line telephony or line telegraphy, including line telephone sets with cordless handsets and telecommunication apparatus for carrier-current line systems or for digital line systems; videophones					
	Country	X, Qty.	X,%	Country	X, Qty.	X,%
1	Singapore	6,172	30.35	Canada	12,029	42.07
2	Canada	5,167	25.41	Singapore	9,551	33.40
3	United Kingdom	1,795	8.83	United Kingdom	1,950	6.82
4	Thailand	1,365	6.71	China	1,915	6.70
5	China	1,112	5.47	Germany	909	3.18
6	Papua New Guinea	1,078	5.30	Thailand	575	2.01
7	Vietnam	1,066	5.24	Malaysia	523	1.83
8	Germany	1,006	4.95	Papua New Guinea	381	1.33
9	Indonesia	706	3.47	Indonesia	265	0.93
10	Malaysia	396	1.95	Vietnam	227	0.79
11	France	354	1.74	France	212	0.74
12	Italy	58	0.28	Ireland	23	0.08
13	Sweden	39	0.19	Sweden	18	0.06
14	Ireland	23	0.11	Italy	15	0.05
15	United States of America	0	0.00	United States of America	0	0.00

Source: Compiled from Trade Data International, (2007)

Table: 4.23

Rank	1990-2006			2000-2006		
	CATEGORY 8703: EXPORT RANKING (HS-4) Qty. Units; Quarterly Average, % of the Total. 8703: - Motor cars and other motor vehicles principally designed for the transport of persons (other than public transport type), including station wagons and racing cars					
	Country	X, Qty.	X,%	Country	X, Qty.	X,%
1	United States of America	2,955	65.29	United States of America	3,567	54.19
2	United Kingdom	405	8.94	United Kingdom	936	14.22
3	Singapore	330	7.29	Singapore	759	11.54
4	Indonesia	265	5.85	Indonesia	519	7.88
5	China	147	3.24	China	353	5.36
6	Papua New Guinea	134	2.96	Papua New Guinea	214	3.26
7	Thailand	131	2.89	Germany	138	2.10
8	Germany	111	2.44	Malaysia	38	0.58
9	Malaysia	23	0.50	Thailand	22	0.34
10	Italy	8	0.17	Italy	17	0.26
11	Sweden	7	0.15	Canada	10	0.15
12	Canada	5	0.10	Ireland	4	0.06
13	Vietnam	4	0.09	Sweden	3	0.04
14	Ireland	3	0.06	France	1	0.02
15	France	1	0.02	Vietnam	0	0.00

Source: Compiled from Trade Data International, (2007)

Table: 4.24

Rank	1990-2006			2000-2006		
	CATEGORY 3004: IMPORT RANKING (HS-4) Qty. Units; Quarterly Average, % of the Total. 3004: - Medicaments (excluding goods of 3002, 3005 or 3006) consisting of mixed or unmixed products for therapeutic or prophylactic uses, put up in measured doses or in forms or packings for retail sale					
	Country	M, Qty.	M,%	Country	M, Qty.	M,%
1	France	94,985	37.47	Germany	172,405	38.24
2	Germany	79,523	31.37	France	122,624	27.20
3	United States of America	42,301	16.69	United States of America	102,495	22.73
4	United Kingdom	28,314	11.17	United Kingdom	49,130	10.90
5	Sweden	6,618	2.61	Ireland	4,131	0.92
6	Ireland	1,701	0.67	Malaysia	80	0.02
7	Malaysia	33	0.01	Singapore	6	0.00
8	Singapore	2	0.00	Canada	1	0.00
9	Canada	0	0.00	Sweden	0	0.00
10	China	0	0.00	China	0	0.00
11	Indonesia	0	0.00	Indonesia	0	0.00
12	Italy	0	0.00	Italy	0	0.00
13	Papua New Guinea	0	0.00	Papua New Guinea	0	0.00
14	Thailand	0	0.00	Thailand	0	0.00
15	Vietnam	0	0.00	Vietnam	0	0.00

Source: Compiled from Trade Data International, (2007)

Table: 4.25

CATEGORY 8471: IMPORT RANKING (HS-4) Qty. Units; Quarterly Average, % of the Total						
8471: - Automatic data processing machines and units thereof; magnetic or optical readers, machines for transcribing data onto data media in coded form and machines for processing such data, not elsewhere specified or included						
Rank	1990-2006			2000-2006		
	Country	M, Qty.	M,%	Country	M, Qty.	M,%
1	China	1,010,385	45.50	China	2,191,640	56.55
2	Singapore	402,619	18.13	Singapore	539,109	13.91
3	Malaysia	288,398	12.99	Malaysia	441,375	11.39
4	Thailand	218,768	9.85	Thailand	368,091	9.50
5	United States of America	193,510	8.71	United States of America	146,581	3.78
6	Indonesia	52,102	2.35	Indonesia	110,605	2.85
7	United Kingdom	14,536	0.65	Germany	20,315	0.52
8	Germany	12,308	0.55	Vietnam	18,703	0.48
9	Vietnam	8,003	0.36	United Kingdom	13,133	0.34
10	Ireland	6,181	0.28	Ireland	7,997	0.21
11	Italy	4,481	0.20	France	5,812	0.15
12	France	4,077	0.18	Canada	5,193	0.13
13	Canada	3,681	0.17	Italy	4,969	0.13
14	Sweden	1,410	0.06	Sweden	2,221	0.06
15	Papua New Guinea	6	0.00	Papua New Guinea	6	0.00

Source: Compiled from Trade Data International, (2007)

Table: 4.26

CATEGORY 8473: IMPORT RANKING (HS-4) Qty. Units; Quarterly Average, % of the Total						
8473: - Parts and accessories (other than covers, carrying cases and the like) suitable for use solely or principally with office machines						
Rank	1990-2006			2000-2006		
	Country	M, Qty.	M,%	Country	M, Qty.	M,%
1	China	956,730	53.44	China	2,181,696	58.28
2	United States of America	513,905	28.70	United States of America	974,010	26.02
3	Malaysia	97,607	5.45	Malaysia	197,756	5.28
4	United Kingdom	58,605	3.27	United Kingdom	117,730	3.15
5	Germany	55,068	3.08	Germany	87,970	2.35
6	Ireland	32,134	1.79	Ireland	76,957	2.06
7	Thailand	31,668	1.77	Thailand	37,253	1.00
8	Singapore	11,900	0.66	Indonesia	23,098	0.62
9	Indonesia	9,884	0.55	France	14,044	0.38
10	France	7,166	0.40	Canada	10,100	0.27
11	Canada	5,558	0.31	Italy	9,512	0.25
12	Italy	5,376	0.30	Singapore	8,108	0.22
13	Sweden	2,464	0.14	Sweden	2,885	0.08
14	Vietnam	2,355	0.13	Vietnam	2,223	0.06
15	Papua New Guinea	5	0.00	Papua New Guinea	9	0.00

Source: Compiled from Trade Data International, (2007)

Table: 4.27

CATEGORY 8517: IMPORT RANKING (HS-4) Qty. Units; Quarterly Average, % of the Total						
8517: - Electrical apparatus for line telephony or line telegraphy, including line telephone sets with cordless handsets and telecommunication apparatus for carrier-current line systems or for digital line systems; videophones						
	1990-2006			2000-2006		
Rank	Country	M, Qty.	M,%	Country	M, Qty.	M,%
1	China	323,224	62.89	China	563,452	71.28
2	Malaysia	62,982	12.25	Malaysia	97,145	12.29
3	Thailand	50,640	9.85	Thailand	66,731	8.44
4	United States of America	20,809	4.05	United States of America	16,593	2.10
5	Singapore	13,897	2.70	United Kingdom	10,160	1.29
6	Canada	8,647	1.68	Germany	8,978	1.14
7	United Kingdom	8,234	1.60	Singapore	7,909	1.00
8	Sweden	6,269	1.22	Vietnam	4,169	0.53
9	Germany	5,180	1.01	Italy	3,812	0.48
10	Vietnam	5,059	0.98	Sweden	3,811	0.48
11	Italy	4,533	0.88	France	2,851	0.36
12	France	2,848	0.55	Canada	2,138	0.27
13	Indonesia	928	0.18	Indonesia	1,555	0.20
14	Ireland	661	0.13	Ireland	1,128	0.14
15	Papua New Guinea	20	0.00	Papua New Guinea	44	0.01

Source: Compiled from Trade Data International, (2007)

Table: 4.28

CATEGORY 8703: IMPORT RANKING (HS-4) Qty. Units; Quarterly Average, % of the Total						
8703: - Motor cars and other motor vehicles principally designed for the transport of persons (other than public transport type), including station wagons and racing cars						
Rank	1990-2006			2000-2006		
	Country	M, Qty.	M,%	Country	M, Qty.	M,%
1	Germany	10,857	42.65	Germany	15,315	41.49
2	United States of America	4,176	16.41	United States of America	5,046	13.67
3	United Kingdom	3,509	13.78	United Kingdom	4,383	11.87
4	France	1,895	7.44	France	3,360	9.10
5	Thailand	1,488	5.84	Thailand	3,342	9.05
6	Sweden	1,282	5.04	China	2,521	6.83
7	China	1,039	4.08	Sweden	1,152	3.12
8	Malaysia	584	2.29	Italy	991	2.69
9	Italy	512	2.01	Malaysia	560	1.52
10	Canada	105	0.41	Canada	230	0.62
11	Singapore	6	0.02	Singapore	8	0.02
12	Indonesia	1	0.00	Ireland	1	0.00
13	Papua New Guinea	0	0.00	Vietnam	0	0.00
14	Ireland	0	0.00	Papua New Guinea	0	0.00
15	Vietnam	0	0.00	Indonesia	0	0.00

Source: Compiled from Trade Data International, (2007)

Table: 4.29

CATEGORY 3004: NET EXPORT RANKING (HS-4) Qty. Units; Quarterly Average				
3004: - Medicaments (excluding goods of 3002, 3005 or 3006) consisting of mixed or unmixed products for therapeutic or prophylactic uses, put up in measured doses or in forms or packings for retail sale				
	1990-2006		2000-2006	
Rank	Country	Quantity	Country	Quantity
1	France	-84,641	Germany	-108,276
2	Germany	-52,616	France	-105,251
3	Sweden	288	United States of America	10,388
4	Italy	6,638	Sweden	14,086
5	Ireland	10,532	Italy	15,507
6	Indonesia	11,973	Ireland	18,707
7	United States of America	18,375	Indonesia	24,730
8	China	19,252	Vietnam	32,287
9	Canada	36,308	Papua New Guinea	32,416
10	Papua New Guinea	41,823	China	44,072
11	Thailand	44,210	Canada	53,217
12	Vietnam	45,376	Thailand	84,521
13	United Kingdom	107,778	United Kingdom	166,856
14	Malaysia	196,163	Singapore	417,476
15	Singapore	198,467	Malaysia	434,776

Source: Compiled from Trade Data International, (2007)

Table: 4.30

CATEGORY 8471: NET EXPORT RANKING (HS-4) Qty. Units; Quarterly Average				
8471: - Automatic data processing machines and units thereof; magnetic or optical readers, machines for transcribing data onto data media in coded form and machines for processing such data, not elsewhere specified or included				
Rank	1990-2006		2000-2006	
	Country	Quantity	Country	Quantity
1	China	-1,005,254	China	-2,180,216
2	Singapore	-380,143	Singapore	-496,297
3	Malaysia	-277,534	Malaysia	-417,266
4	United States of America	-193,510	Thailand	-237,703
5	Thailand	-164,266	United States of America	-146,581
6	Indonesia	-50,525	Indonesia	-107,390
7	Germany	-10,389	Germany	-16,795
8	Ireland	-5,426	Ireland	-6,357
9	Italy	-4,227	Vietnam	-5,568
10	Canada	-2,895	Italy	-4,701
11	Vietnam	-2,542	Canada	-4,235
12	France	-270	Sweden	964
13	Sweden	-61	France	3,027
14	Papua New Guinea	1,888	Papua New Guinea	3,193
15	United Kingdom	11,157	United Kingdom	45,495

Source: Compiled from Trade Data International, (2007)

Table: 4.31

CATEGORY 8473: NET EXPORT RANKING (HS-4) Qty. Units; Quarterly Average				
8473: - Parts and accessories (other than covers, carrying cases and the like) suitable for use solely or principally with office machines				
Rank	1990-2006		2000-2006	
	Country	Quantity	Country	Quantity
1	China	-956,730	United States of America	-2,181,696
2	United States of America	-513,905	Vietnam	-974,010
3	Malaysia	-97,607	Singapore	-197,756
4	United Kingdom	-58,605	Sweden	-117,730
5	Germany	-55,068	United Kingdom	-87,970
6	Ireland	-32,134	Ireland	-76,957
7	Thailand	-31,668	Italy	-37,253
8	Singapore	-11,274	Germany	-23,098
9	Indonesia	-9,884	Malaysia	-14,044
10	France	-7,166	China	-10,100
11	Canada	-5,558	Thailand	-9,512
12	Italy	-5,376	France	-6,970
13	Sweden	-2,464	Canada	-2,885
14	Vietnam	-2,355	Papua New Guinea	-2,223
15	Papua New Guinea	-5	Indonesia	-9

Source: Compiled from Trade Data International, (2007)

Table: 4.32

CATEGORY 8517: NET EXPORT RANKING (HS-4) Qty. Units; Quarterly Average				
8517: - Electrical apparatus for line telephony or line telegraphy, including line telephone sets with cordless handsets and telecommunication apparatus for carrier-current line systems or for digital line systems; videophones				
Rank	1990-2006		2000-2006	
	Country	Quantity	Country	Quantity
1	China	-322,112	China	-561,538
2	Malaysia	-62,586	Malaysia	-96,622
3	Thailand	-49,275	Thailand	-66,155
4	United States of America	-20,809	United States of America	-16,593
5	Singapore	-7,725	United Kingdom	-8,210
6	United Kingdom	-6,438	Germany	-8,069
7	Sweden	-6,229	Vietnam	-3,942
8	Italy	-4,475	Italy	-3,797
9	Germany	-4,174	Sweden	-3,793
10	Vietnam	-3,993	France	-2,639
11	Canada	-3,480	Indonesia	-1,289
12	France	-2,493	Ireland	-1,105
13	Ireland	-639	Papua New Guinea	337
14	Indonesia	-222	Singapore	1,642
15	Papua New Guinea	1,058	Canada	9,891

Source: Compiled from Trade Data International, (2007)

Table: 4.33

CATEGORY 8703: NET EXPORT RANKING (HS-4) Qty. Units; Quarterly Average				
8703: - Motor cars and other motor vehicles principally designed for the transport of persons (other than public transport type), including station wagons and racing cars				
Rank	1990-2006		2000-2006	
	Country	Quantity	Country	Quantity
1	Germany	-10,747	Germany	-15,177
2	United Kingdom	-3,104	United Kingdom	-3,447
3	France	-1,894	France	-3,359
4	Thailand	-1,357	Thailand	-3,319
5	Sweden	-1,276	China	-2,168
6	United States of America	-1,222	United States of America	-1,479
7	China	-892	Sweden	-1,149
8	Malaysia	-561	Italy	-974
9	Italy	-505	Malaysia	-522
10	Canada	-101	Canada	-221
11	Ireland	2	Vietnam	0
12	Vietnam	4	Ireland	3
13	Papua New Guinea	134	Papua New Guinea	214
14	Indonesia	264	Indonesia	518
15	Singapore	324	Singapore	752

Source: Compiled from Trade Data International, (2007)

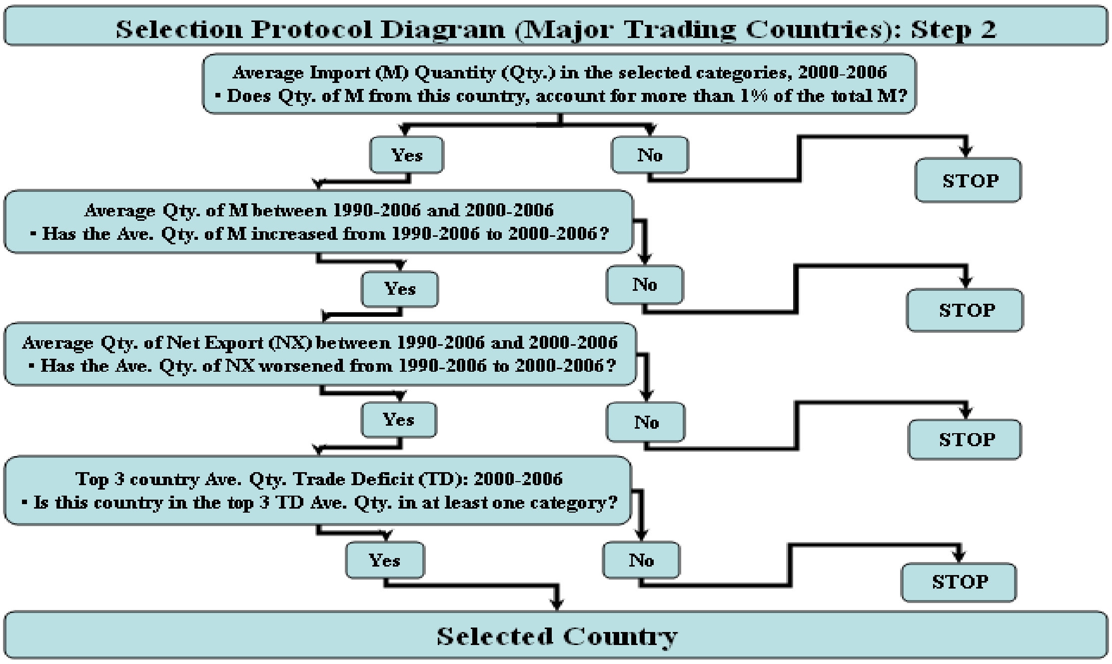
Diagram 4.5 has a fundamental similarity with Diagram 4.3, which has been used in the selection of the major TD countries in STEP ONE. Both diagrams and their corresponding selection criteria are based on the TD and M levels and both have 4 major phases of the selection criteria. However, Diagram 4.3 and Diagram 4.5 are slightly different in order to ensure the effectiveness in the selection of the limited number of countries within the selected range of the categories. Unlike Diagram 4.3, Diagram 4.5 does not have the selection criteria in relation to the X levels, because it has already been established that a considerable X links between the selected countries and Australia exists. Furthermore, Diagram 4.5 gives more emphasis on the TD levels and the changes between the LT and the ST, unlike in Diagram 4.3 where the emphasis is given more on the ST. The selection basics are the same as in the previous 3 stages of the selection, and the countries that will be selected for the final analysis in this research are the countries that satisfy all selection criteria, while the countries, which do not satisfy all the selection criteria, will be excluded from comprehensive examination.

In the first phase of Diagram 4.5, the selection criterion is whether the country under examination accounts for more than 1 percent of the total M in at least 1 out of the 5 selected categories in the ST. This selection criterion ensures that the country that progresses to the second phase is a considerable M source country in at least 1 out of the 5 selected categories in the ST. The country that satisfies this criterion is progressed into the second phase of the selection protocol, while the country that does not satisfy this criterion is excluded from further assessment.

Once the country has progressed into the second phase, then it is assessed whether the average M levels between the LT and the ST has increased in the same category where the M levels accounts for more than 1 percent (the category identified in phase one). This criterion ensures that the M volumes from this country is considerable and increasing in size, which implies an increased likelihood that the TD is rising with the country under examination, ceteris-paribus. The countries that satisfy this criterion are progressed into the third phase of the selection protocol, while the countries that do not, are excluded from further assessment.

The remaining countries which have progressed into the third phase, despite accounting for a significant M levels and these volumes are increasing, the country under examination is not necessarily the TD country in the selected categories. In order to ensure that the country will progress into the next phase of the selection criteria is the country with a deteriorating NX, the countries in this stage are assessed whether the NX has worsened between the LT and the ST in at least 1 out of 5 selected categories[81]. This assessment is conducted based on the average QTY units, not percentages, mainly because the absolute QTY are considered a superior measure for determining the true values[82] of the NX. The countries that satisfy this selection criterion is progressed into the final fourth phase of the selection criteria, while the countries that do not, are excluded from further assessment.

Diagram: 4.5



The final fourth phase of the selection criteria is to assess the countries that have progressed to this final phase, of whether there are ranked in the Top 3 TD countries, in at least 1 of out of 5 goods categories. This selection criterion will ensure that only the top TD countries are selected for further analysis. According to these principles based on which the Diagram 4.5 has been structured, the FA „PROTOCOL STEP TWO - COUNTRIES' which are presented in Appendix Tables 4.154-4.155 is explained next.

According to Diagram 4.5, in the first phase of the selection criteria, the selection analysis process in Appendix Tables 4.154-4.155 shows the 3 countries Canada,

[81] The NX deterioration constitute whenever one of these following 3 cases has occurred: the negative NX becomes a more negative NX, a positive NX becomes a negative NX and the positive NX becomes less positive NX.
[82] The main reason why the percentages are not considered is because they represents a relative QTY and are easily influenced by the changes in the X and M volumes by other countries within the observed categories.

Papua New Guinea and Vietnam that have not satisfied the selection criterion and have been excluded from further analysis. The remaining 12 countries have progressed into the second phase.

In the second phase, all countries have satisfied the selection criterion and none of the countries have been excluded, and this confirms that the countries which accounts for more than 1 percent of the total M in the ST, has also increased their M levels between the LT and the ST. Consequently, all remaining 12 countries have progressed into the third phase of the selection protocol.

In the third phase, all 12 countries that progressed to this stage have satisfied the criterion in this phase and none of the countries has been excluded. This outcome confirms the earlier conjecture that when the M level is substantial and are increasing, ceteris-paribus, than it is more likely that the NX level will deteriorate. Due to this outcome, once more all 12 remaining countries have progressed into the fourth phase of the selection protocol.

Finally, in the fourth phase of the selection protocol analysis, all 12 remaining countries are assessed on whether they are ranked in the Top 3 TD countries in at least 1 out of the 5 categories. The 4 countries that did not satisfy this criterion and have been excluded from further analysis are Indonesia, Ireland, Italy and Sweden and the countries which satisfied all selection criteria in Diagram 4.5, are the following 8 countries:

- China
- France
- Germany
- Malaysia
- Singapore
- Thailand
- United Kingdom and
- United States of America

Now that the final eight countries are selected and their significant association with the six selected goods categories is established, the summary for some of the key facts about these eight countries are as follows:

- By referring to Tables 4.15, the combined LT X, M and NX trends for the period 1990-2006, are:
  - X is growing on average by an AUD431.81 mill. per quarter.
  - M is increasing on average by an AUD1,138.67 mill. per quarter and
  - TD is increasing on average by an AUD706.87 mill. per quarter.
- By referring to Table 4.12, Appendix Table 4.37 and Appendix Tables 4.24-4.36, the X values in AUD, mill. are:
  - Period 1990-2006 (LT); the X to these eight countries accounts for 30.27 percent of the total Australian X.
  - Period 2000-2006 (ST); the X to these eight countries accounts for 32.44 percent of the total Australian X.
    - This is a difference of 7.17 percent in the two different time duration.
  - Period 1990-2006 (LT); average of the X to these eight countries accounts for an AUD7,509.3 mill. per quarter.
  - Period 2000-2006 (ST); average of the X to these eight countries accounts for an AUD9,880.9 mill. per quarter.
    - This is a difference of 31.58 percent in the two different time duration.
  - The top X rankings are:
    - Period 1990-2006 (LT); these eight countries occupied the Top 20 positions (2^{nd}, 5^{th}, 6^{th}, 7^{th}, 12^{th}, 13^{th}, 17^{th} and 20^{th}).
    - Period 2000-2006 (ST); these eight countries occupied the Top 20 positions (2^{nd}, 3^{rd}, 6^{th}, 7^{th}, 12^{th}, 13^{th}, 19^{th} and 20^{th}).
- By referring to Table 4.13, Appendix Table 4.38 and Appendix Tables 4.24-4.36, the M values in AUD, mill. are:
  - Period 1990-2006 (LT); the M from these eight countries accounts for 50.41 percent of the total Australian M.
  - Period 2000-2006 (ST); the M from these eight countries accounts for 51.93 percent of the total Australian M.
    - This is a difference of 3.02 percent in the two different time duration.

- Period 1990-2006 (LT); the average of the M from these eight countries accounts for an AUD13,069.94 mill. per quarter.
- Period 2000-2006 (ST); the average M from these eight countries accounts for an AUD18,905.11 mill. per quarter.
  - This is a difference of 44.65 percent in the two different time duration.
- The top M rankings are:
  - Period 1990-2006 (LT); these eight countries occupied the Top 14 positions (1^{st}, 3^{rd}, 4^{th}, 5^{th}, 6^{th}, 9^{th}, 10^{th} and 14^{th}).
  - Period 2000-2006 (ST); these eight countries occupied the Top 12 positions (1^{st}, 3^{rd}, 4^{th}, 5^{th}, 6^{th}, 9^{th}, 10^{th} and 12^{th}).

- By referring to Table 4.14, Appendix Table 4.39 and Appendix Tables 4.24-4.36, the TD values in AUD, mill. are:
  - Period 1990-2006 (LT); the average TD with these eight countries accounts for an AUD5,560.79 mill. per quarter.
  - Period 2000-2006 (ST); the average TD with these eight countries accounts for an AUD9,024.25 mill. per quarter.
    - This is a difference of 62.28 percent in the two different time duration.
  - The top TD rankings are:
    - Period 1990-2006 (LT); these eight countries occupied the Top 232 positions (1^{st}, 2^{nd}, 3^{rd}, 4^{th}, 7^{th}, 9^{th}, 15^{th} and 232^{nd}).
    - Period 2000-2006 (ST); these eight countries occupied the Top 13 positions (1^{st}, 2^{nd}, 3^{rd}, 4^{th}, 5^{th}, 9^{th}, 11^{th} and 13^{th}).

By observing these facts, it is evident that these eight selected countries accounts for a significant X and M volumes. Furthermore, they are amongst the top TD countries and finally they are closely linked with the six selected major TD categories. Now that the six major TD categories based on HS-4 and ANZSIC-2 level of aggregation and the eight TD countries have been identified and selected, the summaries of STEP TWO for selected categories and countries are presented in the next section.

4.11 SUMMARY OF SELECTION PROTOCOL TWO

Based on the preceding analysis, the six major TD categories selected for further analysis in this research are the five goods categories based on HS-4 and one service category based on ANZSIC-2 level of aggregation, and they are:

Goods, HS-4:

- **3004: -** Medicaments (excluding goods of 3002, 3005 or 3006) consisting of mixed or unmixed products for therapeutic or prophylactic uses, put up in measured doses or in forms or packings for retail sale
- **8471: -** Automatic data processing machines and units thereof; magnetic or optical readers, machines for transcribing data onto data media in coded form and machines for processing such data, not elsewhere specified or included
- **8473: -** Parts and accessories (other than covers, carrying cases and the like) suitable for use solely or principally with office machines
- **8517: -** Electrical apparatus for line telephony or line telegraphy, including line telephone sets with cordless handsets and telecommunication apparatus for carrier-current line systems or for digital line systems; videophones
- **8703: -** Motor cars and other motor vehicles principally designed for the transport of persons (other than public transport type), including station wagons and racing cars

Services, ANZSIC-2:

- **1.2: -** Freight transportation

In addition, eight major TD countries selected for the further analysis are:

- China
- France
- Germany
- Malaysia
- Singapore
- Thailand
- United Kingdom and
- United States of America

The detailed and in-depth analysis carried out for these six categories and eight selected countries have revealed the following facts:

- The X, AUD values; 1990-2006 (LT), accounted for a quarterly average of:
    - Six categories: AUD1,364.44 mill.
    - Eight countries: AUD7,509.3 mill.
- The X, AUD values; 2000-2006 (ST), accounted for a quarterly average of:
    - Six categories: AUD1,865.4 mill.
    - Eight countries: AUD9,880.9 mill.
- The M, AUD values; 1990-2006 (LT), accounted for a quarterly average of:
    - Six categories: AUD4,240.1 mill.
    - Eight countries: AUD13,069.94 mill.
- The M, AUD values; 2000-2006 (ST), accounted for a quarterly average of:
    - Six categories AUD5,958.2 mill.
    - Eight countries: AUD18,905.11 mill.
- The TD, AUD values; 1990-2006 (LT), accounted for a quarterly average of:
    - Six categories: AUD2,875.3 mill.
    - Eight countries: AUD5,560.79 mill.
- The TD, AUD values; 2000-2006 (ST), accounted for a quarterly average of:
    - Six categories: AUD4,093.5 mill.
    - Eight countries: AUD9,024.25 mill.
- The top TD rankings; for the period between 1990-2006 (LT):
    - Six categories: occupied the Top 13 positions (1^{st}, 2^{nd}, 3^{rd}, 6^{th}, 7^{th} and 13^{th}).
    - Eight countries: Occupied the Top 232 positions (1^{st}, 2^{nd}, 3^{rd}, 4^{th}, 7^{th}, 9^{th}, 15^{th} and 232^{nd}).
- The top TD rankings; for the period between 2000-2006 (ST):
    - Six categories: Occupied the Top 12 positions (1^{st}, 2^{nd}, 3^{rd}, 5^{th}, 7^{th} and 12^{th}).

- Eight countries: Occupied the Top 13 positions (1st, 2nd, 3rd, 4th, 5th, 9th, 11th and 13th).

Based on these summaries, it is apparent that the six categories and eight countries selected for the comprehensive analysis in this research accounts for a substantial X and M volumes. These facts signify the intensity of the competition in these categories between Australia and the selected countries. Furthermore, both the X and M levels in these categories are noticeably higher when the LT and the ST volumes are weighted against each other. These facts clearly demonstrate that trade in these categories between Australia and the selected countries are competitive industries. However, the Australian X volumes in these categories are increasing at a lower rate than the M volumes in these categories, consequently these categories account for a substantial TD in Australia. Due to these trends, the TD levels in these six categories between Australia and the eight selected countries are increasing considerably. These trends warrant an in-depth analysis in an attempt to identify the economic variables that are responsible for such trends and to establish their significance. Once this is achieved, the policy makers in Australia will have access to vital information for formulating and implementing optimal economic decisions, which are applicable to the increasing TD level in Australia in these categories with these countries.

4.12 CONCLUSION

In this chapter, the FA - selection protocol was developed and applied for the selection of the major TD categories and the countries associated with the rising TD in Australia. Since such a protocol was previously not existent in the current literature, the entire protocol and corresponding selection criteria was developed from the very beginning. The major guiding criteria for selecting in the development of this protocol are the X and M trend volumes for Australia and their influence on an increasing TD in Australia, for the period between 1990 and 2006. This chapter consists of four main stages. The first STAGE ONE is the identification of the major TD categories based on HS-2 and ANZSIC-1 level of aggregation. The second STAGE TWO is the identification of the major TD countries. The third STAGE THREE is revealing the major TD sub-categories out of the selected TD categories in the first stage; based on HS-4 and ANZSIC-2 level of aggregation. The fourth STAGE FOUR is to evaluate the association between the selected TD sub-categories based on HS-4 and ANZSIC-2 level of aggregation and the selected TD countries.

In all stages of the identification processes, one diagram was developed autonomously from each other to accommodate the selection protocol effectiveness. Despite that these four selection diagrams have developed autonomously from each other, they all focused fundamentally on the identification of the major TD categories or countries.

Once this selection protocol diagram was applied in STAGE ONE, it was established that the five major TD categories that warranted attention based on the selection criteria are the following:

Goods, HS-2:

- **30: -** Pharmaceutical products
- **84: -** Nuclear reactors, boilers, machinery and mechanical appliances; Parts thereof
- **85: -** Electrical machinery and equipment and parts thereof; Sound recorders and reproducers, television image and sound recorders and reproducers, and parts and accessories of such articles
- **87: -** Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof

Services, ANZSIC-1:

- **1: -** Transportation Services

STAGE TWO of the selection of the identification process established that the fifteen major TD countries that warranted attention based on the selection criteria are the following:

- Canada
- China
- France
- Germany
- Indonesia
- Ireland
- Italy
- Malaysia
- Papua New Guinea
- Singapore

- Sweden
- Thailand
- United Kingdom
- United States of America and
- Vietnam

Once the five major TD categories and the fifteen countries were selected in the first and second stage of the selection process, the five selected categories were dis-aggregated to a lower level of aggregation, based on HS-4 and ANZSIC-2 level of aggregation. This process had generated 158 categories; - 155 goods and three service categories. Based on the selection criteria in STAGE THREE, it was established that six out the 158 categories warranted an in-depth analysis in this research, and they are as follows:

Goods, HS-4:

- **3004: -** Medicaments (excluding goods of 3002, 3005 or 3006) consisting of mixed or unmixed products for therapeutic or prophylactic uses, put up in measured doses or in forms or packings for retail sale
- **8471: -** Automatic data processing machines and units thereof; magnetic or optical readers, machines for transcribing data onto data media in coded form and machines for processing such data, not elsewhere specified or included
- **8473: -** Parts and accessories (other than covers, carrying cases and the like) suitable for use solely or principally with office machines
- **8517: -** Electrical apparatus for line telephony or line telegraphy, including line telephone sets with cordless handsets and telecommunication apparatus for carrier-current line systems or for digital line systems; videophones
- **8703: -** Motor cars and other motor vehicles principally designed for the transport of persons (other than public transport type), including station wagons and racing cars

Services, ANZSIC-2

- **1.2: -** Freight transportation

In STAGE FOUR of the selections process, the assessment of the association between these six major TD categories with the fifteen selected countries is embarked upon. The countries with a weak association with these major TD categories based on the selection criteria in STAGE FOUR have been excluded from further consideration, while the eight countries which have demonstrated a strong association with these categories and have been selected for an in-depth analysis in this research, and they are as follows:

- China
- France
- Germany
- Malaysia
- Singapore
- Thailand
- United Kingdom and
- United States of America

These eight TD countries and the six TD categories selected, accounts for a significant TD in Australia. With these eight countries the Australian TD account for quarterly average of AUD5,560.79 mill. in the LT, while in the ST it accounts for an AUD9,024.25 mill. This is a difference of 62.23 percent in the two different time duration. Furthermore, these six categories account for a quarterly average TD of AUD2,875.3 mill. in the LT, while in the ST they account for a quarterly average TD of AUD4,093.5 mill. This is a difference in the two different time duration of 42 percent. The substantial TD levels in these categories between Australia and the eight selected countries are rapidly increasing. As a result, the trade patterns and determinants in these selected TD categories between Australia and the selected TD countries will be analysed in-depth in the next four chapters of this research in order to establish the economic variables that are influencing these trends.

CHAPTER 5

5. COMPARATIVE ADVANTAGE ANALYSIS

5.1 INTRODUCTION

Due to the increasing Trade Deficit (TD) in the selected categories between Australia and the selected TD countries identified in chapter 4, this chapter aims are to analyse the Comparative Advantage (CA), trade competitiveness and the trade performance in these categories. The CA analyses are performed according to the Balassa Revealed Comparative Advantage Index (BRCAI) and the trade competitiveness analyses are performed according to the Vollrath Revealed Export Advantage Index (VRXAI), the Vollrath Revealed Import Advantage Index (VRMAI), the Vollrath Revealed Trade Advantage Index (VRTAI) and the Vollrath Revealed Competitive Advantage Index (VRCAI). Finally, the trade performance indices are analysed in respect to the Export (X) and Import (M) volumes between Australia and the Rest of the World (RoW) and the domestic outputs in the selected categories. The trade performance indices calculated in this chapter are Trade Specialization Index (TSI), Export Propensity Index (XPI), Import Penetration Index (MPI) and Export/ Import Ratio (XMR). The selected goods categories are analysed for all the CA, trade competitiveness and trade performance, while the selected service categories are analysed only for trade performance, since suitable world trade data are not available for the service categories. Consequently, the selected service categories are analysed for the TSI, XPI, MPI and XMR only.

The structure of this chapter is divided into 5 distinct sections – Section 5.2 data definition and data sources, Section 5.3 theoretical framework and followed by Section 5.4 empirical testing. The last 2 sections are Section 5.5 empirical findings summaries and finally Section 5.6 represents the concluding remarks. Section 5.2 define the data and the data sources, while Section 5.3 comments on the underlying theoretical framework relevant to CA. Major empirical testings and analysis are presented in Section 5.4; Sections 5.4.1 and 5.4.2 covers BRCAI, Sections 5.4.3 and 5.4.4 covers VRXAI, VRTAI and VRCAI, while Section 5.4.5 covers the trade performance indices which includes TSI, XPI, MPI and XMR.

5.2 DATA AND DATA SOURCES

Trade data used in this chapter are obtained from the United Nation (UN) trade statistic databases, Trade Data International (TDI) and the Australian Bureau of Statistics (ABS). As mentioned in chapter 4, the preferred source of trade data for both goods and services analysis is data originating from the TDI, however, the scope of the TDI is limited. The data from the TDI contains only trade data in goods between Australia and the RoW, and they are not sufficient for the calculations of the BRCAI, VRXAI, VRTAI and VRCAI, therefore, the data utilized in this chapter was obtained from the UN and ABS.

The calculation and analysis of the BRCAI, VRXAI, VRTAI and VRCAI requires trade data that consists of all trade flows between all countries in the world, in the specific categories. As the data from TDI does not comprise of such as records this has necessitated in addition to TDI to use data from the UN and the ABS. The data used for the analysis of Balassa and Vollrath indices originates from the UN statistical databases, which consists of annual time series data for the period between 1990 and 2005. While the data used for the analysis of trade performance indices originates from the TDI and ABS, which consists of a quarterly time series data for the period between 1990 and 2006.

The trade data originating from the UN sources are classified according to the Standard Industrial Trade Classification (SITC), while the categories identified for further analysis in chapter 4 are classified according to the Harmonized Commodity Description and Coding System (HS). Both SITC and HS are commodity-based classification systems (ABS, 2008i), while the main difference between the SITC and HS is that the categories classifications to some extent differ. Due to the difference between the SITC and HS, the selected categories from the UN databases, are the categories[83] which were the most closely related to the selected categories in chapter 4. This selection process has been applied throughout the entire selection process for each category between the SITC and HS classification. The categories according to the 2-digit Standard Industrial Trade Classification (SITC-2) have been assigned to the Harmonized Commodity Description and Coding System - Second Level of aggregation (HS-2), and the 3-digit Standard Industrial Trade Classification (SITC-3)

[83] Although the categories and industries can have different meaning to different parties, distinction between the 2 is ignored and the reader is advised that category and industry are used interchangeably.

has been assigned to the Harmonized Commodity Description and Coding System - Forth Level of aggregation (HS-4). The categories selected from the UN according to the SITC classification are as follows:

SITC-2 → HS-2

- **54:** - Pharmaceutical Products → **30:** - Pharmaceutical products
- **71:** - Power Generating Equipment **and 75:** - Office/ Data Processing Machines → **84:** - Nuclear reactors, boilers, machinery and mechanical appliances; Parts thereof
- **76:** - Telecoms Equipment **and 77:** - Electrical Equipment → **85:** - Electrical machinery and equipment and parts thereof; Sound recorders and reproducers, television image and sound recorders and reproducers, and parts and accessories of such articles and
- **78:** - Road vehicles → **87:** - Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof

SITC-3 → HS-4

- **542:** - Medicaments incl. Vet → **3004:** - Medicaments (excluding goods of 3002, 3005 or 3006) consisting of mixed or unmixed products for therapeutic or prophylactic uses, put up in measured doses or in forms or packings for retail sale
- **751:** - Office Machines **and 752:** - Computer Equipment → **8471:** - Automatic data processing machines and units thereof; magnetic or optical readers, machines for transcribing data onto data media in coded form and machines for processing such data, not elsewhere specified or included
- **759:** - Office Equipment Parts/ Accessories → **8473:** - Parts and accessories (other than covers, carrying cases and the like) suitable for use solely or principally with office machines
- **764:** - Telecoms Equipment NES → **8517:** - Electrical apparatus for line telephony or line telegraphy, including line telephone sets with cordless handsets and telecommunication apparatus for carrier-current line systems or for digital line systems; videophones and

- **781:** - Passenger Cars Etc. → **8703:** - Motor cars and other motor vehicles principally designed for the transport of persons (other than public transport type), including station wagons and racing cars

5.3 THEORETICAL FRAMEWORK

There are various theoretical explanations of why countries trade with each other and what benefits of international trade are to the countries engaging in international trade. The evolution of the theoretical framework associated with international trade dates back to 15th century (period between 1500-1800) and is known as a Mercantilism. According to Kerr (1986), the traditional Mercantilism is to promote the X while discouraging M and as such, supports the „nationalist dimension' of self-sufficiency and independence. Mercantilists believed that the trade between countries is a „zero-sum-game', which means that countries do not benefit from trade and whatever is gained from the X is lost by the M[84], which implies that X is desirable, while M is not desirable (Mayall, 2001). However, the term Mercantilism was unknown during that period until the French politician Mirabeau coined the term Mercantilist in 1763 (Cannon, 2001), while Adam Smith (1776) was critical of Mercantilist notion towards international trade in his book *Wealth of Nations* (Mayall, 2001).

5.3.1 ABSOLUTE ADVANTAGE THEORY

The trade theory of Absolute Advantage (AA[85]) by Adam Smith (1776), argues that the country can benefit from both the X and M; by exporting the goods in which the country possess an AA; and importing of the goods in which the country have an absolute disadvantage. According to this theory, if a country can produce the goods more efficiently[86] than any other country, it then possess an AA and should specialize in the production of those goods and export that goods to the RoW. On the other hand, if a country is not efficient in producing that particular goods than other countries, then they should import those goods from the countries which maintain an AA in the production of that goods. Where countries possess an AA, according to the principles of specialization in the production of goods, both exporting and importing countries

[84] This comment is valid under the assumption that the X and M volumes are balanced.
[85] Absolute Advantage (AA) theory is based on the assumption that only one input into production exists, which is labour, while the production function is linear.
[86] Under Absolute Advantage (AA) theory, most efficient in the production of the goods refer to the scenario when a country can produce the goods with a lower labour cost than any other nation.

will benefits from trade and consequently raise the country's welfare and standard of living due to the increased resource utilization.

While the theory of AA explains the trade patterns and associated benefits of trade for the countries with AA relatively well, it stop shorts of explaining the benefits of trade between the countries which does not hold an AA. The countries that do not hold an AA in the production of any goods category, according to the AA theory, the benefits from trade are non-existent.

5.3.2 COMPARATIVE ADVANTAGE THEORY

According to AA theory, as mentioned previously, the countries that do not hold an AA in the production of any good categories, cannot benefit from trade. David Ricardo with his doctrine of the CA[87] in his book of *On the Principles of Political Economy and Taxation* (Ricardo, 1817) questioned this principle of the AA theory. David Ricardo argued that even if the country does not hold an AA, it could still benefit from trade according to the CA because the theory of CA maintains that as long as the country can produce the goods at a lower comparative cost than another country, then that country can still benefit from trade. According to this theory, the nation that possesses a CA in the production of a particular good, should specialize in the production of that good and export that good to the RoW. At the same time, if a nation has a Comparative Disadvantage (CD) in the production of a particular good, that good should be imported from the RoW. According to the principle of CA, both the exporting and importing countries will benefit from trade and raise their welfare and standard of living due to increased resource utilization.

The CA theory is based on restrictive assumptions, such as 2 goods, 2 countries and labour is the only input into production; consequently the cost of labour is the only observed cost. Haberler (1936) argued that the validity of the CA theory still holds, even if some of these assumptions are relaxed. Haberler (1936) explained the comparative costs in terms of opportunity cost[88], which shows that countries should specialize in the production of the products that command a lower opportunity cost

[87] Comparative Advantage (CA) theory is based on the following assumptions: 2 countries, 2 goods, 1 input into production (labour is only inputs into production) and labour is homogenous within the country and is heterogenous across the countries and the production function is linear. Both goods are homogeneous, the transport of goods between countries and reallocation of labour between industries is costless, the technology differences between industries and countries exists; which is reflected in the labour productivity, markets are perfectly competitive for both the labour and the goods, firms are profit maximiser and consumers trying to maximise their utility. However, according to Haberler (1936), these assumptions are not necessary in order to validate the CA theory.

[88] Opportunity Cost is the value of the next best alternative forgone as a result of carrying out certain decision, which equate to the value of output which must be given up (sacrificed) in order to produce other output.

and exporting these products to the RoW. In addition to opportunity cost, the studies by Bhagwati (1964) and Dun & Mutti (2000) state that the CA theory is built upon perfect competition principles and constant return to scale.

5.3.3 HECKSCHER-OHLIN THEORY

The CA theory explains the fundamental principles of the countries specialization according to their relative productivity of labour, and specifies which products the country will export and import. Furthermore, the CA also suggests the possibility of complete specialization[89] in the production of the product in which country possess a lower opportunity cost of production compared to other countries.

While identification of the countries relative productivity of labour is important, the factors that influence the labour productivity are equally significant. However, these are not taken into account in the CA theory. This issue was first analysed in Heckscher-Ohlin Theory (HO-theory[90]) in *The Effect of Foreign Trade on the Distribution of Income* (Heckscher, 1919) and Ohlin (1933) made further contribution to this work in *Interregional and International Trade*. The HO-theory stipulates that a country will export the product/s, which are intensive in the country abundant resource/s, and the country will import the product/s which are intensive in the country scarce resource/s. The distinct differences between CA and HO-theory is that HO-theory, unlike the CA, assumes 2 inputs into production which are Labour (L) and Capital (K) and these factor endowments are dissimilar between countries, while production is according to incomplete[91] specialization.

According to HO-theory, the country which is abundant in L will specialize in L intensive products; while the country which is abundant in K will specialize in the production of the K intensive products. As a result, L abundant country will export L intensive products to L scarce country and import the products that are K intensive from K abundant country. On another hand, the K abundant country will export K

[89] Complete specialization is possible because the reallocation of the productive resources (Labour) according to the CA theory between industries is costless, which implies that the cost of the production is constant (Linear Production Possibility Curve) at all levels of output.
[90] Heckscher-Ohlin theory (HO-theory) is based on the following assumptions: 2 countries, 2 goods, 2 inputs into production (labour and capital and both factors are homogenous; one type of labour and one type of capital), while the production function is non-linear (Increasing Cost of Production). Both goods are homogenous, the transport of goods between countries is costless and trade barriers do not exists. Finally, the factor endowments differ between countries that are the only difference between the countries. The factor intensity, tastes and preferences are similar amongst the countries, markets are perfectly competitive for both the labour and goods markets, constant return to scale, perfect mobility of the factors of production within nations but immobile across the nations, full employment, balanced trade, the firms are profit maximiser and consumers trying to maximise their utility.
[91] Incomplete specialization is according to increasing cost of production.

intensive products to K scarce country and import the products which are L intensive from L abundant country. Due to the increasing cost of production, according to HO-theory, the countries will incompletely specialize in the production of the products that are intensive in their abundant resource, and both exporting and importing countries will benefit from trade and raise their welfare and standard of living due to increased resource utilization.

Furthermore, HO-theory predicts that countries that are L abundant will possess a CA in L intensive products and consequently export L intensive products and import K intensive products; while the countries that are K abundant will possess CA in K intensive products and consequently export K intensive products and import L intensive products. Based on proposition of HO-theory significant volume of empirical studies was generated to validate fundamental explanations to the trade patterns between countries.

Wassily Leontief (1954) undertook one of the first empirical studies using input-output X and M trade data for The United States of America and the RoW. The United States of America would be considered a relatively K abundant and L scarce country and according to HO-theory, it was expected that The United States of America to export K intensive products, while import L intensive products. However, the empirical findings contradicted HO-theory for The United States of America which mainly exported L intensive, while mainly imported K intensive products (Leontief, 1954; 1956). This empirical finding is known as *Leontief Paradox* in the literature.

Many researchers were becomes interested in the *Leontief Paradox* and attempted to determine other aspects besides the L and K, that influence the trade flows between countries. The study conducted by Kravis (1956) suggests that trade barriers such as tariff have affected the flow in labour intensive products, which contributed to the *Leontief Paradox*. The studies by Keesing (1966) and Baldwin (1971) explains the *Leontief Paradox* in respect to human capital, while Kenen (1965) links the human K and physical K using original data by Leontief (1954) and find a linkage in support of the HO-theory, while Stern & Markus (1981) shows that inclusion of human K eliminate the *Leontief Paradox*.

Numerous additional empirical studies have found that one of the reasons which have led to the *Leontief Paradox*, are non-inclusion of the Research and Development (R&D) (Gruber & Vernon, 1967), skill intensities and various technological innovation (Keesing, 1965, 1966; Bharadwaj & Bhagwati, 1967; Baldwin, 1971) and human capital as a determinants of dynamic CA (Tan, 1992). These factors according to these studies are certainly influencing the CA thus the X and M composition and volumes between countries.

All of these studies have contributed to the overall understanding that other factors, besides the relative abundance of L and K, are influencing the level of the CA and consequently the X and M flows between the countries. As a result, these empirical studies including *Leontief Paradox* Leontief, (1954, 1956) did not make HO-theory fallacious; they have rather complemented to the understanding of this theory that many other factors have to be considered as to what influences the CA and consequently the X and M volumes between countries.

5.4 EMPIRICAL TESTING

The theoretical background of the CA and the empirical studies in respect to HO-theory revisited in previous sections and the Australian resource availability, suggest that Australia is likely to specialize in the production of the products which are intensive in natural resources and export these products to the RoW, while import human capital intensive products from the RoW. According to DFAT (2008d), *Economic Fact Sheets* the Australian Top 5 X categories are coal, iron ore, non-monetary gold, crude petroleum and aluminium ore, while the Top 5 M categories are passenger vehicles, crude petroleum, refined petroleum, computers and pharmaceutical products. These facts of the major Australian X and M categories suggests that Australia mainly export the products which are intensive in the Australian abundant factor, while importing the product which are relatively less abundant and thus is consistent with HO-theory.

Numerous empirical studies attempted to examine and measures CA in various categories between Australia and its trading partners. According to the studies, Australia has CA mainly in natural resources related products, however, since the late 1970s and early 1980s there is some indication that Australia is gaining CA in some capital intensive product categories (Krause, 1984). According to Sheehan *et al.*

(1995) and Son & Wilson (1995) the Australian CA is mainly in the natural resources and primary products, while studies by Kalirajan & Shand (1998) pointing-out that the Australian CA is present in both the natural resource and capital-intensive categories which depends on which country analysis are focused. Furthermore, the studies by Anderson (1995), Sheehan *et al*. (1995, 1998) and Huey (1998) suggests that the Australian CA is changing due to government policies and world economic trends. According to these studies, there is some evidence that the composition of the Australian X is shifting from predominantly natural resource to knowledge intensive output, which is observable from the Australian X and M patterns. Finally, empirical evidence suggests that Australia poses CA in the categories intensive in natural resources such as primary products (Gunawardana & Khorchurklang, 2007) and in some manufacturing sub-categories (Havrila, 2003; 2004).

Theoretically, the CA refers to a relative price of the products in autarky[92] scenario and according to this, a relative prices should be observable in pre-trade scenario, however, in reality such prices are unobservable. In order to test the HO-theory and to measure the CA such data is essential, however, they are not available. Balassa (1965, p.116) in his work recognized this challenge and states in his commentary that the CA is likely to be an outcome of numerous factors, however, some of those factors are available and some are not, some are measurable and some are not. Moreover, in order to overcome these challenges and facilitate the measurement of the CA, Balassa (1965) suggests that the trade patterns could be observed once they have taken place and according to such trade data, the CA can be „*Revealed*'. This concept has been adopted in the current literature and is known as a BRCAI or just Revealed Comparative Advantage (RCA).

This BRCAI developed by Balassa (1965) is used in this chapter to measure the BRCAI in the selected TD categories in chapter 4, for all 4 goods categories based on HS-2 and 5 goods categories abased on HS-4 level of aggregation in respect to all 15 selected TD countries. The formula for BRCAI is presented in Equation (5.1).

$$BRCAI_{ij}^{\ t} = \left(X_{ij}^{\ t} / X_{j}^{\ t}\right) / \left(X_{iw}^{\ t} / X_{w}^{\ t}\right) \qquad (5.1)$$

where: $'X'$ is Export, $'i'$ is the product i, $'j'$ is a country j, $'w'$ is world total and $'t'$ is a time period.

[92] Autarky is a „Closed Economy' scenario, were the trade with other countries does not exists.

The values for BRCAI are observed from two aspects expects, if the value of BRCAI is greater than one, it shows that the proportion of a country $'j'$ in the X of the product $'i'$ is greater than the world $'w'$ proportion of the X of the product $'i'$, which reveals that a country has a RCA in the product $'i'$. If BRCAI is less than one it reveals that a country $'j'$ has a Revealed Comparative Disadvantage (RCD) in the product $'i'$.

BRCAI has been utilized in numerous studies in the current literature in respect to various categories and various countries and such studies includes Balassa (1977, 1979, 1989), Yeats (1985) Chuankamnerdkarn (1997), Havrila & Gunawardana (2003), Fertö & Hubbard (2003), Hoen & Oosterhaven (2006) and Gunawardana & Khorchurklang (2007). Although the BRCAI possesses some valuable information, there are numerous limitation to this index.

One of the major criticism of the BRCAI is that it contains only X levels while M levels are not considered and according to Bowen (1983), both X and M should be considered in measuring the CA. Furthermore, Bowen (1983) also suggests that the Net Export (NX) should be included as a variable in the calculation of the BRCAI in order to better reflect the CA; however, Vollrath (1991) disputes this proposal. Yeats (1985) and Ballance (1987) argues that the BRCAI is not a reliable measure of the CA and is not trustworthy, neither as an ordinal nor cardinal measurement of the RCA. Yeats (1985) further suggests that the cardinal measure of this index is more desirable than ordinal in order to compare the magnitude of the CA amongst the countries; while Ballance (1987) suggests that due to this irregularity usage of the BRCAI as a cardinal and/ or ordinal measure for CA should be predominantly according to the theoretical grounds alone. Furthermore, numerous studies, which includes studies by Hoen & Oosterhaven (2006) and Siggel (2006), suggests on as how to improve the reliability of the BRCAI measure. Hoen & Oosterhaven (2006) proposed an additive measure of the BRCAI compared to the original Balassa index which is multiplicative and Siggel (2006) argues that that BRCAI is more about competitiveness and not the CA and he proposes an integrated approach of measurement of the competitiveness and the CA.

5.4.1 REVEALED COMPARATIVE ADVANTAGE INDEX, HS-2

Despite the major critiques with respect to the Balassa index mentioned in the previous section, the BRCAI is remaining a widely accepted measure of the CA between countries and is currently used by numerous empirical studies. This chapter adopts the BRCAI as a measure of CA.

The calculation of the BRCAI by Balassa (1965), will be conducted according to Equation 5.1, however, this equation component (X_j^t) in numerator and equation component (X_w^t) in denominator does not stipulate precisely what total country and total world X trade consists of, and this creates some confusion when some current studies are observed and compared with each other. The total trade can be viewed as a total trade in broad industry such as manufacturing, total goods trade in all goods, total trade in all goods and services or some other specific aggregation.

By observing the existing studies such as Chuankamnerdkarn (1997), Havrila & Gunawardana (2003), Fertö & Hubbard (2003), Havrila (2004), Hoen & Oosterhaven (2006) and Gunawardana & Khorchurklang (2007), none of them specify exactly what the total trade consists of. Consequently, this is left to the interpretation or guesswork of the reader. In order to avoid existing confusion in the current studies, such information should be clearly stated, which will make these studies comparable in the future in the area of international trade analysis. This research is mindful of this shortcoming in the current studies and to avoid such confusion in the future, the BRCAI according to Equation 5.1 is calculated by treating the total trade as total trade in all goods and total trade in all goods and services combined. Consequently, the BRCAI calculated will reveal two indexes for each category; first, the proportion of the total trade in all goods and second, the proportion in respect to total trade in all goods and services combined. The equation for calculating the BRCAI in this chapter is presented in Equation 5.2 for total goods trade and Equation 5.3 for total trade in all goods and services combined.

$$BRCAI_{ij(GOODS)}{}^{t} = \left(X_{ij}{}^{t} / X_{j(GOODS)}{}^{t}\right) / \left(X_{iw}{}^{t} / X_{w(GOODS)}{}^{t}\right) \tag{5.2}$$

$$BRCAI_{ij(GOODS+SERVICES)}{}^{t} = \left(X_{ij}{}^{t} / X_{j(GOODS+SERVICES)}{}^{t}\right) / \left(X_{iw}{}^{t} / X_{w(GOODS+SERVICES)}{}^{t}\right) \tag{5.3}$$

The benefits of calculation of the BRCAI according to Equation 5.2 and 5.3 is twofold; firstly, it will provide precise information of what the total trade consists of and secondly, by calculating the BRCAI side by side for both goods and goods and services combined, additional information can be revealed such as weight of the service sector within the country. Now that formulae's are specified, the BRCAI is calculated and presented in the following sections.

5.4.1.1 BALASSA REVEALED COMPARATIVE ADVANTAGE INDEX; CATEGORY: 30

Table 5.1 shows the BRCAI for Australia and 8 selected TD countries in category 30 and Table 5.1 is the sub-set of Appendix Table 5.1, which consists of all fifteen TD countries. According to the Table 5.1, the BRCAI for Australia is less than one for the entire period except in the years 1999-2001 as a proportion of the trade in goods and in year 2000 as a proportion in the total trade, which shows that Australia in category 30 has a RCD in overall. Important to note here is that the Australian BRCAI is always lower according to a proportion of the total trade than as a proportion of the

Table: 5.1

BRCAI: CATEGORY 30*						
Year	**Goods Only**	**Total Trade**	**Goods Only**	**Total Trade**	**Goods Only**	**Total Trade**
Country	**AUSTRALIA**		**CHINA**		**FRANCE**	
1990	0.514	0.512	-	-	1.564	1.434
1991	0.579	0.580	-	-	1.570	1.431
1992	0.635	0.640	0.815	0.916	1.520	1.379
1993	0.677	0.673	0.649	0.722	1.659	1.478
1994	0.755	0.729	0.543	0.590	1.570	1.493
1995	0.775	0.738	0.507	0.551	1.642	1.574
1996	0.791	0.753	0.437	0.482	1.664	1.609
1997	0.753	0.727	0.330	0.364	1.720	1.681
1998	0.898	0.869	0.314	0.351	2.007	1.982
1999	1.029	0.975	0.254	0.283	2.021	2.012
2000	1.192	1.139	0.190	0.212	2.218	2.185
2001	1.008	0.993	0.141	0.158	2.189	2.178
2002	0.702	0.686	0.085	0.096	2.098	2.082
2003	0.854	0.810	0.062	0.071	2.067	2.060
2004	0.897	0.857	0.044	0.051	2.012	2.012
2005	0.978	0.958	0.038	0.044	2.199	2.189
Country	**GERMANY**		**MALAYSIA**		**SINGAPORE**	
1990	-	-	0.116	0.128	0.342	0.346
1991	1.351	1.470	0.108	0.120	0.299	0.307
1992	1.241	1.363	0.085	0.096	0.266	0.272
1993	1.321	1.447	0.073	0.082	0.317	0.327
1994	1.358	1.487	0.080	0.087	0.338	0.345
1995	1.307	1.415	0.075	0.080	0.303	0.317
1996	1.327	1.433	0.071	0.074	0.283	0.297
1997	1.423	1.535	0.058	0.060	0.270	0.287
1998	1.715	1.876	0.063	0.069	0.323	0.344
1999	1.682	1.843	0.054	0.060	0.559	0.592
2000	1.559	1.693	0.053	0.058	0.432	0.457
2001	1.632	1.785	0.045	0.049	0.420	0.442
2002	1.190	1.294	0.042	0.046	0.283	0.297
2003	1.313	1.429	0.040	0.045	0.251	0.260
2004	1.539	1.680	0.042	0.047	0.241	0.248
2005	1.631	1.776	0.040	0.045	0.539	0.558
Country	**THAILAND**		**UNITED KINGDOM**		**UNITED STATES**	
1990	0.106	0.103	1.971	1.886	0.958	0.871
1991	0.105	0.105	1.976	1.907	0.934	0.847
1992	0.129	0.128	1.930	1.834	0.883	0.805
1993	0.232	0.227	1.934	1.843	0.847	0.772
1994	0.131	0.131	1.910	1.802	0.819	0.742
1995	0.152	0.149	2.078	1.951	0.757	0.686
1996	0.126	0.120	2.031	1.890	0.773	0.698
1997	0.118	0.116	1.940	1.786	0.753	0.687
1998	0.119	0.121	2.287	2.044	0.938	0.855
1999	0.110	0.111	2.256	1.981	0.989	0.890
2000	0.112	0.117	2.496	2.196	1.108	1.004
2001	0.099	0.103	2.435	2.134	1.089	0.990
2002	0.077	0.079	2.299	1.970	1.015	0.908
2003	0.073	0.077	2.609	2.184	1.111	0.992
2004	0.062	0.066	2.624	2.126	1.210	1.075
2005	0.067	0.071	2.412	1.973	1.227	1.086

Pharmaceutical Products

Source: Compiled from the UN (2008c, 2008d; 2008e; 2008f; 2008g)

Table: 5.2

WORLD'S TOP 5 EXPORT/IMPORT COUNTRIES: CATEGORY 30*								
HS-2	**Country**	**AUD, mill.**	**Country**	**AUD, mill.**	**Country**	**AUD, mill.**	**Country**	**AUD, mill.**
EXPORT								
Rank-Year	**1990**		**1991**		**1992**		**1993**	
1	**Germany**	7,502	**Germany**	8,416	**Germany**	10,147	**Germany**	11,172
2	**Switzerland**	5,580	**USA**	5,989	**Switzerland**	7,732	**USA**	8,587
3	**USA**	5,346	**Switzerland**	5,963	**USA**	7,407	**Switzerland**	8,323
4	**U.K.**	5,172	**U.K.**	5,591	**U.K.**	6,942	**U.K.**	7,836
5	**France**	4,691	**France**	5,063	**France**	6,567	**France**	7,298
16-16-16-17	**Australia**	**580**	**Australia**	**612**	**Australia**	**751**	**Australia**	**773**
Rank-Year	**1994**		**1995**		**1996**		**1997**	
1	**Germany**	11,885	**Germany**	13,760	**Germany**	13,604	**Germany**	15,618
2	**Switzerland**	8,602	**Switzerland**	10,170	**Switzerland**	10,541	**U.K.**	11,752
3	**USA**	8,411	**U.K.**	10,123	**U.K.**	10,411	**USA**	11,029
4	**U.K.**	8,044	**France**	9,198	**USA**	9,309	**Switzerland**	10,999
5	**France**	7,365	**USA**	8,782	**France**	9,202	**France**	10,587
18-17-18-21	**Australia**	**791**	**Australia**	**974**	**Australia**	**940**	**Australia**	**711**
Rank-Year	**1998**		**1999**		**2000**		**2001**	
1	**Germany**	22,610	**Germany**	23,066	**USA**	22,570	**Germany**	34,845
2	**Switzerland**	15,669	**Switzerland**	17,636	**Germany**	22,265	**USA**	29,763
3	**USA**	15,361	**USA**	17,321	**U.K.**	18,660	**Switzerland**	25,977
4	**U.K.**	15,130	**U.K.**	15,483	**Switzerland**	18,326	**U.K.**	25,108
5	**France**	14,810	**France**	15,467	**France**	17,347	**France**	24,387
21-21-21-21	**Australia**	**864**	**Australia**	**1,016**	**Australia**	**1,141**	**Australia**	**1,301**
Rank-Year	**2002**		**2003**		**2004**		**2005**	
1	**Belgium-**	40,112	**Belgium-**	39,231	**Germany**	45,869	**Germany**	48,801
2	**Germany**	30,968	**Germany**	36,321	**Belgium-**	41,540	**Belgium-**	45,248
3	**USA**	29,713	**U.K.**	29,818	**USA**	32,373	**USA**	33,730
4	**Switzerland**	29,202	**USA**	29,566	**Switzerland**	31,087	**Switzerland**	33,671
5	**France**	27,493	**Switzerland**	28,859	**U.K.**	30,269	**France**	29,587
21-19-20-19	**Australia**	**1,661**	**Australia**	**1,505**	**Australia**	**1,787**	**Australia**	**1,825**
IMPORT								
Rank-Year	**1990**		**1991**		**1992**		**1993**	
1	**Germany**	4,347	**Germany**	5,410	**Germany**	6,389	**Germany**	6,206
2	**Japan**	3,647	**Japan**	3,985	**USA**	5,251	**USA**	6,172
3	**Italy**	3,606	**USA**	3,958	**Italy**	5,062	**Japan**	5,778
4	**France**	3,387	**France**	3,948	**France**	4,914	**France**	5,274
5	**USA**	3,251	**Italy**	3,878	**U.K.**	3,984	**Italy**	4,745
14-14-14-13	**Australia**	**902**	**Australia**	**931**	**Australia**		**Australia**	**1,392**
Rank-Year	**1994**		**1995**		**1996**		**1997**	
1	**Germany**	7,275	**Germany**	8,929	**Germany**	9,089	**USA**	11,818
2	**USA**	6,467	**France**	7,539	**USA**	9,081	**Germany**	9,538
3	**Japan**	5,742	**USA**	7,511	**France**	7,268	**France**	7,873
4	**France**	5,717	**Japan**	6,588	**U.K.**	5,969	**U.K.**	6,915
5	**U.K.**	4,696	**U.K.**	5,773	**Italy**	5,872	**Italy**	6,383
13-13-13-14	**Australia**	**1,497**	**Australia**	**1,678**	**Australia**	**1,926**	**Australia**	**2,200**
Rank-Year	**1998**		**1999**		**2000**		**2001**	
1	**USA**	17,462	**USA**	21,020	**USA**	25,551	**USA**	36,193
2	**Germany**	13,313	**Germany**	13,351	**Germany**	15,157	**Germany**	20,614
3	**France**	11,394	**France**	11,933	**France**	13,399	**France**	17,896
4	**U.K.**	8,961	**U.K.**	10,481	**U.K.**	12,727	**U.K.**	17,714
5	**Italy**	8,642	**Italy**	9,542	**Italy**	10,322	**Belgium**	16,123
13-13-12-12	**Australia**	**2,839**	**Australia**	**3,186**	**Australia**	**4,056**	**Australia**	**4,604**
Rank-Year	**2002**		**2003**		**2004**		**2005**	
1	**USA**	45,768	**USA**	48,879	**USA**	47,751	**USA**	51,119
2	**Belgium**	38,673	**Belgium**	39,270	**Belgium**	43,304	**Belgium**	46,733
3	**Germany**	32,069	**Germany**	31,879	**Germany**	36,885	**Germany**	39,039
4	**U.K.**	20,398	**U.K.**	21,087	**France**	21,378	**France**	22,259
5	**France**	19,838	**France**	20,200	**U.K.**	21,349	**U.K.**	20,625
12-12-12-12	**Australia**	**5,207**	**Australia**	**5,541**	**Australia**	**6,469**	**Australia**	**7,092**

***Pharmaceutical Products**
Source: Compiled from the UN (2008c; 2008e; 2008g)

trade in goods, except in one of the first 2 years 1991-1992. The countries that the BRCAI is greater than one for the entire period, in both the proportion of the trade in the goods and proportion in total trade are France, Germany and The United Kingdom, while The United States of America in the last few years is also recording a RCA in this category.

As mentioned earlier the observed BRCAI for the selected countries has an important shortcoming, which is the usage of this index as an ordinal and/ or cardinal measure for the CA (Yeats, 1985; Balance, 1987). Due to this shortcoming of this index, an examination of the Top X and M countries in all categories analysed is conducted in addition to analysis of the calculated indices. Table 5.2 shows Top 5 X and M countries rankings in total AUD, mill. and is compiled from Appendix Tables 5.21 and 5.25, which consists of the world's Top 15 ranked countries. According to this Table 5.2, the Top X countries in the category 30 for the entire period are Germany except in the year 2000 and 2002-2003, where The United States of America and Belgium-Luxembourg was rank first respectively. By observing Australia in Table 5.2, the Top world's X countries ranking for Australia has dropped from 16th in 1990 to 19th position in 2005, while the Australian X for this period has tripled in this period from AUD580 mill. to AUD1,825 mill. It is also important to note that the Top world's X country Germany for entire period has increased the world's Top X in this category by more than 6 times between year 1990 and 2005.

According to Table 5.2 the world's Top X countries are also the world's Top M countries. The Australian M of the products in the category 30, has increased by almost 8 times between 1990-2005 to reach AUD7,092 mill. of the M in 2005, while the ranking in the world's Top M countries, Australia has claimed from the 14th to 12th position.

In summary, Australia possesses in overall a RCD in the category 30 and this RCD is more pronounced as a proportion of the total trade than as a proportion in goods trade only. Furthermore, for the entire period between 1990-2005, the world's Top X ranking for Australia has declined and the world's Top M ranking has progressed to higher ranks.

5.4.1.2 BALASSA REVEALED COMPARATIVE ADVANTAGE INDEX; CATEGORY: 84

Table 5.3 is a sub-set of Appendix Table 5.2 and shows the BRCAI for Australia and 8 selected TD countries in category 84. According to Table 5.3, the Australian BRCAI is less than one for both as a proportion of the trade in goods and as a proportion in the total trade and this show the RCD for Australia in this category. The rest of the countries, except for France and Germany, the BRCAI are higher than one in overall, which shows the RCA for these countries in this category.

Table: 5.3

BRCAI: CATEGORY 84*						
Year	Goods Only	Total Trade	Goods Only	Total Trade	Goods Only	Total Trade
Country	AUSTRALIA		CHINA		FRANCE	
1990	0.350	0.349	-	-	1.033	0.947
1991	0.388	0.388	-	-	1.037	0.945
1992	0.459	0.463	1.650	1.854	1.225	1.111
1993	0.394	0.392	1.325	1.474	0.940	0.837
1994	0.449	0.434	1.169	1.269	0.923	0.878
1995	0.488	0.465	1.258	1.365	0.896	0.859
1996	0.461	0.439	1.131	1.247	0.897	0.867
1997	0.390	0.377	1.007	1.113	0.851	0.832
1998	0.386	0.373	1.203	1.346	1.048	1.035
1999	0.350	0.331	1.140	1.273	0.999	0.995
2000	0.296	0.283	1.048	1.169	0.934	0.920
2001	0.270	0.266	1.040	1.169	0.912	0.907
2002	0.281	0.275	1.043	1.182	0.844	0.838
2003	0.292	0.277	0.948	1.086	0.802	0.799
2004	0.271	0.259	0.831	0.954	0.806	0.807
2005	0.259	0.253	0.859	0.989	0.819	0.815
Country	GERMANY		MALAYSIA		SINGAPORE	
1990	-	-	0.457	0.504	2.900	2.942
1991	0.839	0.913	0.755	0.843	2.810	2.892
1992	0.919	1.010	1.223	1.384	3.737	3.827
1993	0.704	0.771	1.127	1.265	3.167	3.265
1994	0.712	0.779	1.350	1.464	3.398	3.471
1995	0.718	0.777	1.500	1.612	3.190	3.337
1996	0.724	0.782	1.701	1.781	3.292	3.461
1997	0.700	0.755	1.935	2.016	3.160	3.351
1998	0.860	0.941	2.480	2.703	3.869	4.117
1999	0.845	0.926	2.945	3.268	3.434	3.636
2000	0.892	0.969	3.018	3.310	2.942	3.111
2001	0.891	0.975	2.760	3.000	2.899	3.055
2002	0.896	0.973	2.958	3.242	2.830	2.972
2003	0.938	1.020	2.525	2.836	2.703	2.801
2004	1.085	1.184	2.557	2.856	2.476	2.547
2005	1.050	1.143	2.675	2.971	2.424	2.510
Country	THAILAND		UNITED KINGDOM		UNITED STATES	
1990	1.163	1.137	1.800	1.722	1.780	1.619
1991	1.147	1.150	1.727	1.667	1.734	1.571
1992	1.434	1.416	1.990	1.892	1.978	1.802
1993	1.167	1.143	1.569	1.496	1.532	1.397
1994	1.397	1.397	1.579	1.490	1.533	1.389
1995	1.544	1.520	1.617	1.518	1.533	1.390
1996	1.903	1.817	1.544	1.437	1.501	1.356
1997	1.853	1.817	1.598	1.472	1.474	1.345
1998	2.412	2.441	1.960	1.752	1.673	1.525
1999	2.244	2.260	1.931	1.695	1.632	1.469
2000	2.043	2.124	1.823	1.603	1.643	1.488
2001	2.021	2.121	1.888	1.654	1.644	1.495
2002	1.977	2.038	1.772	1.518	1.586	1.418
2003	1.880	1.983	1.743	1.459	1.578	1.410
2004	1.841	1.944	1.635	1.325	1.573	1.397
2005	2.040	2.177	1.648	1.348	1.610	1.425

***Nuclear Reactors, Boilers, Machinery and Mechanical Appliances; Parts Thereof**

Source: Compiled from the UN (2008c; 2008d; 2008e; 2008f; 2008g)

Table: 5.4

WORLD'S TOP 5 EXPORT/IMPORT COUNTRIES: CATEGORY 84*								
HS-2	**Country**	**AUD, mill.**	**Country**	**AUD, mill.**	**Country**	**AUD, mill.**	**Country**	**AUD, mill.**
EXPORT								
Rank-Year	**1990**		**1991**		**1992**		**1993**	
1	**USA**	55,874	**USA**	59,941	**USA**	67,235	**USA**	75,005
2	**Japan**	44,431	**Japan**	48,308	**Germany**	30,456	**Japan**	69,791
3	**Germany**	26,864	**Germany**	28,185	**U.K.**	29,015	**U.K.**	30,693
4	**U.K.**	26,557	**U.K.**	26,355	**France**	21,449	**Germany**	28,739
5	**France**	17,429	**France**	18,038	**Singapore**	19,156	**Singapore**	26,303
21-22-24-24	**Australia**	**1,121**	**Australia**	**1,366**	**Australia**	**1,515**	**Australia**	**1,792**
Rank-Year	**1994**		**1995**		**1996**		**1997**	
1	**USA**	76,522	**USA**	86,265	**USA**	87,529	**USA**	106,900
2	**Japan**	71,426	**Japan**	75,841	**Japan**	66,471	**Japan**	72,284
3	**Singapore**	32,887	**Singapore**	41,111	**Singapore**	44,099	**U.K.**	47,961
4	**U.K.**	32,338	**U.K.**	38,207	**U.K.**	38,325	**Singapore**	47,872
5	**Germany**	30,281	**Germany**	36,649	**Germany**	35,940	**Germany**	38,046
23-23-24-25	**Australia**	**2,102**	**Australia**	**2,535**	**Australia**	**2,646**	**Australia**	**2,697**
Rank-Year	**1998**		**1999**		**2000**		**2001**	
1	**USA**	123,578	**USA**	124,715	**USA**	158,138	**USA**	165,177
2	**Japan**	77,974	**Japan**	76,365	**Japan**	92,000	**Japan**	87,892
3	**U.K.**	58,498	**U.K.**	57,825	**U.K.**	64,421	**U.K.**	71,553
4	**Germany**	51,134	**Germany**	50,567	**Germany**	60,251	**Germany**	69,925
5	**Singapore**	50,889	**Singapore**	48,587	**Singapore**	55,971	**Singapore**	55,119
27-31-30-31	**Australia**	**2,370**	**Australia**	**2,186**	**Australia**	**2,354**	**Australia**	**2,387**
Rank-Year	**2002**		**2003**		**2004**		**2005**	
1	**USA**	136,391	**USA**	114,992	**China**	125,638	**China**	154,087
2	**Japan**	77,988	**China**	102,968	**USA**	110,953	**USA**	117,758
3	**China**	73,514	**Germany**	71,012	**Germany**	85,237	**Germany**	83,643
4	**Germany**	68,457	**Japan**	64,617	**Japan**	63,427	**Japan**	62,409
5	**U.K.**	62,166	**U.K.**	54,533	**U.K.**	49,732	**China,**	53,299
31-32-31-30	**Australia**	**2,292**	**Australia**	**2,091**	**Australia**	**2,052**	**Australia**	**2,252**
IMPORT								
Rank-Year	**1990**		**1991**		**1992**		**1993**	
1	**USA**	54,197	**USA**	57,739	**USA**	72,447	**USA**	90,328
2	**Germany**	27,651	**Germany**	30,952	**Germany**	35,930	**Germany**	33,467
3	**U.K.**	25,636	**U.K.**	24,720	**U.K.**	28,675	**U.K.**	30,645
4	**France**	20,607	**France**	21,155	**France**	24,328	**France**	22,547
5	**Canada**	13,406	**Canada**	14,180	**Canada**	16,238	**Canada**	19,304
13-14-13-13	**Australia**	**4,806**	**Australia**	**4,684**	**Australia**	**5,275**	**Australia**	**6,236**
Rank-Year	**1994**		**1995**		**1996**		**1997**	
1	**USA**	99,213	**USA**	113,747	**USA**	114,834	**USA**	135,426
2	**Germany**	35,630	**Germany**	42,841	**Germany**	41,387	**Germany**	44,673
3	**U.K.**	30,207	**U.K.**	35,419	**U.K.**	35,650	**U.K.**	42,429
4	**France**	24,276	**France**	26,849	**Japan**	29,431	**Japan**	31,634
5	**Canada**	20,033	**Japan**	26,611	**France**	25,471	**Netherland**	29,773
14-16-16-18	**Australia**	**6,939**	**Australia**	**7,763**	**Australia**	**7,851**	**Australia**	**8,352**
Rank-Year	**1998**		**1999**		**2000**		**2001**	
1	**USA**	169,473	**USA**	181,804	**USA**	221,128	**USA**	220,060
2	**Germany**	63,664	**Germany**	67,240	**Germany**	76,266	**Germany**	86,861
3	**U.K.**	56,361	**U.K.**	58,442	**U.K.**	68,702	**U.K.**	66,693
4	**Netherland**	40,552	**Netherland**	43,117	**Japan**	56,718	**Japan**	56,201
5	**France**	40,261	**Japan**	38,473	**Netherland**	45,973	**France**	47,800
17-17-17-18	**Australia**	**9,210**	**Australia**	**9,465**	**Australia**	**11,483**	**Australia**	**10,828**
Rank-Year	**2002**		**2003**		**2004**		**2005**	
1	**USA**	208,197	**USA**	177,811	**USA**	178,551	**USA**	185,753
2	**Germany**	80,541	**Germany**	79,580	**Germany**	83,118	**Germany**	80,434
3	**U.K.**	62,199	**U.K.**	56,019	**U.K.**	56,048	**China**	61,851
4	**Japan**	51,435	**China**	49,547	**China**	54,180	**U.K.**	55,930
5	**China,**	43,486	**Japan**	46,473	**Netherland**	48,893	**Netherland**	50,057
18-18-18-18	**Australia**	**11,060**	**Australia**	**10,549**	**Australia**	**11,221**	**Australia**	**12,030**

Nuclear Reactors, Boilers, Machinery and Mechanical Appliances; Parts Thereof
Source: Compiled from the UN (2008c; 2008e; 2008g)

Table 5.4 is compiled from Appendix Table 5.22 and 5.26 and consists of the world's Top 5 X and M countries in category 84. According to this table, the top X country is The United States of America, while recently in 2004-2005, China has emerged as a world's Top X country in this category. The world's Top M country in this category is The United States of America, Germany and The United Kingdom, while The United States of America is the world's Top X and M country in this category. By observing

Australia, the world's Top X ranking has decreased from 21st in 1990 to 30th position in 2005, while the world's Top M ranking has decreased from 13th to 18th position for this period.

In summary, Australia has a RCD in category 84 and this RCD is more pronounced as a proportion of total trade than as a proportion in goods trade only; while the BRCAI is decreasing over time. In addition, the world's Top X and M ranking for Australia for the same period, has declined to lower ranks, whereas the X ranks decline is more evident.

5.4.1.3 BALASSA REVEALED COMPARATIVE ADVANTAGE INDEX; CATEGORY: 85

Table 5.5 is sub-set of Appendix Table 5.3 and shows Balassa BRCAI for Australia and 8 selected TD countries in category 85.

The BRCAI in Table 5.5 in the category 85 is less than one for both as a proportion of the trade in goods and as a proportion in the total trade, while this RCD is marginally more distinctive according to a proportion of total trade. The countries for which BRCAI is greater than one from both perspectives are China, Malaysia, Singapore,

Table: 5.5

BRCAI: CATEGORY 85*						
Year	**Goods Only**	**Total Trade**	**Goods Only**	**Total Trade**	**Goods Only**	**Total Trade**
Country	**AUSTRALIA**		**CHINA**		**FRANCE**	
1990	0.164	0.163	-	-	0.862	0.791
1991	0.176	0.176	-	-	0.854	0.778
1992	0.223	0.225	3.262	3.666	0.947	0.859
1993	0.187	0.186	2.722	3.029	0.750	0.668
1994	0.228	0.220	2.297	2.494	0.707	0.673
1995	0.227	0.217	2.221	2.411	0.739	0.709
1996	0.210	0.200	1.932	2.130	0.783	0.757
1997	0.202	0.195	1.640	1.812	0.797	0.779
1998	0.228	0.221	1.820	2.036	1.002	0.990
1999	0.218	0.207	1.697	1.894	0.937	0.933
2000	0.208	0.199	1.615	1.802	0.946	0.932
2001	0.212	0.209	1.568	1.764	0.925	0.920
2002	0.180	0.176	1.511	1.711	0.873	0.867
2003	0.190	0.180	1.388	1.592	0.812	0.809
2004	0.178	0.170	1.302	1.494	0.792	0.792
2005	0.154	0.150	1.197	1.378	0.805	0.802
Country	**GERMANY**		**MALAYSIA**		**SINGAPORE**	
1990	-	-	3.478	3.841	2.673	2.712
1991	0.992	1.080	3.460	3.861	2.581	2.655
1992	1.094	1.202	3.893	4.405	2.907	2.977
1993	0.816	0.893	3.149	3.533	2.216	2.285
1994	0.813	0.890	3.202	3.472	2.558	2.613
1995	0.819	0.886	3.175	3.410	2.321	2.427
1996	0.829	0.895	3.101	3.248	2.221	2.335
1997	0.827	0.892	2.907	3.030	2.083	2.210
1998	0.958	1.048	3.500	3.815	2.577	2.743
1999	0.925	1.013	3.229	3.583	2.527	2.676
2000	0.893	0.970	2.939	3.224	2.622	2.773
2001	0.978	1.069	3.201	3.480	2.618	2.758
2002	0.936	1.017	3.254	3.567	2.731	2.869
2003	0.938	1.020	3.264	3.666	3.118	3.231
2004	0.987	1.077	3.010	3.362	3.218	3.310
2005	0.949	1.034	2.990	3.321	3.177	3.290
Country	**THAILAND**		**UNITED KINGDOM**		**UNITED STATES**	
1990	1.350	1.319	0.968	0.926	1.264	1.150
1991	1.410	1.413	0.929	0.897	1.215	1.102
1992	1.752	1.730	1.052	1.000	1.388	1.264
1993	1.365	1.337	0.835	0.796	1.113	1.014
1994	1.404	1.404	0.888	0.838	1.149	1.041
1995	1.343	1.322	0.938	0.881	1.188	1.076
1996	1.408	1.345	0.973	0.906	1.210	1.093
1997	1.405	1.378	0.919	0.846	1.203	1.097
1998	1.705	1.725	1.176	1.052	1.417	1.291
1999	1.674	1.686	1.102	0.968	1.457	1.311
2000	1.700	1.767	1.130	0.994	1.441	1.305
2001	1.706	1.790	1.248	1.093	1.395	1.268
2002	1.867	1.924	1.236	1.059	1.363	1.219
2003	1.913	2.019	0.940	0.787	1.358	1.213
2004	1.853	1.958	0.850	0.689	1.309	1.163
2005	1.691	1.804	1.073	0.878	1.258	1.113

Electrical Machinery and Equipment and Parts Thereof; Sound Recorders and Producers, Television Image and Sound Recorders and Reproducers, and Parts and Accessories of Such Articles
Source: Compiled from the UN (2008c; 2008d; 2008e; 2008f; 2008g)

Table: 5.6

WORLD'S TOP 5 EXPORT/IMPORT COUNTRIES: CATEGORY 85*								
HS-2	**Country**	**AUD, mill.**	**Country**	**AUD, mill.**	**Country**	**AUD, mill.**	**Country**	**AUD, mill.**
EXPORT								
Rank-Year	**1990**		**1991**		**1992**		**1993**	
1	**Japan**	77,489	**Japan**	86,434	**USA**	67,661	**Japan**	112,720
2	**USA**	53,062	**USA**	58,081	**Germany**	51,987	**USA**	84,399
3	**Germany**	43,970	**Germany**	46,083	**China**	25,063	**Germany**	51,596
4	**France**	19,448	**France**	20,530	**France**	23,792	**China**	34,047
5	**U.K.**	19,092	**Korea,**	20,394	**Korea,**	23,460	**Korea,**	28,578
28-27-32-30	**Australia**	**700**	**Australia**	**855**	**Australia**	**1,053**	**Australia**	**1,320**
Rank-Year	**1994**		**1995**		**1996**		**1997**	
1	**Japan**	120,141	**Japan**	137,890	**USA**	116,460	**USA**	139,839
2	**USA**	95,268	**USA**	115,200	**Japan**	114,039	**Japan**	119,523
3	**Germany**	57,462	**Germany**	72,097	**Germany**	67,890	**Germany**	72,127
4	**Singapore**	41,118	**Singapore**	51,560	**Singapore**	49,109	**China**	51,198
5	**China**	38,670	**Korea,**	50,094	**China**	45,758	**Singapore**	50,607
28-31-31-32	**Australia**	**1,771**	**Australia**	**2,035**	**Australia**	**1,991**	**Australia**	**2,235**
Rank-Year	**1998**		**1999**		**2000**		**2001**	
1	**USA**	163,531	**USA**	179,201	**USA**	246,089	**USA**	228,167
2	**Japan**	129,715	**Japan**	141,993	**Japan**	197,760	**Japan**	165,563
3	**Germany**	89,095	**Germany**	89,061	**Germany**	107,006	**Germany**	124,911
4	**China**	57,350	**China**	59,229	**China**	88,738	**China**	94,553
5	**U.K.**	54,885	**Korea,**	58,798	**Singapore**	88,544	**Singapore**	94,541
34-33-33-33	**Australia**	**2,189**	**Australia**	**2,191**	**Australia**	**2,936**	**Australia**	**3,055**
Rank-Year	**2002**		**2003**		**2004**		**2005**	
1	**USA**	197,839	**USA**	168,779	**China**	172,780	**China**	221,466
2	**Japan**	157,598	**Japan**	153,092	**USA**	162,828	**USA**	162,822
3	**Germany**	120,772	**China**	134,514	**Japan**	158,157	**Japan**	150,461
4	**China**	117,604	**Germany**	121,168	**Germany**	136,765	**Germany**	133,815
5	**Singapore**	104,107	**Singapore**	105,541	**China**	118,501	**China**	131,485
35-38-38-36	**Australia**	**2,481**	**Australia**	**2,321**	**Australia**	**2,378**	**Australia**	**2,367**
IMPORT								
Rank-Year	**1990**		**1991**		**1992**		**1993**	
1	**USA**	72,980	**USA**	76,440	**USA**	90,898	**USA**	110,961
2	**Germany**	35,490	**Germany**	40,535	**Germany**	44,467	**Germany**	43,631
3	**U.K.**	23,753	**U.K.**	23,588	**China**	30,059	**China**	39,850
4	**France**	21,779	**France**	22,486	**U.K.**	27,049	**Singapore**	32,715
5	**Italy**	16,768	**Singapore**	18,784	**France**	24,293	**U.K.**	28,877
18-19-20-20	**Australia**	**4,378**	**Australia**	**4,438**	**Australia**	**5,262**	**Australia**	**6,236**
Rank-Year	**1994**		**1995**		**1996**		**1997**	
1	**USA**	124,827	**USA**	149,297	**USA**	141,465	**USA**	159,193
2	**Germany**	49,691	**Germany**	60,187	**Germany**	55,545	**China**	64,400
3	**China**	45,664	**China**	57,495	**China**	55,332	**Germany**	56,039
4	**Singapore**	42,778	**Singapore**	53,186	**Singapore**	48,454	**Singapore**	50,552
5	**U.K.**	32,259	**Japan**	41,016	**U.K.**	45,394	**U.K.**	49,152
20-19-21-21	**Australia**	**7,227**	**Australia**	**8,924**	**Australia**	**8,801**	**Australia**	**8,833**
Rank-Year	**1998**		**1999**		**2000**		**2001**	
1	**USA**	196,759	**USA**	218,877	**USA**	313,962	**USA**	289,743
2	**Germany**	74,253	**Germany**	74,774	**China**	99,459	**Germany**	110,372
3	**China**	67,011	**China**	65,871	**Germany**	95,089	**China**	104,325
4	**U.K.**	57,048	**U.K.**	59,725	**Japan**	83,287	**Japan**	102,724
5	**Singapore**	50,139	**Singapore**	55,818	**U.K.**	83,024	**Mexico**	82,893
22-21-21-24	**Australia**	**9,872**	**Australia**	**11,721**	**Australia**	**15,385**	**Australia**	**13,620**
Rank-Year	**2002**		**2003**		**2004**		**2005**	
1	**USA**	276,819	**USA**	241,715	**USA**	249,778	**USA**	269,791
2	**China**	127,938	**China**	152,939	**China**	182,744	**China**	217,126
3	**Germany**	112,422	**Germany**	110,898	**Germany**	125,531	**Germany**	138,049
4	**Japan**	98,853	**Japan**	99,895	**Singapore**	113,677	**Singapore**	109,472
5	**Singapore**	75,672	**Singapore**	71,478	**Japan**	80,341	**Japan**	86,127
22-21-21-21	**Australia**	**13,567**	**Australia**	**13,941**	**Australia**	**15,856**	**Australia**	**16,394**

****Electrical Machinery and Equipment and Parts Thereof; Sound Recorders and Producers, Television Image and Sound Recorders and Reproducers, and Parts and Accessories of Such Articles***
Source: Compiled from the UN (2008c; 2008e; 2008g)

Thailand and the United States of America, and this show the RCA for these countries in this category. Table 5.6 is compiled from Appendix Tables 5.23 and 5.27, which consists of the Top 15 X and M ranking and Table 5.6 shows the Top 5 X and M countries rankings in total AUD, mill. According to this table, it is evident that Japan and The United States of America are the world's Top X countries in this category, while recently China has becomes the Top X country in this category. Furthermore, the world's Top M country is The United States of America followed by Germany and more recently by China. For the same period the world's Top X countries for Australia has dropped from 28th to 36th position, while the world's Top M rank has dropped also from 18th to 21st position.

In summary, Australia records a RCD in category 85, while the RCD is marginally more distinct as a proportion of total trade compared to a proportion in goods trade only and BRCAI is decreasing overtime[93]. Furthermore, the world's Top X and M ranking for Australia has declined to lower ranks, whereas the X rank decline is more evident.

[93] Overtime is referring to the entire period of the analysis, which is the period between 1990 and 2005.

5.4.1.4 BALASSA REVEALED COMPARATIVE ADVANTAGE INDEX; CATEGORY: 87

Table 5.7 is sub-set of Appendix Table 5.4 and shows the BRCAI for Australia and 8 selected TD countries in category 87. By referring to this table, the Australian BRCAI is less than one for the entire period for both as a proportion of the trade in goods and as a proportion in the total trade, which shows a RCD in this category. An encouraging sign is that the BRCAI for Australia is increasing overtime. The countries for which BRCAI is greater than one are France and Germany and recently for The United Kingdom and The United States of America, which shows the RCA

Table: 5.7

BRCAI: CATEGORY 87*						
Year	**Goods Only**	**Total Trade**	**Goods Only**	**Total Trade**	**Goods Only**	**Total Trade**
Country	**AUSTRALIA**		**CHINA**		**FRANCE**	
1990	0.150	0.149	-	-	1.236	1.133
1991	0.155	0.156	-	-	1.259	1.148
1992	0.191	0.193	0.402	0.452	1.529	1.387
1993	0.178	0.178	0.573	0.637	1.170	1.042
1994	0.164	0.158	0.390	0.424	1.206	1.147
1995	0.174	0.166	0.174	0.188	1.251	1.199
1996	0.221	0.211	0.134	0.147	1.240	1.199
1997	0.232	0.224	0.130	0.144	1.226	1.198
1998	0.257	0.248	0.111	0.124	1.462	1.444
1999	0.339	0.321	0.070	0.078	1.488	1.482
2000	0.382	0.365	0.060	0.067	1.599	1.576
2001	0.429	0.423	0.056	0.062	1.591	1.582
2002	0.428	0.418	0.056	0.063	1.663	1.651
2003	0.453	0.430	0.054	0.062	1.694	1.688
2004	0.409	0.391	0.036	0.041	1.753	1.754
2005	0.401	0.393	0.029	0.034	1.755	1.747
Country	**GERMANY**		**MALAYSIA**		**SINGAPORE**	
1990	-	-	0.046	0.050	0.103	0.105
1991	1.593	1.733	0.047	0.052	0.100	0.102
1992	2.092	2.298	0.085	0.096	0.139	0.142
1993	1.342	1.470	0.084	0.095	0.124	0.128
1994	1.474	1.613	0.071	0.077	0.103	0.105
1995	1.565	1.694	0.072	0.078	0.100	0.105
1996	1.666	1.799	0.074	0.078	0.101	0.106
1997	1.695	1.828	0.073	0.076	0.100	0.106
1998	2.040	2.231	0.090	0.098	0.091	0.097
1999	2.049	2.245	0.067	0.074	0.081	0.086
2000	2.117	2.299	0.057	0.063	0.078	0.082
2001	2.173	2.377	0.051	0.055	0.074	0.078
2002	2.120	2.304	0.054	0.059	0.081	0.085
2003	2.164	2.354	0.054	0.060	0.126	0.130
2004	2.125	2.319	0.069	0.077	0.140	0.143
2005	2.204	2.399	0.082	0.091	0.151	0.156
Country	**THAILAND**		**UNITED KINGDOM**		**UNITED STATES**	
1990	0.101	0.098	0.739	0.707	0.813	0.739
1991	0.110	0.110	0.774	0.746	0.827	0.749
1992	0.130	0.129	0.928	0.882	1.082	0.986
1993	0.178	0.174	0.679	0.648	0.918	0.837
1994	0.202	0.202	0.734	0.692	0.958	0.868
1995	0.145	0.143	0.842	0.791	0.948	0.859
1996	0.158	0.151	0.948	0.882	0.931	0.841
1997	0.216	0.212	0.938	0.864	0.918	0.838
1998	0.300	0.303	1.086	0.971	1.029	0.938
1999	0.420	0.423	1.097	0.963	0.996	0.897
2000	0.473	0.491	1.074	0.945	0.999	0.905
2001	0.544	0.570	0.918	0.805	0.978	0.890
2002	0.541	0.558	1.057	0.905	1.054	0.943
2003	0.630	0.665	1.118	0.936	1.052	0.939
2004	0.739	0.781	1.193	0.966	1.068	0.949
2005	0.977	1.042	1.213	0.993	1.171	1.036

***Vehicles Other Than Railway or Tramway Rolling-Stock, and Parts and Accessories Thereof**
Source: Compiled from the UN (2008c; 2008d; 2008e; 2008f; 2008g)

Table: 5.8

WORLD'S TOP 5 EXPORT/IMPORT COUNTRIES: CATEGORY 87*								
HS-2	Country	AUD, mill.	Country	AUD, mill.	Country	AUD, mill.	Country	AUD, mill.
EXPORT								
Rank-Year	1990		1991		1992		1993	
1	Germany	85,762	Japan	90,249	Germany	97,294	Japan	117,465
2	Japan	83,941	Germany	79,384	USA	51,606	Germany	73,825
3	USA	39,071	USA	42,411	Canada	40,419	USA	60,531
4	Canada	34,644	Canada	34,152	France	37,585	Canada	51,230
5	France	31,942	France	32,496	Belgium-	25,820	France	33,476
22-20-23-21	Australia	**734**	Australia	**812**	Australia	**885**	Australia	**1,094**
Rank-Year	1994		1995		1996		1997	
1	Japan	109,200	Japan	104,616	Germany	100,007	Germany	106,495
2	Germany	82,611	Germany	98,850	Japan	93,039	Japan	106,190
3	USA	62,975	USA	65,957	USA	65,663	USA	76,955
4	Canada	54,233	Canada	56,388	Canada	53,163	Canada	61,549
5	France	36,241	France	42,045	France	40,156	France	43,195
26-28-23-22	Australia	**1,009**	Australia	**1,119**	Australia	**1,534**	Australia	**1,858**
Rank-Year	1998		1999		2000		2001	
1	Germany	143,236	Germany	140,487	Germany	153,314	Germany	189,836
2	Japan	124,039	Japan	127,285	Japan	151,866	Japan	156,291
3	USA	89,785	Canada	89,111	USA	103,187	USA	109,438
4	Canada	73,955	USA	87,226	Canada	99,826	Canada	101,842
5	France	57,469	France	56,945	France	63,430	France	72,505
27-25-24-24	Australia	**1,860**	Australia	**2,426**	Australia	**3,257**	Australia	**4,232**
Rank-Year	2002		2003		2004		2005	
1	Germany	198,459	Germany	207,891	Germany	211,577	Germany	213,242
2	Japan	171,091	Japan	158,765	Japan	157,073	Japan	160,433
3	USA	111,006	USA	97,217	USA	95,464	USA	104,034
4	Canada	99,584	Canada	83,931	Canada	82,061	Canada	83,357
5	France	78,464	France	79,073	France	81,391	France	76,364
25-25-25-23	Australia	**4,270**	Australia	**4,123**	Australia	**3,933**	Australia	**4,242**
IMPORT								
Rank-Year	1990		1991		1992		1993	
1	USA	96,167	USA	94,020	USA	104,791	USA	125,426
2	Germany	37,107	Germany	50,779	Germany	55,345	Germany	39,239
3	U.K.	28,741	Canada	29,533	Canada	31,692	Canada	36,904
4	Canada	28,314	France	26,751	France	31,494	U.K.	30,828
5	France	27,980	Italy	24,315	Italy	30,682	France	27,774
14-16-14-15	Australia	**4,809**	Australia	**4,255**	Australia	**5,557**	Australia	**6,690**
Rank-Year	1994		1995		1996		1997	
1	USA	132,205	USA	137,537	USA	133,956	USA	153,596
2	Germany	40,345	Germany	51,583	Germany	53,051	Germany	53,193
3	Canada	38,632	Canada	39,626	U.K.	40,818	U.K.	48,493
4	U.K.	33,509	U.K.	38,125	Canada	38,119	Canada	47,879
5	France	29,962	France	36,837	France	36,177	France	31,456
14-13-14-13	Australia	**7,941**	Australia	**8,378**	Australia	**8,198**	Australia	**9,526**
Rank-Year	1998		1999		2000		2001	
1	USA	196,505	USA	229,416	USA	282,894	USA	308,638
2	Germany	68,567	Germany	68,900	Canada	70,494	Germany	80,356
3	U.K.	60,640	U.K.	61,378	Germany	67,040	U.K.	74,815
4	Canada	56,985	Canada	61,352	U.K.	62,075	Canada	72,383
5	France	44,713	France	46,571	France	50,767	France	57,717
13-13-12-13	Australia	**11,706**	Australia	**12,285**	Australia	**15,027**	Australia	**14,158**
Rank-Year	2002		2003		2004		2005	
1	USA	314,218	USA	270,102	USA	257,817	USA	259,244
2	Germany	82,235	Germany	87,901	Germany	91,415	Germany	84,310
3	U.K.	80,367	U.K.	77,216	U.K.	77,604	U.K.	74,902
4	Canada	78,104	Canada	69,644	Canada	65,714	Canada	69,347
5	France	60,030	France	61,412	France	65,018	France	66,089
12-13-11-11	Australia	**15,831**	Australia	**17,239**	Australia	**18,248**	Australia	**20,247**

****Vehicles Other Than Railway or Tramway Rolling-Stock, and Parts and Accessories Thereof***
Source: Compiled from the UN (2008c; 2008e; 2008g)

for these countries in this category.

Table 5.8 is compiled from Appendix Tables 5.24 and 5.28 and shows the Top 5 X and M countries rankings in total AUD, mill. By referring to this table, Germany and Japan are interchangeably the world's Top X countries in this category, while the Top M country is The United States of America followed by Germany. The Australian world's Top X rankings in this category remains almost unchanged, and slipping down one place only from 22nd in 1990 to 23rd position in 2005 , while the Australian world's Top M ranking has progressed from 14th in 1990 to 11th position in 2005.

In summary, Australia has a RCD in category 87, while the RCD is marginally more distinct as a proportion of the total trade compared to a proportion in goods trade, while encouraging sign is that the BRCAI for Australia is increasing overtime. Additionally, the world's Top X ranking for Australia has slightly declined, while for the world's Top M ranking has moved to a higher rank.

5.4.1.5 SUMMARY – BALASSA REVEALED COMPARATIVE ADVANTAGE INDEX; HS-2

Based on HS-2 level of aggregation for 4 selected TD categories and eight TD countries, Australia has a RCD in all 4 selected goods categories, while the RCD is more pronounced as a proportion of total trade than as a proportion in total goods trade. The Australian BRCAI for the entire period 1990-2005 is increasing overtime for categories 30 and 87, decreasing for category 84 and remains almost unchanged for category 85. Furthermore, by observing the world's Top X and M countries, the Australian world's X rankings over this period has decreased for all 4 categories, with the highest decline in rankings for categories 84 and 85. The world's Top M rankings for Australia are mixed – the M rankings for categories 30 and 87 has progressed to a higher rankings and for categories 84 and 85 it has decreased to a lower rankings, while the highest M rankings increase is for category 87 and highest decrease is for category 84.

5.4.2 REVEALED COMPARATIVE ADVANTAGE INDEX, HS-4

According to the TD categories selection in chapter 4, it has been established that the TD categories based on a lower level of aggregation (HS-4) are the goods categories 3004, 8471, 8473, 8517 and 8703. These 5 categories are sub-set of the 4 categories analysed in previous sections. Consequently, is expected that Australia will have RCD also in these 5 goods categories based on HS-4 level of aggregation as it has based on HS-2 level of aggregation. However, in order to confirm whether Australia records a RCD in these 5 categories, the BRCAI is calculated and analysed in the following sections.

5.4.2.1 BALASSA REVEALED COMPARATIVE ADVANTAGE INDEX; CATEGORY: 3004

Table 5.9 is reproduced from Appendix Table 5.29 and shows the BRCAI for category 3004. According to this table, the Australian BRCAI is increasing and since 1999, except for the period 2002-2003, is more than one and this shows that Australia has a RCA in category 3004. This RCA is more pronounced as a proportion of the trade in goods than as a proportion in the total trade. Furthermore, the countries for which the BRCAI is greater than one for the entire period are France, Germany and The United Kingdom, while the remainder of the countries have a RCD in this

Table: 5.9

BRCAI: CATEGORY 3004*						
Year	**Goods Only**	**Total Trade**	**Goods Only**	**Total Trade**	**Goods Only**	**Total Trade**
Country	**AUSTRALIA**		**CHINA**		**FRANCE**	
1990	0.572	0.570	-	-	1.866	1.711
1991	0.586	0.587	-	-	1.856	1.692
1992	0.669	0.675	0.534	0.600	1.769	1.604
1993	0.732	0.728	0.479	0.533	1.870	1.666
1994	0.851	0.822	0.419	0.455	1.798	1.710
1995	0.896	0.853	0.392	0.426	1.913	1.833
1996	0.942	0.897	0.361	0.398	1.896	1.833
1997	0.842	0.813	0.295	0.326	1.936	1.892
1998	0.935	0.904	0.300	0.336	2.255	2.227
1999	1.111	1.053	0.245	0.273	2.306	2.296
2000	1.357	1.296	0.195	0.218	2.513	2.476
2001	1.124	1.108	0.144	0.162	2.501	2.488
2002	0.815	0.796	0.083	0.094	2.345	2.328
2003	0.999	0.948	0.062	0.072	2.314	2.306
2004	1.054	1.007	0.044	0.050	2.262	2.262
2005	1.172	1.148	0.040	0.046	2.453	2.442
Country	**GERMANY**		**MALAYSIA**		**SINGAPORE**	
1990	-	-	0.109	0.121	0.318	0.323
1991	1.310	1.425	0.101	0.113	0.285	0.294
1992	1.172	1.288	0.093	0.105	0.264	0.270
1993	1.287	1.410	0.074	0.083	0.252	0.260
1994	1.286	1.408	0.077	0.083	0.250	0.255
1995	1.267	1.371	0.066	0.070	0.200	0.209
1996	1.283	1.386	0.065	0.068	0.169	0.178
1997	1.407	1.517	0.055	0.058	0.147	0.156
1998	1.775	1.942	0.060	0.065	0.150	0.160
1999	1.706	1.870	0.050	0.056	0.142	0.151
2000	1.508	1.638	0.047	0.051	0.151	0.159
2001	1.667	1.823	0.040	0.043	0.226	0.239
2002	1.129	1.227	0.034	0.037	0.122	0.128
2003	1.225	1.332	0.031	0.035	0.118	0.123
2004	1.488	1.624	0.032	0.036	0.116	0.119
2005	1.640	1.785	0.026	0.029	0.446	0.461
Country	**THAILAND**		**UNITED KINGDOM**		**UNITED STATES**	
1990	0.098	0.096	2.354	2.253	0.480	0.437
1991	0.096	0.096	2.417	2.333	0.480	0.435
1992	0.114	0.113	2.414	2.295	0.476	0.434
1993	0.116	0.114	2.468	2.352	0.487	0.444
1994	0.109	0.109	2.423	2.287	0.490	0.444
1995	0.099	0.098	2.664	2.501	0.419	0.379
1996	0.108	0.103	2.594	2.414	0.458	0.414
1997	0.103	0.101	2.450	2.256	0.468	0.427
1998	0.097	0.099	2.812	2.514	0.625	0.569
1999	0.096	0.097	2.762	2.425	0.728	0.655
2000	0.093	0.097	2.995	2.635	0.857	0.776
2001	0.076	0.080	2.832	2.482	0.863	0.785
2002	0.059	0.061	2.604	2.231	0.758	0.678
2003	0.056	0.060	3.008	2.518	0.850	0.760
2004	0.055	0.058	3.033	2.458	0.904	0.803
2005	0.059	0.063	2.768	2.265	0.915	0.810

Medicaments (Excluding Goods of 3002, 3005 or 3006) Consisting of Mixed or Unmixed Products for Therapeutic or Prophylactic Uses, Put Up in Measured Doses or in Forms or Packagings for Retail Sale
Source: Compiled from the UN (2008c; 2008d; 2008e; 2008f; 2008g)

Table: 5.10

WORLD'S TOP 5 EXPORT/IMPORT COUNTRIES: CATEGORY 3004*								
HS-4	Country	AUD, mill.	Country	AUD, mill.	Country	AUD, mill.	Country	AUD, mill.
EXPORT								
Rank-Year	1990		1991		1992		1993	
1	Germany	4,339	Germany	5,057	Germany	5,991	Germany	6,673
2	U.K.	3,779	U.K.	4,240	U.K.	5,427	U.K.	6,129
3	Switzerland	3,687	Switzerland	3,886	Switzerland	4,871	Switzerland	5,303
4	France	3,424	France	3,712	France	4,776	France	5,043
5	USA	1,640	Sweden	2,026	Sweden	2,697	USA	3,026
17-16-16-17	Australia	**199**	Australia	**237**	Australia	**340**	Australia	**423**
Rank-Year	1994		1995		1996		1997	
1	Germany	7,097	Germany	8,449	U.K.	8,576	Germany	10,305
2	U.K.	6,436	U.K.	8,221	Germany	8,485	U.K.	9,907
3	Switzerland	5,532	France	6,787	Switzerland	6,872	France	7,955
4	France	5,320	Switzerland	6,317	France	6,763	Switzerland	7,420
5	USA	3,174	Belgium-	3,721	Belgium-	3,807	USA	4,572
17-17-16-17	Australia	**517**	Australia	**607**	Australia	**720**	Australia	**785**
Rank-Year	1998		1999		2000		2001	
1	Germany	16,211	Germany	16,460	U.K.	15,815	Germany	26,118
2	U.K.	12,887	U.K.	13,332	Germany	15,211	U.K.	21,433
3	France	11,524	France	12,413	France	13,881	France	20,445
4	Switzerland	10,492	Switzerland	11,779	USA	12,325	USA	17,322
5	USA	7,085	USA	8,968	Switzerland	12,088	Switzerland	16,590
18-17-14-16	Australia	**881**	Australia	**1,119**	Australia	**1,612**	Australia	**1,988**
Rank-Year	2002		2003		2004		2005	
1	Belgium	34,144	Belgium	32,831	Belgium	35,622	Belgium	38,273
2	Ireland	23,666	U.K.	25,781	Germany	33,500	Germany	37,050
3	U.K.	23,411	Germany	25,397	U.K.	26,424	France	24,926
4	France	23,145	France	23,321	France	23,735	U.K.	24,571
5	Germany	22,115	Ireland	20,027	Ireland	22,247	Switzerland	21,405
17-17-17-14	Australia	**1,702**	Australia	**1,962**	Australia	**2,290**	Australia	**2,897**
IMPORT								
Rank-Year	1990		1991		1992		1993	
1	Germany	2,494	Germany	3,304	Germany	3,853	Germany	3,683
2	U.K.	1,843	U.K.	2,230	U.K.	2,709	France	2,919
3	France	1,779	France	2,005	France	2,650	U.K.	2,885
4	Italy	1,710	Italy	1,835	Italy	2,533	USA	2,869
5	Japan	1,609	USA	1,792	USA	2,430	Japan	2,733
13-14-14-13	Australia	**626**	Australia	**642**	Australia	**903**	Australia	**973**
Rank-Year	1994		1995		1996		1997	
1	Germany	4,517	Germany	5,422	Germany	5,347	USA	7,090
2	U.K.	3,220	France	4,302	USA	4,682	Germany	5,664
3	USA	3,025	U.K.	4,007	France	4,342	U.K.	5,048
4	France	2,997	USA	3,793	U.K.	4,086	France	4,884
5	Japan	2,789	Netherland	3,389	Italy	3,290	Italy	3,721
13-13-12-13	Australia	**1,091**	Australia	**1,253**	Australia	**1,479**	Australia	**1,677**
Rank-Year	1998		1999		2000		2001	
1	USA	11,865	USA	14,220	USA	17,082	USA	25,675
2	Germany	8,147	Germany	8,443	U.K.	9,669	U.K.	14,673
3	France	7,647	U.K.	8,246	France	8,953	Belgium	12,685
4	U.K.	6,545	France	8,077	Germany	8,777	Germany	12,648
5	Italy	5,404	Italy	6,237	Italy	7,052	France	11,741
12-12-12-12	Australia	**2,222**	Australia	**2,532**	Australia	**3,326**	Australia	**3,617**
Rank-Year	2002		2003		2004		2005	
1	Belgium	34,463	USA	36,673	Belgium	39,067	Belgium	41,809
2	USA	34,199	Belgium	34,795	USA	36,199	USA	38,997
3	Germany	23,215	Germany	21,849	Germany	24,899	Germany	27,319
4	U.K.	17,028	U.K.	17,590	U.K.	17,522	U.K.	16,532
5	France	12,948	France	13,869	France	14,901	France	15,868
12-12-12-12	Australia	4,267	Australia	4,417	Australia	5,367	Australia	5,914

Medicaments (Excluding Goods of 3002, 3005 or 3006) Consisting of Mixed or Unmixed Products for Therapeutic or Prophylactic Uses, Put Up in Measured Doses or in Forms or Packagings for Retail Sale
Source: Compiled from the UN (2008c; 2008e; 2008g)

category.

Table 5.10 is compiled from Appendix Tables 5.54 and 5.59 and shows the Top 5 X and M countries rankings in total AUD, mill. The world's Top X country for category 3004 is Germany, however, since 2002 the Top rank X country is Belgium-Luxembourg, while the world's Top M country is Germany between 1990-1996, The United States of America between 1997-2001 and since 2002 Belgium-Luxembourg has become the world's Top M country in this category. The Australian world's Top X rankings in the category has improved from 17th in 1990 to 14th position in 2005, while the world's Top M ranking has claimed by one rank from 13th in 1990 to 12th position in 2005.

In summary, Australia has gained a RCA in category 3004 since 1999 and this RCA is more pronounced as a proportion of total trade than as a proportion in goods trade, while the BRCAI is increasing over time. In addition, the world's Top X and M ranking for Australia for the same period, has improved to higher ranks, whereas X ranks improvement is more evident.

5.4.2.2 BALASSA REVEALED COMPARATIVE ADVANTAGE INDEX; CATEGORY: 8471

Table 5.11 is reproduced from Appendix Table 5.30 and shows the BRCAI for Australia and 8 selected TD countries in category 8471. According to Table 5.11, the Australian BRCAI is less than one for both as a proportion of the trade in goods and as a proportion in the total trade, and this show a RCD for Australia in this category, while the BRCAI is slightly improving overtime. The countries with a BRCAI higher than one are Singapore, Thailand, The United Kingdom and The United States of

Table: 5.11

BRCAI: CATEGORY 8471*						
Year	**Goods Only**	**Total Trade**	**Goods Only**	**Total Trade**	**Goods Only**	**Total Trade**
Country	**AUSTRALIA**		**CHINA**		**FRANCE**	
1990	0.177	0.176	-	-	0.663	0.607
1991	0.195	0.195	-	-	0.731	0.667
1992	0.203	0.205	1.448	1.627	0.942	0.855
1993	0.193	0.192	0.965	1.073	0.690	0.615
1994	0.240	0.232	0.868	0.943	0.690	0.656
1995	0.202	0.192	0.851	0.924	0.796	0.763
1996	0.175	0.167	0.917	1.011	0.824	0.796
1997	0.134	0.130	0.774	0.855	0.785	0.767
1998	0.170	0.165	0.986	1.103	0.948	0.936
1999	0.132	0.125	0.968	1.080	0.820	0.816
2000	0.101	0.097	0.797	0.889	0.794	0.783
2001	0.126	0.124	0.842	0.947	0.707	0.703
2002	0.191	0.187	0.935	1.059	0.635	0.630
2003	0.234	0.222	0.663	0.760	0.535	0.533
2004	0.199	0.190	0.505	0.580	0.523	0.523
2005	0.214	0.209	0.527	0.607	0.481	0.479
Country	**GERMANY**		**MALAYSIA**		**SINGAPORE**	
1990	-	-	0.149	0.164	5.483	5.562
1991	0.668	0.726	0.239	0.266	5.245	5.397
1992	0.739	0.812	0.536	0.607	7.552	7.733
1993	0.566	0.620	0.501	0.562	5.628	5.803
1994	0.554	0.607	0.861	0.934	5.474	5.593
1995	0.571	0.617	1.148	1.234	5.186	5.424
1996	0.509	0.549	1.730	1.812	5.400	5.677
1997	0.515	0.555	2.285	2.382	4.978	5.280
1998	0.668	0.731	2.695	2.938	6.238	6.638
1999	0.621	0.680	2.731	3.030	5.525	5.851
2000	0.693	0.753	2.684	2.943	4.623	4.889
2001	0.652	0.712	3.318	3.607	4.515	4.758
2002	0.677	0.735	3.445	3.776	4.463	4.688
2003	0.727	0.791	3.200	3.595	3.943	4.086
2004	0.875	0.955	3.789	4.233	3.244	3.337
2005	0.737	0.803	4.168	4.629	2.790	2.888
Country	**THAILAND**		**UNITED KINGDOM**		**UNITED STATES**	
1990	0.734	0.717	1.777	1.700	1.785	1.623
1991	0.913	0.916	1.692	1.632	1.710	1.550
1992	1.121	1.106	2.018	1.918	2.100	1.913
1993	1.230	1.205	1.580	1.506	1.458	1.330
1994	2.010	2.010	1.657	1.564	1.494	1.354
1995	2.063	2.031	1.775	1.666	1.431	1.297
1996	2.341	2.235	1.609	1.497	1.387	1.253
1997	1.621	1.589	1.591	1.465	1.280	1.168
1998	1.444	1.461	1.971	1.762	1.443	1.315
1999	1.337	1.346	1.948	1.710	1.411	1.270
2000	1.191	1.238	1.881	1.655	1.478	1.339
2001	1.157	1.213	1.770	1.551	1.442	1.311
2002	1.824	1.880	1.436	1.230	1.304	1.166
2003	2.324	2.452	1.309	1.096	1.226	1.095
2004	2.251	2.377	1.154	0.935	1.209	1.075
2005	3.160	3.372	1.082	0.885	1.206	1.068

Automatic Data Processing Machines and Units Thereof; Magnetic or Optical Readers, Machines for Transcribing Data onto Data Media in Coded Form and Machines for Processing Such Data, Not Elsewhere Specified or Included
Source: Compiled from the UN (2008c; 2008d; 2008e; 2008f; 2008g)

Table: 5.12

WORLD'S TOP 5 EXPORT/IMPORT COUNTRIES: CATEGORY 8471*								
HS-4	**Country**	**AUD, mill.**	**Country**	**AUD, mill.**	**Country**	**AUD, mill.**	**Country**	**AUD, mill.**
EXPORT								
Rank-Year	**1990**		**1991**		**1992**		**1993**	
1	**USA**	21,224	**USA**	22,352	**USA**	25,399	**Japan**	30,415
2	**Japan**	20,558	**Japan**	22,335	**Singapore**	13,777	**USA**	27,908
3	**U.K.**	9,935	**Singapore**	10,115	**U.K.**	10,471	**Singapore**	18,275
4	**Singapore**	9,170	**U.K.**	9,760	**Germany**	8,719	**U.K.**	12,077
5	**Germany**	8,523	**Germany**	8,480	**France**	5,874	**Germany**	9,038
23-23-25-24	**Australia**	**214**	**Australia**	**260**	**Australia**	**238**	**Australia**	**344**
Rank-Year	**1994**		**1995**		**1996**		**1997**	
1	**USA**	29,074	**USA**	32,400	**USA**	33,529	**USA**	39,288
2	**Japan**	27,042	**Japan**	28,278	**Singapore**	29,990	**Singapore**	31,911
3	**Singapore**	20,660	**Singapore**	26,882	**Japan**	24,487	**Japan**	29,786
4	**U.K.**	13,233	**U.K.**	16,873	**U.K.**	16,551	**U.K.**	20,205
5	**Netherland**	9,714	**Netherland**	12,721	**Netherland**	14,384	**Netherland**	17,377
24-24-27-29	**Australia**	**438**	**Australia**	**421**	**Australia**	**417**	**Australia**	**393**
Rank-Year	**1998**		**1999**		**2000**		**2001**	
1	**USA**	43,036	**USA**	42,801	**USA**	55,260	**USA**	55,072
2	**Singapore**	33,127	**Singapore**	31,039	**Singapore**	34,159	**Netherland**	32,944
3	**Japan**	30,102	**Japan**	28,036	**Japan**	31,653	**Singapore**	32,642
4	**Netherland**	24,186	**Netherland**	25,647	**Netherland**	27,823	**Japan**	29,588
5	**U.K.**	23,746	**U.K.**	23,154	**U.K.**	25,822	**China**	28,618
28-30-31-31	**Australia**	**422**	**Australia**	**326**	**Australia**	**312**	**Australia**	**425**
Rank-Year	**2002**		**2003**		**2004**		**2005**	
1	**USA**	41,528	**China**	66,801	**China**	83,992	**China**	105,290
2	**China**	41,030	**USA**	34,355	**USA**	33,649	**USA**	34,268
3	**Singapore**	29,162	**Netherland**	29,583	**Netherland**	30,880	**Netherland**	29,487
4	**Netherland**	28,772	**Singapore**	24,931	**Germany**	27,129	**Germany**	22,803
5	**Japan**	21,648	**Germany**	21,169	**Singapore**	22,374	**Singapore**	20,490
27-26-27-26	**Australia**	**576**	**Australia**	**644**	**Australia**	**596**	**Australia**	**723**
IMPORT								
Rank-Year	**1990**		**1991**		**1992**		**1993**	
1	**USA**	23,693	**USA**	26,899	**USA**	35,250	**USA**	44,546
2	**Germany**	13,052	**Germany**	15,288	**Germany**	17,727	**Germany**	16,806
3	**U.K.**	10,666	**U.K.**	10,635	**U.K.**	12,267	**U.K.**	15,307
4	**France**	9,048	**France**	8,727	**France**	10,067	**France**	9,628
5	**Netherland**	6,041	**Netherland**	6,125	**Netherland**	6,968	**Netherland**	8,530
12-14-12-12	**Australia**	**2,275**	**Australia**	**2,076**	**Australia**	**2,428**	**Australia**	**2,822**
Rank-Year	**1994**		**1995**		**1996**		**1997**	
1	**USA**	46,993	**USA**	53,612	**USA**	56,433	**USA**	67,486
2	**Germany**	16,847	**Germany**	19,972	**Germany**	18,438	**U.K.**	19,650
3	**U.K.**	14,552	**U.K.**	17,228	**Japan**	16,561	**Germany**	19,523
4	**France**	9,873	**Japan**	14,697	**U.K.**	16,270	**Netherland**	16,875
5	**Netherland**	9,552	**Netherland**	12,970	**Netherland**	14,053	**Japan**	16,867
11-11-13-12	**Australia**	**3,231**	**Australia**	**3,862**	**Australia**	**3,882**	**Australia**	**4,366**
Rank-Year	**1998**		**1999**		**2000**		**2001**	
1	**USA**	78,554	**USA**	82,490	**USA**	103,323	**USA**	98,047
2	**Germany**	28,711	**Germany**	28,668	**Germany**	31,003	**Germany**	34,872
3	**U.K.**	24,913	**Netherland**	25,335	**Japan**	30,958	**Japan**	29,883
4	**Netherland**	23,756	**U.K.**	24,965	**U.K.**	30,030	**U.K.**	29,401
5	**France**	16,566	**Japan**	20,037	**Netherland**	27,029	**Netherland**	28,820
14-15-16-18	**Australia**	**4,770**	**Australia**	**4,972**	**Australia**	**6,097**	**Australia**	**5,281**
Rank-Year	**2002**		**2003**		**2004**		**2005**	
1	**USA**	97,988	**USA**	87,690	**USA**	88,018	**USA**	89,879
2	**Germany**	31,120	**Germany**	29,205	**Germany**	30,778	**Germany**	29,418
3	**Japan**	27,078	**Netherland**	27,328	**Netherland**	30,623	**Netherland**	29,039
4	**U.K.**	26,381	**Japan**	25,221	**U.K.**	25,317	**Japan**	24,910
5	**Netherland**	24,627	**U.K.**	24,523	**Japan**	24,428	**China**	24,001
18-16-15-15	**Australia**	**5,487**	**Australia**	**5,296**	**Australia**	**5,999**	**Australia**	**6,451**

****Automatic Data Processing Machines and Units Thereof; Magnetic or Optical Readers, Machines for Transcribing Data onto Data Media in Coded Form and Machines for Processing Such Data, Not Elsewhere Specified or Included***
Source: Compiled from the UN (2008c; 2008e; 2008g)

America with a RCA in this category. Malaysia deserves special attention, because Malaysia had a distinct RCD in 1990; however, the index has increased rapidly and since 1995, Malaysia maintains ever since RCA and this BRCAI is noticeably increasing overtime. Where France, Germany and China alongside Australia clearly shows a RCD in this category.

Table 5.12 is compiled from Appendix Tables 5.55 and 5.60 and shows the Top 5 X and M countries rankings in total AUD, mill. The world's Top X country for category 8471 is The United States of America, which is maintaining the first ranking between 1990-2002, except in the year 1993 were Japan was ranked first. However, since 2003 China has become the world's Top X country in this category. By observing the world's Top M rankings, The United States of America followed by Germany are clearly the world's Top M countries for the entire period. The Australian world's Top X rankings in this category has dropped from 23rd in 1990 to 26th position in 2005; while the world's Top M ranking has also decreased from 12th in 1990 to 15th position in 2005.

In summary, Australia has a RCD in category 8471 and this is more pronounced as a proportion of total trade than as a proportion in the goods trade, while the BRCAI is increasing marginally overtime. Furthermore, the world's Top X and M ranking for Australia in the same period, has slid to lower rankings for both the X and M.

5.4.2.3 BALASSA REVEALED COMPARATIVE ADVANTAGE INDEX; CATEGORY: 8473

Table 5.13 is reproduced from Appendix Table 5.31 and shows the BRCAI for Australia and 8 selected TD countries in category 8473. According to Table 5.13, the Australian BRCAI is less than one for both as a proportion of the trade in goods and as a proportion in the total trade and this show RCD for Australia in this category, while BRCAI is decreasing overtime. The BRCAI for China, Malaysia, Singapore, Thailand and The United States of America is higher than one, which shows a RCA for these countries in this category.

Table: 5.13

BRCAI: CATEGORY 8473*						
Year	**Goods Only**	**Total Trade**	**Goods Only**	**Total Trade**	**Goods Only**	**Total Trade**
Country	**AUSTRALIA**		**CHINA**		**FRANCE**	
1990	0.569	0.566	-	-	0.828	0.759
1991	0.646	0.647	-	-	0.774	0.706
1992	0.828	0.835	3.620	4.067	0.783	0.710
1993	0.750	0.746	2.918	3.247	0.563	0.501
1994	0.891	0.861	2.389	2.595	0.526	0.501
1995	0.968	0.922	2.663	2.891	0.464	0.445
1996	0.920	0.876	2.257	2.488	0.484	0.468
1997	0.712	0.688	2.056	2.272	0.462	0.452
1998	0.715	0.692	2.460	2.753	0.519	0.512
1999	0.626	0.593	2.154	2.405	0.504	0.502
2000	0.452	0.431	1.997	2.228	0.497	0.490
2001	0.488	0.480	2.152	2.421	0.441	0.439
2002	0.448	0.438	2.019	2.287	0.377	0.374
2003	0.355	0.337	2.133	2.445	0.315	0.314
2004	0.264	0.253	2.065	2.369	0.297	0.297
2005	0.182	0.178	2.162	2.489	0.273	0.272
Country	**GERMANY**		**MALAYSIA**		**SINGAPORE**	
1990	-	-	1.374	1.518	2.575	2.613
1991	0.508	0.553	2.269	2.532	2.435	2.505
1992	0.545	0.599	3.548	4.014	3.097	3.171
1993	0.386	0.423	3.275	3.674	2.984	3.076
1994	0.395	0.432	3.449	3.739	4.058	4.145
1995	0.420	0.454	3.471	3.728	3.519	3.680
1996	0.404	0.436	3.298	3.454	3.493	3.672
1997	0.349	0.377	3.337	3.477	3.525	3.739
1998	0.434	0.475	4.870	5.308	4.582	4.877
1999	0.458	0.502	6.345	7.040	4.029	4.267
2000	0.486	0.527	6.194	6.793	3.377	3.571
2001	0.501	0.548	4.917	5.345	3.727	3.928
2002	0.464	0.505	5.465	5.990	3.620	3.802
2003	0.430	0.468	4.382	4.923	3.580	3.710
2004	0.578	0.631	3.729	4.166	3.854	3.964
2005	0.594	0.647	3.633	4.035	4.279	4.429
Country	**THAILAND**		**UNITED KINGDOM**		**UNITED STATES**	
1990	3.515	3.435	1.354	1.296	1.985	1.805
1991	3.019	3.027	1.408	1.358	1.863	1.688
1992	3.815	3.767	1.503	1.429	2.027	1.846
1993	2.429	2.380	1.148	1.094	1.534	1.399
1994	1.933	1.934	1.219	1.150	1.495	1.355
1995	2.209	2.174	1.234	1.159	1.609	1.458
1996	2.945	2.812	1.180	1.098	1.642	1.483
1997	3.734	3.662	1.092	1.006	1.594	1.455
1998	6.254	6.330	1.230	1.100	1.716	1.563
1999	5.369	5.407	1.196	1.050	1.532	1.379
2000	4.411	4.587	1.120	0.985	1.510	1.368
2001	4.696	4.927	1.118	0.980	1.427	1.297
2002	3.535	3.644	1.244	1.065	1.294	1.157
2003	2.608	2.752	1.027	0.859	1.445	1.291
2004	2.292	2.421	1.025	0.831	1.391	1.236
2005	1.750	1.867	1.181	0.967	1.378	1.220

Parts and Accessories (Other Than Covers, Carrying Cases and the Like) Suitable for Use Solely or Principally with Office Machines
Source: Compiled from the UN (2008c; 2008d; 2008e; 2008f; 2008g)

Table: 5.14

WORLD'S TOP 5 EXPORT/IMPORT COUNTRIES: CATEGORY 8473*								
HS-4	**Country**	**AUD, mill.**	**Country**	**AUD, mill.**	**Country**	**AUD, mill.**	**Country**	**AUD, mill.**
EXPORT								
Rank-Year	**1990**		**1991**		**1992**		**1993**	
1	**USA**	14,317	**USA**	15,358	**USA**	16,738	**Japan**	18,261
2	**Japan**	11,227	**Japan**	12,216	**U.K.**	5,326	**USA**	18,173
3	**U.K.**	4,593	**U.K.**	5,123	**China,**	4,712	**Singapore**	5,996
4	**Netherland**	4,219	**Netherland**	4,118	**Netherland**	4,650	**China**	5,698
5	**Germany**	4,011	**Germany**	4,071	**Germany**	4,393	**U.K.**	5,431
16-16-17-16	**Australia**	**418**	**Australia**	**543**	**Australia**	**663**	**Australia**	**825**
Rank-Year	**1994**		**1995**		**1996**		**1997**	
1	**Japan**	20,789	**USA**	23,809	**USA**	24,575	**USA**	29,911
2	**USA**	19,064	**Japan**	21,908	**Japan**	20,031	**Japan**	21,026
3	**Singapore**	10,032	**Singapore**	11,927	**Singapore**	12,011	**Singapore**	13,812
4	**U.K.**	6,376	**China**	8,750	**China**	8,312	**China**	10,357
5	**China**	6,188	**U.K.**	7,672	**U.K.**	7,517	**U.K.**	8,481
15-15-17-17	**Australia**	**1,066**	**Australia**	**1,321**	**Australia**	**1,355**	**Australia**	**1,274**
Rank-Year	**1998**		**1999**		**2000**		**2001**	
1	**USA**	32,901	**USA**	32,049	**USA**	43,804	**USA**	40,277
2	**Japan**	23,206	**Japan**	23,105	**Japan**	28,906	**Japan**	25,482
3	**Singapore**	15,651	**Malaysia**	16,264	**Malaysia**	22,835	**China**	22,395
4	**China**	12,878	**Singapore**	15,603	**Singapore**	19,365	**Singapore**	19,913
5	**Malaysia**	9,983	**China**	12,787	**China**	18,631	**Ireland**	19,082
18-22-22-22	**Australia**	**1,140**	**Australia**	**1,071**	**Australia**	**1,082**	**Australia**	**1,213**
Rank-Year	**2002**		**2003**		**2004**		**2005**	
1	**USA**	31,602	**China**	29,458	**China**	33,594	**China**	38,613
2	**China**	25,629	**USA**	28,862	**USA**	27,901	**USA**	35,516
3	**Japan**	25,621	**Japan**	26,050	**Japan**	25,680	**Japan**	26,679
4	**Malaysia**	23,406	**Singapore**	23,394	**Singapore**	22,470	**Singapore**	21,650
5	**Singapore**	18,167	**Netherland**	16,134	**Korea,**	17,639	**Netherland**	21,413
24-26-29-27	**Australia**	**1,038**	**Australia**	**698**	**Australia**	**524**	**Australia**	**419**
IMPORT								
Rank-Year	**1990**		**1991**		**1992**		**1993**	
1	**USA**	11,505	**USA**	12,342	**USA**	15,164	**USA**	20,072
2	**U.K.**	6,941	**U.K.**	6,519	**U.K.**	7,758	**Germany**	6,907
3	**Germany**	6,008	**Germany**	6,407	**Germany**	7,156	**U.K.**	6,731
4	**Netherland**	4,172	**Netherland**	4,123	**Netherland**	4,527	**Singapore**	5,415
5	**France**	3,785	**France**	3,866	**France**	4,302	**Netherland**	4,242
12-12-13-13	**Australia**	**1,176**	**Australia**	**1,308**	**Australia**	**1,507**	**Australia**	**1,751**
Rank-Year	**1994**		**1995**		**1996**		**1997**	
1	**USA**	25,093	**USA**	32,098	**USA**	29,355	**USA**	34,566
2	**Germany**	7,777	**Singapore**	9,968	**Singapore**	10,102	**Singapore**	11,959
3	**U.K.**	7,528	**Germany**	9,670	**U.K.**	9,033	**U.K.**	10,874
4	**Singapore**	5,965	**U.K.**	8,680	**Germany**	8,992	**Germany**	9,429
5	**Japan**	4,856	**Japan**	7,109	**Japan**	8,178	**Netherland**	9,314
13-15-16-16	**Australia**	**1,955**	**Australia**	**2,067**	**Australia**	**1,943**	**Australia**	**2,045**
Rank-Year	**1998**		**1999**		**2000**		**2001**	
1	**USA**	45,578	**USA**	50,001	**USA**	58,690	**USA**	51,257
2	**U.K.**	15,733	**U.K.**	17,094	**U.K.**	21,111	**China**	22,010
3	**Germany**	13,028	**Germany**	15,006	**China**	18,957	**Germany**	19,579
4	**Singapore**	12,197	**Singapore**	13,506	**Singapore**	16,975	**U.K.**	16,996
5	**Netherland**	11,937	**Netherland**	13,334	**Germany**	16,536	**Singapore**	16,889
17-20-19-21	**Australia**	**2,281**	**Australia**	**2,149**	**Australia**	**2,577**	**Australia**	**2,509**
Rank-Year	**2002**		**2003**		**2004**		**2005**	
1	**USA**	46,534	**USA**	39,257	**USA**	41,101	**USA**	40,815
2	**China**	22,650	**China**	24,475	**China**	25,362	**China**	30,160
3	**Germany**	18,479	**Germany**	19,315	**Germany**	20,142	**Singapore**	22,525
4	**Singapore**	18,076	**Singapore**	17,910	**Singapore**	17,850	**Germany**	17,698
5	**U.K.**	16,728	**Netherland**	15,349	**Netherland**	15,516	**Netherland**	17,053
18-19-19-19	**Australia**	**2,480**	**Australia**	**2,239**	**Australia**	**2,130**	**Australia**	**2,096**

Parts and Accessories (Other Than Covers, Carrying Cases and the Like) Suitable for Use Solely or Principally with Office Machines
Source: Compiled from the UN (2008c; 2008e; 2008g)

Furthermore, The United Kingdom maintains the RCA as a proportion of the trade in goods, however, most recently shows a RCD as a proportion of the total trade, while France and Germany alongside with Australia have a RCD in this category.

Table 5.14 is compiled from Appendix Tables 5.56 and 5.61 and shows the Top 5 X and M countries rankings in total AUD, mill. The world's Top X ranking in category 8473 is interchangeably occupied by The United States of America and Japan, while since 2003, China has become the world's Top X country in this category. By observing the world's Top M rankings, The United States of America is clearly the world's Top M country for the entire period. The Australian world's Top X rankings in this category has dropped significantly from 16th in 1990 to 27th position in 2005, while the Australian world's Top M ranking has dropped from 12th in 1990 to 19th position in 2005.

In summary, Australia has a RCD in category 8473, which is more pronounced as a proportion of total trade than as a proportion in the goods trade, while the BRCAI is decreasing significantly overtime. Furthermore, the world's Top X and M ranking for Australia for the same period, has slide to a lower ranking for both the X and M, while the drop in X ranking is more evident.

5.4.2.4 BALASSA REVEALED COMPARATIVE ADVANTAGE INDEX; CATEGORY: 8517

Table 5.15 is reproduced from Appendix Table 5.32 and shows the BRCAI for Australia and 8 selected TD countries in category 8517. According to this Table 5.15, the Australian BRCAI is less than one for both as a proportion of the trade in goods and as a proportion in the total trade and this show a RCD for Australia in this category, while the BRCAI is decreasing overtime. The countries with a BRCAI distinctly greater than one are China, Malaysia, Singapore and The United Kingdom, while for Thailand and The United States of America, the BRCAI recently has

Table: 5.15

BRCAI: CATEGORY 8517*						
Year	**Goods Only**	**Total Trade**	**Goods Only**	**Total Trade**	**Goods Only**	**Total Trade**
Country	**AUSTRALIA**		**CHINA**		**FRANCE**	
1990	0.312	0.311	-	-	0.798	0.732
1991	0.305	0.306	-	-	0.744	0.678
1992	0.438	0.442	4.129	4.640	0.843	0.765
1993	0.290	0.289	3.487	3.880	0.597	0.532
1994	0.414	0.400	2.953	3.207	0.588	0.559
1995	0.374	0.356	2.877	3.123	0.670	0.642
1996	0.325	0.310	2.503	2.760	0.726	0.701
1997	0.396	0.382	2.003	2.213	0.811	0.793
1998	0.386	0.374	2.250	2.518	1.146	1.132
1999	0.371	0.352	2.021	2.256	1.123	1.118
2000	0.405	0.387	1.764	1.968	1.250	1.232
2001	0.347	0.341	1.667	1.876	1.010	1.005
2002	0.201	0.196	1.771	2.006	0.969	0.962
2003	0.240	0.228	1.677	1.922	0.863	0.860
2004	0.215	0.205	1.480	1.697	0.810	0.810
2005	0.174	0.170	1.295	1.491	0.722	0.719
Country	**GERMANY**		**MALAYSIA**		**SINGAPORE**	
1990	-	-	2.437	2.691	2.578	2.615
1991	0.673	0.733	2.480	2.768	2.366	2.434
1992	0.848	0.932	2.916	3.299	2.902	2.971
1993	0.612	0.670	2.114	2.371	2.237	2.306
1994	0.655	0.718	2.275	2.466	2.533	2.588
1995	0.671	0.726	2.144	2.303	2.115	2.213
1996	0.727	0.785	2.074	2.172	1.758	1.848
1997	0.762	0.822	1.948	2.030	1.549	1.643
1998	0.806	0.882	2.179	2.375	1.634	1.739
1999	0.873	0.956	1.863	2.067	1.491	1.579
2000	0.826	0.897	1.958	2.148	1.232	1.302
2001	0.924	1.011	2.260	2.457	1.208	1.273
2002	0.897	0.975	1.926	2.111	1.382	1.452
2003	0.806	0.877	1.872	2.103	1.918	1.987
2004	0.888	0.970	1.834	2.049	2.049	2.108
2005	0.827	0.900	1.754	1.949	1.874	1.940
Country	**THAILAND**		**UNITED KINGDOM**		**UNITED STATES**	
1990	1.332	1.302	1.001	0.958	1.301	1.183
1991	1.401	1.404	0.962	0.928	1.232	1.117
1992	1.712	1.691	1.177	1.119	1.577	1.437
1993	1.112	1.090	0.850	0.810	1.181	1.077
1994	1.130	1.131	0.987	0.932	1.195	1.083
1995	1.129	1.112	1.247	1.171	1.257	1.140
1996	1.154	1.102	1.318	1.226	1.228	1.110
1997	0.982	0.963	1.380	1.271	1.225	1.118
1998	1.134	1.147	1.976	1.767	1.408	1.283
1999	1.097	1.105	1.810	1.590	1.337	1.204
2000	1.025	1.066	1.865	1.640	1.211	1.097
2001	1.012	1.062	2.061	1.806	1.208	1.098
2002	1.189	1.226	2.206	1.890	1.116	0.998
2003	1.349	1.423	1.607	1.346	1.068	0.954
2004	1.072	1.132	1.100	0.891	1.036	0.920
2005	0.848	0.905	2.021	1.653	0.956	0.846

Electrical Apparatus for Line Telephony or Line Telegraphy, Including Line Telephone Sets with Cordless Handsets and Telecommunication Apparatus for Carrier-Current Line Systems or for Digital Line Systems; Videophones
Source: Compiled from the UN (2008c; 2008d; 2008e; 2008f; 2008g)

Table: 5.16

WORLD'S TOP 5 EXPORT/IMPORT COUNTRIES: CATEGORY 8517*								
HS-4	**Country**	**AUD, mill.**	**Country**	**AUD, mill.**	**Country**	**AUD, mill.**	**Country**	**AUD, mill.**
EXPORT								
Rank-Year	**1990**		**1991**		**1992**		**1993**	
1	**Japan**	19,376	**Japan**	22,805	**USA**	14,147	**Japan**	26,168
2	**USA**	10,736	**USA**	11,718	**Germany**	7,418	**USA**	18,026
3	**Germany**	5,370	**Germany**	6,224	**China**	5,836	**China**	8,776
4	**U.K.**	3,883	**U.K.**	4,040	**U.K.**	4,528	**Germany**	7,787
5	**France**	3,540	**France**	3,559	**Singapore**	3,925	**Singapore**	5,794
24-24-26-27	**Australia**	**262**	**Australia**	**296**	**Australia**	**381**	**Australia**	**412**
Rank-Year	**1994**		**1995**		**1996**		**1997**	
1	**Japan**	25,600	**Japan**	24,405	**USA**	23,793	**USA**	30,422
2	**USA**	20,142	**USA**	23,909	**Japan**	18,975	**Japan**	20,321
3	**China**	10,108	**China**	12,144	**Germany**	11,987	**Germany**	14,195
4	**Germany**	9,417	**Germany**	11,573	**China**	11,930	**U.K.**	14,186
5	**Singapore**	8,278	**U.K.**	9,959	**Sweden**	10,908	**China**	13,353
26-27-28-26	**Australia**	**654**	**Australia**	**656**	**Australia**	**620**	**Australia**	**937**
Rank-Year	**1998**		**1999**		**2000**		**2001**	
1	**USA**	36,050	**USA**	37,547	**USA**	50,160	**USA**	50,438
2	**U.K.**	20,451	**Japan**	20,477	**U.K.**	28,347	**U.K.**	32,470
3	**Japan**	20,191	**U.K.**	19,916	**Japan**	27,726	**Germany**	30,135
4	**Germany**	16,618	**Germany**	19,191	**Germany**	23,987	**China**	29,739
5	**Sweden**	16,468	**Sweden**	16,966	**China**	23,492	**Korea,**	25,669
28-28-30-31	**Australia**	**822**	**Australia**	**851**	**Australia**	**1,386**	**Australia**	**1,276**
Rank-Year	**2002**		**2003**		**2004**		**2005**	
1	**USA**	39,720	**China**	42,768	**China**	59,565	**China**	80,851
2	**China**	36,992	**Korea,**	33,136	**Korea,**	41,983	**Korea,**	43,301
3	**U.K.**	32,033	**USA**	31,358	**USA**	33,883	**USA**	38,303
4	**Korea,**	29,926	**Germany**	30,118	**Germany**	32,420	**Germany**	33,337
5	**Germany**	29,082	**Japan**	24,599	**Japan**	30,975	**U.K.**	31,368
35-33-33-32	**Australia**	**677**	**Australia**	**694**	**Australia**	**722**	**Australia**	**722**
IMPORT								
Rank-Year	**1990**		**1991**		**1992**		**1993**	
1	**USA**	15,155	**USA**	15,978	**USA**	17,780	**USA**	21,056
2	**Germany**	5,602	**Germany**	6,782	**Germany**	7,669	**China**	9,045
3	**U.K.**	4,539	**U.K.**	4,577	**China,**	5,756	**Germany**	7,740
4	**France**	3,236	**Singapore**	3,571	**U.K.**	5,169	**Singapore**	7,130
5	**Singapore**	3,001	**France**	3,299	**China**	4,194	**U.K.**	5,826
19-19-19-17	**Australia**	**987**	**Australia**	**1,067**	**Australia**	**1,254**	**Australia**	**1,550**
Rank-Year	**1994**		**1995**		**1996**		**1997**	
1	**USA**	23,161	**USA**	24,987	**USA**	22,623	**USA**	25,982
2	**China**	10,357	**China**	13,834	**China**	13,234	**China**	17,487
3	**Germany**	8,770	**Germany**	9,664	**U.K.**	11,013	**U.K.**	13,696
4	**U.K.**	8,107	**U.K.**	9,616	**Japan**	9,014	**Germany**	9,263
5	**Singapore**	7,117	**Singapore**	9,243	**Germany**	8,430	**Japan**	8,805
18-18-19-20	**Australia**	**1,807**	**Australia**	**2,500**	**Australia**	**2,379**	**Australia**	**2,436**
Rank-Year	**1998**		**1999**		**2000**		**2001**	
1	**USA**	35,770	**USA**	45,630	**USA**	77,507	**USA**	74,251
2	**China**	18,619	**U.K.**	18,390	**U.K.**	26,630	**China**	29,116
3	**U.K.**	16,207	**China**	16,950	**China**	26,270	**Germany**	25,324
4	**Germany**	12,853	**Germany**	14,040	**Germany**	21,037	**U.K.**	24,821
5	**Japan**	12,124	**Japan**	14,018	**Japan**	18,351	**Japan**	23,226
20-16-15-20	**Australia**	**2,678**	**Australia**	**4,257**	**Australia**	**6,147**	**Australia**	**4,865**
Rank-Year	**2002**		**2003**		**2004**		**2005**	
1	**USA**	70,422	**USA**	63,399	**USA**	69,381	**USA**	80,009
2	**China**	31,009	**China**	28,853	**China**	31,301	**China**	35,725
3	**Germany**	25,564	**Germany**	28,547	**Germany**	31,203	**Germany**	34,964
4	**U.K.**	21,427	**U.K.**	19,302	**U.K.**	25,699	**U.K.**	27,397
5	**Japan**	19,482	**Japan**	18,836	**Japan**	22,101	**Japan**	24,057
19-19-19-19	**Australia**	**4,106**	**Australia**	**4,158**	**Australia**	**4,908**	**Australia**	**5,106**

Electrical Apparatus for Line Telephony or Line Telegraphy, Including Line Telephone Sets with Cordless Handsets and Telecommunication Apparatus for Carrier-Current Line Systems or for Digital Line Systems; Videophones
Source: Compiled from the UN (2008c; 2008e; 2008g)

become less than one and as such shows RCD for these two countries in this category.

Table 5.16 is compiled from Appendix Tables 5.57 and 5.62, which consists of the Top 15 X and M ranking in total AUD, mill. The world's Top X ranking in category 8517 is occupied interchangeably by Japan and The United States of America, while since 2003, China has become the world's Top X country in this category. In respect to the world's Top M rankings, The United States of America is ranked first for the entire period in this category. The Australian world's Top X rankings in category 8517, has dropped from 24th in 1990 to 32nd position in 2005, while the Australian world's Top M ranking has fluctuated over this period considerably; however, the 19th rank has been maintained in 2005 as it has been in 1990.

In summary, Australia has a RCD in category 8517 and this RCD is more pronounced as a proportion of total trade than as a proportion in the goods trade, while the BRCAI is decreasing overtime. Furthermore, the world's Top X ranking for Australia for the same period, has slide to a lower ranking, while the world's M ranking did not change.

5.4.2.5 BALASSA REVEALED COMPARATIVE ADVANTAGE INDEX; CATEGORY: 8703

Table 5.17 is reproduced from Appendix Table 5.33 and shows the BRCAI for Australia and 8 selected TD countries in category 8703. According to Table 5.17, the Australian BRCAI is less than one for both as a proportion of the trade in goods and as a proportion in the total trade and this show RCD for Australia in this category, while the BRCAI is increasing overtime. The countries with a BRCAI greater than one, are France and Germany and more recently, The United Kingdom has joined countries with RCA, while the rest of the 6 countries in Table 5.17 includes Australia

Table: 5.17

BRCAI: CATEGORY 8703*						
Year	**Goods Only**	**Total Trade**	**Goods Only**	**Total Trade**	**Goods Only**	**Total Trade**
Country	**AUSTRALIA**		**CHINA**		**FRANCE**	
1990	0.159	0.159	-	-	1.203	1.102
1991	0.152	0.152	-	-	1.196	1.091
1992	0.194	0.195	0.259	0.291	1.536	1.393
1993	0.175	0.174	0.453	0.504	1.132	1.009
1994	0.146	0.141	0.203	0.220	1.137	1.081
1995	0.151	0.144	0.049	0.053	1.123	1.076
1996	0.232	0.221	0.042	0.047	1.136	1.098
1997	0.250	0.241	0.057	0.063	1.208	1.181
1998	0.290	0.280	0.063	0.071	1.419	1.401
1999	0.400	0.379	0.043	0.048	1.388	1.382
2000	0.478	0.457	0.045	0.050	1.487	1.465
2001	0.544	0.536	0.056	0.063	1.572	1.564
2002	0.511	0.499	0.065	0.074	1.703	1.690
2003	0.538	0.510	0.073	0.084	1.762	1.756
2004	0.525	0.501	0.048	0.055	1.844	1.844
2005	0.536	0.525	0.038	0.044	1.841	1.833
Country	**GERMANY**		**MALAYSIA**		**SINGAPORE**	
1990	-	-	0.050	0.055	0.016	0.016
1991	1.670	1.818	0.047	0.052	0.014	0.014
1992	2.401	2.638	0.079	0.089	0.038	0.039
1993	1.695	1.856	0.062	0.070	0.036	0.038
1994	1.865	2.041	0.041	0.045	0.022	0.023
1995	1.907	2.063	0.048	0.052	0.034	0.035
1996	2.011	2.171	0.050	0.052	0.026	0.028
1997	2.068	2.231	0.052	0.054	0.028	0.029
1998	2.468	2.699	0.058	0.063	0.021	0.023
1999	2.495	2.734	0.036	0.040	0.011	0.012
2000	2.601	2.824	0.022	0.024	0.011	0.012
2001	2.626	2.871	0.012	0.013	0.012	0.013
2002	2.554	2.776	0.020	0.022	0.014	0.014
2003	2.599	2.828	0.010	0.012	0.028	0.029
2004	2.477	2.703	0.017	0.019	0.034	0.035
2005	2.619	2.851	0.018	0.020	0.037	0.038
Country	**THAILAND**		**UNITED KINGDOM**		**UNITED STATES**	
1990	0.026	0.025	0.609	0.583	0.529	0.481
1991	0.045	0.046	0.738	0.712	0.553	0.501
1992	0.014	0.013	0.950	0.903	0.810	0.738
1993	0.015	0.015	0.652	0.622	0.599	0.546
1994	0.007	0.007	0.744	0.702	0.636	0.576
1995	0.006	0.006	0.934	0.877	0.608	0.551
1996	0.004	0.004	1.042	0.969	0.576	0.520
1997	0.025	0.024	1.028	0.946	0.510	0.465
1998	0.030	0.030	1.182	1.056	0.550	0.501
1999	0.047	0.048	1.256	1.102	0.536	0.482
2000	0.075	0.078	1.154	1.015	0.519	0.470
2001	0.235	0.246	0.947	0.830	0.559	0.508
2002	0.168	0.173	1.183	1.014	0.647	0.579
2003	0.212	0.223	1.278	1.070	0.672	0.601
2004	0.262	0.277	1.415	1.146	0.685	0.609
2005	0.473	0.505	1.494	1.222	0.832	0.736

Motor Cars and Other Motor Vehicles Principally Designed for the Transport of Persons (Other Than Public Transport Type), Including Station Wagons and Racing Cars
Source: Compiled from the UN (2008c; 2008d; 2008e; 2008f; 2008g)

Table: 5.18

WORLD'S TOP 5 EXPORT/IMPORT COUNTRIES: CATEGORY 8703*								
HS-4	**Country**	**AUD, mill.**	**Country**	**AUD, mill.**	**Country**	**AUD, mill.**	**Country**	**AUD, mill.**
EXPORT								
Rank-Year	**1990**		**1991**		**1992**		**1993**	
1	**Japan**	53,254	**Japan**	57,589	**Germany**	58,553	**Japan**	69,969
2	**Germany**	52,696	**Germany**	46,117	**Canada**	20,473	**Germany**	52,124
3	**Canada**	18,013	**Canada**	18,552	**USA**	20,254	**Canada**	28,085
4	**Belgium-**	17,449	**Belgium-**	17,158	**France**	19,787	**USA**	22,075
5	**France**	17,158	**France**	17,105	**Belgium-**	19,246	**Belgium-**	20,955
18-16-19-19	**Australia**	**431**	**Australia**	**439**	**Australia**	**470**	**Australia**	**599**
Rank-Year	**1994**		**1995**		**1996**		**1997**	
1	**Japan**	61,782	**Germany**	65,127	**Germany**	65,873	**Germany**	70,981
2	**Germany**	57,427	**Japan**	56,559	**Japan**	51,419	**Japan**	64,598
3	**Canada**	32,079	**Canada**	33,847	**Canada**	32,075	**Canada**	36,247
4	**Belgium-**	23,008	**Belgium-**	24,158	**Belgium-**	23,803	**Belgium-**	23,847
5	**USA**	22,955	**USA**	22,877	**USA**	22,173	**USA**	23,339
21-21-20-19	**Australia**	**494**	**Australia**	**526**	**Australia**	**879**	**Australia**	**1,091**
Rank-Year	**1998**		**1999**		**2000**		**2001**	
1	**Germany**	95,966	**Germany**	95,853	**Germany**	104,164	**Germany**	116,881
2	**Japan**	80,824	**Japan**	84,705	**Japan**	97,907	**Japan**	109,861
3	**Canada**	45,505	**Canada**	53,600	**Canada**	60,364	**Canada**	67,734
4	**France**	30,884	**France**	29,764	**France**	32,613	**France**	36,595
5	**Belgium-**	27,626	**Belgium**	26,855	**Spain**	29,783	**Belgium**	31,579
23-21-21-19	**Australia**	**1,163**	**Australia**	**1,602**	**Australia**	**2,257**	**Australia**	**2,533**
Rank-Year	**2002**		**2003**		**2004**		**2005**	
1	**Germany**	136,309	**Germany**	140,926	**Germany**	136,861	**Germany**	139,364
2	**Japan**	115,368	**Japan**	105,322	**Japan**	101,011	**Japan**	103,700
3	**Canada**	59,081	**Canada**	48,322	**Canada**	49,495	**Canada**	48,361
4	**France**	45,795	**France**	46,429	**France**	47,497	**France**	44,062
5	**USA**	38,835	**Belgium**	37,617	**Belgium**	38,815	**USA**	40,660
20-22-22-20	**Australia**	**2,906**	**Australia**	**2,761**	**Australia**	**2,796**	**Australia**	**3,117**
IMPORT								
Rank-Year	**1990**		**1991**		**1992**		**1993**	
1	**USA**	61,090	**USA**	60,748	**USA**	65,159	**USA**	78,815
2	**Germany**	21,873	**Germany**	30,629	**Germany**	32,338	**Germany**	25,431
3	**U.K.**	16,886	**Italy**	17,256	**Italy**	22,885	**U.K.**	17,806
4	**France**	16,056	**France**	14,872	**France**	18,410	**France**	17,088
5	**Italy**	16,017	**Canada**	13,338	**U.K.**	15,877	**Italy**	14,673
14-15-14-14	**Australia**	**2,188**	**Australia**	**2,221**	**Australia**	**2,920**	**Australia**	**3,401**
Rank-Year	**1994**		**1995**		**1996**		**1997**	
1	**USA**	85,482	**USA**	88,931	**USA**	86,851	**USA**	99,750
2	**Germany**	24,856	**Germany**	31,165	**Germany**	30,990	**Germany**	31,099
3	**U.K.**	18,993	**U.K.**	20,890	**U.K.**	22,525	**U.K.**	29,849
4	**France**	17,217	**France**	19,589	**France**	20,398	**Italy**	22,526
5	**Italy**	14,594	**Italy**	17,820	**Italy**	18,353	**Canada**	17,665
14-13-13-12	**Australia**	**3,818**	**Australia**	**4,305**	**Australia**	**4,213**	**Australia**	**5,274**
Rank-Year	**1998**		**1999**		**2000**		**2001**	
1	**USA**	131,423	**USA**	151,788	**USA**	191,223	**USA**	209,349
2	**Germany**	39,537	**Germany**	40,120	**Germany**	37,827	**U.K.**	47,504
3	**U.K.**	37,031	**U.K.**	37,242	**U.K.**	36,274	**Germany**	46,930
4	**Italy**	28,713	**Italy**	29,288	**Italy**	29,902	**Italy**	35,847
5	**France**	23,639	**France**	25,374	**France**	28,284	**France**	31,134
13-12-11-13	**Australia**	**6,533**	**Australia**	**6,741**	**Australia**	**8,399**	**Australia**	**8,663**
Rank-Year	**2002**		**2003**		**2004**		**2005**	
1	**USA**	213,222	**USA**	178,953	**USA**	167,756	**USA**	163,284
2	**U.K.**	50,705	**Germany**	50,524	**Germany**	52,578	**Germany**	46,200
3	**Germany**	47,229	**U.K.**	47,721	**U.K.**	47,570	**U.K.**	45,381
4	**Italy**	38,149	**Italy**	40,117	**Italy**	40,701	**Italy**	39,544
5	**France**	32,198	**France**	32,589	**France**	34,065	**France**	34,565
12-11-11-9	**Australia**	**9,658**	**Australia**	**10,756**	**Australia**	**11,006**	**Australia**	**12,058**

****Motor Cars and Other Motor Vehicles Principally Designed for the Transport of Persons (Other Than Public Transport Type), Including Station Wagons and Racing Cars***
Source: Compiled from the UN (2008c; 2008e; 2008g)

records RCD in this category.

Table 5.18 is compiled from Appendix Tables 5.58 and 5.63 and shows the Top 5 X and M countries rankings in total AUD, mill. The world's Top X ranking in category 8703 is occupied interchangeably by Japan and Germany between 1990-1994, however since 1995, Germany is clearly the world's Top X country, while the world's

Top M countries for the entire period are The United States of America followed by Germany. The Australian world's Top X rankings in this category has dropped from 18th in 1990 to 20th position in 2005, while the Australian world's Top M ranking has increased considerably from 14th in 1990 to 9th position in 2005.

In summary, Australia has a RCD in category 8703, and this RCD is more pronounced as a proportion of total trade than as a proportion in the goods trade; however, the BRCAI is increasing overtime. Furthermore, the world's Top X ranking for Australia has dropped for the same period, while the world's Top M ranking has climbed to higher rankings.

5.4.2.6 SUMMARY - BALASSA REVEALED COMPARATIVE ADVANTAGE INDEX; HS-4

Now that the analysis of the BRCAI based on HS-4 level of aggregation and X and M rankings for the 5 selected TD categories and 8 TD countries have been determined, the main findings are as follow.

Out of the 5 categories analysed, Australia records a RCA in category 3004, while in categories 8471, 8473, 8517 and 8703, it records a RCD. In all 5 selected goods categories, the RCA and the RCD is more pronounced as a proportion of total trade than as a proportion in the goods trade. The BRCAI for the entire period 1990-2005 for Australia is increasing overtime for categories 3004, 8471 and 8703 and decreasing for category 8473 and 8517.

Furthermore, by observing the world's Top X and M countries, the Australian world's Top X rankings over this period has decreased in 4 categories, while the X ranking for category 3004 has progressed to higher rankings, with the highest decline in rankings for category 8473. The world's Top M rankings for Australia are mixed - the M rankings for category 3004 and 8703 has progressed to a higher rankings for categories 8471, and 8473 has decreased to a lower rankings, while for category 8517, the world's Top M rankings remains unchanged. The highest world's Top M rankings decrease is for category 8473, while the highest increase is for category 8703.

5.4.3 REVEALED TRADE AND COMPETITIVE ADVANTAGE INDEX, HS-2

Balassa BRCAI has numerous inherent limitations according to the current literature and Vollrath (1991) indices attempts to address some of these limitations. One of the limitations of BRCAI is that when a country only exports a negligible amount and most of the country X is in observed category, it may be seen that the country is exceptionally competitive (Vollrath, 1991). Furthermore, trade between countries is unlikely to be free of distortions as assumed in BRCAI; consequently, Vollrath (1991) further builds on Kunimoto's (1977) work in developing a measure of RCA under various trade distortions[94]. Additionally, Vollrath (1991) suggests that his measure of RCA is particularly useful when measuring the RCA between countries with different factor endowments, and this measure also prevents double counting of the category and country that is evident in the BRCAI. Finally, the BRCAI does not include the M levels, and as such does not represent a real world trade scenario; Vollrath (1991) has addressed this limitation by an inclusion in his indices the M levels in the measurement of RCA.

In overall, Vollrath (1991) has demonstrated in his work how to measure a RCA under international competitiveness according to 4 specific measurements. These measurements are VRXAI, VRMAI, VRTAI and VRCAI and they are presented in Equations 5.4-5.7 below:

$$VRXAI_{ij}^{\ t} = \left(X_{ij}^{\ t} / X_{nj}^{\ t}\right) / \left(X_{ir}^{\ t} / X_{nr}^{\ t}\right) \tag{5.4}$$

$$VRMAI_{ij}^{\ t} = \left(M_{ij}^{\ t} / M_{nj}^{\ t}\right) / \left(M_{ir}^{\ t} / M_{nr}^{\ t}\right) \tag{5.5}$$

$$VRTAI_{ij}^{\ t} = VRXA_{ij}^{\ t} - VRMA_{ij}^{\ t} \tag{5.6}$$

$$VRCAI_{ij}^{\ t} = \ln\left(VRXA_{ij}^{\ t}\right) - \ln\left(VRMA_{ij}^{\ t}\right) \tag{5.7}$$

where: $'X'$ is Export, $'M'$ is Import, $'i'$ is the product i, $'j'$ is a country j, $'n'$ is all products excluding product i, $'r'$ is rest of the countries in the world excluding country j, $'\ln'$ is a natural logarithm and $'t'$ is a time period.

According to Vollrath (1991), the indices calculated should be observed according to their sign, positive values of VRXAI, VRTAI and VRCAI shows a RCA, while negative values of these indices shows a RCD. One aspect emphasised by Vollrath

[94] The trade distortions refer to the tariff and numerous non-tariff impediments to free trade such as government industry assistance (subsidies).

(1991) is that when interpreting these indices, care should be taken that the VRCAI can be easily influenced when bilateral trade does not exists or the X and M volumes are very small.

Vollrath (1991) indices for the measurement of the RCA have been utilized in some studies in the current literature in respect to various categories and various countries, and such studies include Chuankamnerdkarn (1997), Havrila & Gunawardana (2003), Havrila (2004) and Gunawardana & Khorchurklang (2007).

The calculation of Vollrath (1991) indices are according to Equations 5.4-5.7, however, these equation components same as in the BRCAI, does not stipulate precisely what the total country and total world trade[95] consists of, and this as previously mentioned, can create confusion when existing studies are compared with each other. A precise definition of the total trade will assist future studies in this area and studies which adopt this approach, will be comparable with a greater accuracy, while this approach will increase the likelihood of obtaining additional useful information relevant to the international trade analysis. Examples of the empirical studies which have limited information as to what the total trade consists of, are studies by Chuankamnerdkarn (1997), Havrila & Gunawardana (2003), Havrila (2004) and Gunawardana & Khorchurklang (2007).

In order to address these shortcomings in the current studies and to avoid confusion in the future, the Vollrath (1991) indices according to Equations 5.4-5.7 are calculated by treating the total trade as total trade in all goods and total trade in all goods and services combined. As a result, the Vollrath (1991) indices once calculated will consists of two indexes for each category; the first is the proportion of the total trade in all goods according to Equations 5.8-5.11, and the second is the proportion in respect to total trade in all goods and services combined, according to Equations 5.12-5.15

$$VRXAI_{ij(GOODS)}{}^{t} = \left(X_{ij}{}^{t} / X_{nj(GOODS)}{}^{t}\right) / \left(X_{ir}{}^{t} / X_{nr(GOODS)}{}^{t}\right) \tag{5.8}$$

$$VRMAI_{ij(GOODS)}{}^{t} = \left(M_{ij}{}^{t} / M_{nj(GOODS)}{}^{t}\right) / \left(M_{ir}{}^{t} / M_{nr(GOODS)}{}^{t}\right) \tag{5.9}$$

$$VRTAI_{ij(GOODS)}{}^{t} = VRXAI_{ij(GOODS)}{}^{t} - VRMAI_{ij(GOODS)}{}^{t} \tag{5.10}$$

$$VRCAI_{ij(GOODS)}{}^{t} = \ln\left(VRXAI_{ij(GOODS)}{}^{t}\right) - \ln\left(VRMAI_{ij(GOODS)}{}^{t}\right) \tag{5.11}$$

[95] Total trade can be defined as a total trade in a broad industry such as manufacturing, total goods trade in all goods categories, total trade in all goods and services or even some other definitions.

$$VRXAI_{ij(GOODS+SERVICES)}{}^{t} = \left(X_{ij}{}^{t} / X_{nj(GOODS+SERVICES)}{}^{t}\right) / \left(X_{ir}{}^{t} / X_{nr(GOODS+SERVICES)}{}^{t}\right) \quad (5.12)$$

$$VRMAI_{ij(GOODS+SERVICES)}{}^{t} = \left(M_{ij}{}^{t} / M_{nj(GOODS+SERVICES)}{}^{t}\right) / \left(M_{ir}{}^{t} / M_{nr(GOODS+SERVICES)}{}^{t}\right) \quad (5.13)$$

$$VRTAI_{ij(GOODS+SERVICES)}{}^{t} = VRXAI_{ij(GOODS+SERVICES)}{}^{t} - VRMAI_{ij(GOODS+SERVICES)}{}^{t} \quad (5.14)$$

$$VRCAI_{ij(GOODS+SERVICES)}{}^{t} = \ln\left(VRXAI_{ij(GOODS+SERVICES)}{}^{t}\right) - \ln\left(VRMAI_{ij(GOODS+SERVICES)}{}^{t}\right) \quad (5.15)$$

According to these Equations 5.8-5.15, Vollrath (1991) indices are calculated for 4 selected TD categories based on HS-2 level of aggregation and 5 selected TD categories based on HS-4 level of aggregation. Before comments are made in respect to Vollrath (1991) indices calculated, the tables in the next sections are structured as follow.

Tables 5.19-5.22 show the VRXAI, VRTAI and VRCAI for 4 selected TD categories based on HS-2 level of aggregation in respect to Australia and 8 selected TD countries, while each Table consists of 3 parts (Part A, B and C). Tables 5.19-5.22 are compiled from Appendix Tables; VRXAI is obtained from Appendix Tables 5.5-5.8, VRMAI used for calculating VRTAI is obtained from Appendix Tables 5.9-5.12, VRTAI is obtained from Appendix Tables 5.13-5.16 and VRCAI is obtained from Appendix Tables 5.17-5.20. All of these Appendix Tables 5.5-5.20 contains VRXAI, VRMAI, VRTAI and VRCAI for Australia and all 15 selected TD countries, while Tables 5.19-5.22 shows for Australia and 8 selected TD countries.

5.4.3.1 VOLLRATH REVEALED (EXPORT, TRADE AND COMPETITIVE) ADVANTAGE INDEX; CATEGORY: 30

According to Table 5.19, the Australian VRXAI has a positive value, which shows that Australia possesses a Revealed Export Advantage (RXA) in category 30. The VRXAI has fluctuated over time and it has been steadily increasing between 1990-2000. However, since the year 2000 until 2002, it has sharply decreased and since 2003 it has began to increase again. These patterns of RXA are more pronounced as a proportion of total trade in goods than in the total trade in goods and services. By observing the VRTAI and VRCAI, both values are negative for the entire period of the analysis which suggests a RCD for Australia in this category, while this RCD is more pronounced as a proportion of total trade than as a proportion in the goods trade. An encouraging sign is that both the VRTAI and VRCAI are favourably improving overtime.

Out of the 8 remaining countries in Table 5.19, the countries which the VRTAI and the VRCAI are positive are France, The United Kingdom and The United States of America, Germany which recorded a few negative values whereas Singapore since 1999, recorded positive values for both indices, which suggests a RCA for these countries in this category.

Table: 5.19 (Part A)

VRXAI, VRTAI, VRCAI: CATEGORY 30*						
Country	**AUSTRALIA**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	0.508	-1.311	-1.275	0.506	-1.187	-1.207
1991	0.573	-1.091	-1.066	0.574	-0.993	-1.004
1992	0.629	-1.163	-1.047	0.635	-1.080	-0.993
1993	0.671	-0.868	-0.830	0.668	-0.832	-0.809
1994	0.750	-0.736	-0.684	0.724	-0.716	-0.688
1995	0.770	-0.674	-0.629	0.734	-0.658	-0.640
1996	0.786	-0.815	-0.711	0.748	-0.786	-0.718
1997	0.747	-0.856	-0.764	0.722	-0.819	-0.758
1998	0.896	-0.985	-0.742	0.866	-0.973	-0.753
1999	1.029	-0.862	-0.608	0.974	-0.888	-0.648
2000	1.198	-1.047	-0.628	1.142	-1.051	-0.652
2001	1.008	-1.017	-0.697	0.993	-1.001	-0.697
2002	0.695	-0.990	-0.885	0.680	-1.011	-0.911
2003	0.849	-0.826	-0.679	0.806	-0.876	-0.736
2004	0.894	-0.967	-0.733	0.854	-0.988	-0.769
2005	0.978	-1.005	-0.707	0.957	-1.010	-0.720

****Pharmaceutical Products***

Source: Compiled from the UN (2008c; 2008d; 2008e; 2008f; 2008g)

Table: 5.19 Continued (Part B)

VRXAI, VRTAI, VRCAI: CATEGORY 30*						
Country	**CHINA**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	-	-	-	-	-	-
1991	-	-	-	-	-	-
1992	0.810	-0.348	-0.357	0.914	-0.384	-0.351
1993	0.640	-0.022	-0.033	0.716	-0.035	-0.048
1994	0.533	-0.170	-0.276	0.581	-0.184	-0.274
1995	0.497	-0.184	-0.315	0.542	-0.157	-0.254
1996	0.426	-0.141	-0.285	0.472	-0.139	-0.258
1997	0.318	-0.173	-0.433	0.354	-0.160	-0.373
1998	0.304	-0.167	-0.438	0.342	-0.160	-0.384
1999	0.244	-0.105	-0.358	0.275	-0.097	-0.304
2000	0.182	-0.083	-0.374	0.205	-0.080	-0.331
2001	0.134	-0.051	-0.322	0.152	-0.049	-0.282
2002	0.079	-0.034	-0.353	0.091	-0.033	-0.312
2003	0.058	-0.022	-0.317	0.067	-0.022	-0.281
2004	0.041	-0.022	-0.425	0.047	-0.022	-0.388
2005	0.035	-0.026	-0.557	0.040	-0.027	-0.509
Country	**FRANCE**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	1.641	0.436	0.309	1.491	0.299	0.224
1991	1.647	0.389	0.270	1.487	0.250	0.184
1992	1.591	0.322	0.226	1.428	0.203	0.153
1993	1.749	0.441	0.291	1.539	0.312	0.227
1994	1.643	0.347	0.237	1.552	0.245	0.171
1995	1.729	0.311	0.198	1.647	0.218	0.142
1996	1.752	0.357	0.228	1.685	0.284	0.184
1997	1.818	0.409	0.255	1.769	0.350	0.221
1998	2.153	0.459	0.240	2.117	0.388	0.203
1999	2.168	0.487	0.255	2.150	0.405	0.209
2000	2.391	0.677	0.333	2.344	0.559	0.272
2001	2.373	0.674	0.334	2.347	0.576	0.281
2002	2.269	0.741	0.395	2.237	0.661	0.350
2003	2.234	0.760	0.416	2.212	0.699	0.380
2004	2.162	0.636	0.348	2.150	0.592	0.322
2005	2.383	0.775	0.393	2.355	0.718	0.363
Country	**GERMANY**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	-	-	-	-	-	-
1991	1.430	0.474	0.403	1.575	0.585	0.465
1992	1.290	0.399	0.370	1.437	0.528	0.458
1993	1.385	0.557	0.514	1.534	0.715	0.627
1994	1.429	0.484	0.414	1.582	0.658	0.537
1995	1.366	0.423	0.371	1.492	0.574	0.485
1996	1.388	0.387	0.327	1.512	0.543	0.445
1997	1.503	0.526	0.431	1.634	0.688	0.547
1998	1.865	0.714	0.483	2.056	0.925	0.598
1999	1.818	0.721	0.505	2.007	0.939	0.631
2000	1.651	0.487	0.350	1.805	0.671	0.465
2001	1.756	0.594	0.413	1.935	0.805	0.538
2002	1.218	-0.334	-0.242	1.335	-0.172	-0.121
2003	1.367	-0.032	-0.023	1.499	0.133	0.093
2004	1.650	0.056	0.034	1.815	0.245	0.145
2005	1.764	0.050	0.028	1.934	0.244	0.135
Country	**MALAYSIA**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	0.114	-0.517	-1.715	0.126	-0.534	-1.658
1991	0.106	-0.398	-1.560	0.118	-0.418	-1.510
1992	0.083	-0.467	-1.896	0.094	-0.495	-1.836
1993	0.071	-0.289	-1.622	0.080	-0.301	-1.558
1994	0.078	-0.247	-1.427	0.085	-0.255	-1.387
1995	0.072	-0.211	-1.366	0.078	-0.218	-1.334
1996	0.069	-0.213	-1.411	0.072	-0.215	-1.379
1997	0.056	-0.240	-1.659	0.059	-0.240	-1.624
1998	0.061	-0.233	-1.566	0.067	-0.234	-1.501
1999	0.053	-0.253	-1.758	0.059	-0.255	-1.676
2000	0.051	-0.223	-1.674	0.057	-0.226	-1.609
2001	0.044	-0.245	-1.882	0.048	-0.249	-1.819
2002	0.041	-0.195	-1.756	0.045	-0.202	-1.703
2003	0.039	-0.189	-1.775	0.044	-0.193	-1.691
2004	0.041	-0.194	-1.748	0.046	-0.202	-1.688
2005	0.039	-0.201	-1.817	0.044	-0.207	-1.749

***Pharmaceutical Products**

Source: Compiled from the UN (2008c; 2008d; 2008e; 2008f; 2008g)

Table: 5.19 Continued (Part C)

VRXAI, VRTAI, VRCAI: CATEGORY 30*						
Country	**SINGAPORE**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	0.335	-0.012	-0.034	0.341	-0.040	-0.111
1991	0.292	-0.013	-0.045	0.301	-0.038	-0.120
1992	0.260	-0.040	-0.144	0.267	-0.072	-0.239
1993	0.309	-0.051	-0.152	0.319	-0.088	-0.243
1994	0.329	-0.028	-0.082	0.337	-0.061	-0.167
1995	0.294	-0.047	-0.147	0.309	-0.060	-0.177
1996	0.274	-0.046	-0.154	0.289	-0.056	-0.178
1997	0.261	-0.057	-0.197	0.279	-0.066	-0.212
1998	0.315	-0.032	-0.097	0.337	-0.035	-0.100
1999	0.550	0.173	0.378	0.584	0.192	0.397
2000	0.423	0.103	0.279	0.449	0.117	0.304
2001	0.410	0.090	0.248	0.434	0.113	0.301
2002	0.274	0.010	0.037	0.290	0.025	0.091
2003	0.242	0.005	0.020	0.252	0.021	0.085
2004	0.233	0.022	0.101	0.241	0.036	0.161
2005	0.528	0.192	0.452	0.548	0.219	0.511
Country	**THAILAND**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	0.104	-0.600	-1.912	0.102	-0.631	-1.974
1991	0.103	-0.502	-1.770	0.104	-0.520	-1.796
1992	0.127	-0.538	-1.657	0.125	-0.537	-1.665
1993	0.227	-0.315	-0.870	0.223	-0.311	-0.873
1994	0.128	-0.403	-1.423	0.128	-0.383	-1.382
1995	0.148	-0.329	-1.169	0.146	-0.317	-1.154
1996	0.123	-0.371	-1.393	0.117	-0.359	-1.401
1997	0.115	-0.440	-1.574	0.113	-0.418	-1.547
1998	0.117	-0.467	-1.610	0.119	-0.440	-1.550
1999	0.107	-0.533	-1.787	0.108	-0.509	-1.740
2000	0.110	-0.429	-1.592	0.114	-0.415	-1.532
2001	0.096	-0.390	-1.621	0.101	-0.385	-1.570
2002	0.075	-	-	0.077	-	-
2003	0.071	-0.296	-1.642	0.075	-0.290	-1.580
2004	0.060	-0.247	-1.629	0.064	-0.241	-1.560
2005	0.065	-0.254	-1.591	0.070	-0.248	-1.519
Country	**UNITED KINGDOM**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	2.122	1.171	0.803	2.018	1.038	0.722
1991	2.128	1.073	0.701	2.042	0.960	0.636
1992	2.070	0.998	0.658	1.954	0.859	0.579
1993	2.074	1.079	0.735	1.963	0.944	0.656
1994	2.041	0.999	0.672	1.911	0.866	0.604
1995	2.245	1.158	0.726	2.089	0.996	0.648
1996	2.191	1.133	0.728	2.020	0.961	0.646
1997	2.084	1.046	0.697	1.900	0.865	0.607
1998	2.483	1.316	0.755	2.191	1.041	0.644
1999	2.443	1.152	0.638	2.114	0.863	0.525
2000	2.730	1.284	0.636	2.367	0.979	0.534
2001	2.671	1.214	0.606	2.300	0.889	0.488
2002	2.509	1.184	0.639	2.106	0.831	0.502
2003	2.900	1.479	0.713	2.367	1.023	0.566
2004	2.910	1.512	0.733	2.292	0.973	0.552
2005	2.631	1.281	0.667	2.101	0.833	0.505
Country	**UNITED STATES**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	0.952	0.491	0.726	0.853	0.380	0.589
1991	0.924	0.419	0.603	0.824	0.302	0.457
1992	0.867	0.356	0.529	0.777	0.237	0.363
1993	0.825	0.390	0.641	0.740	0.272	0.457
1994	0.796	0.368	0.620	0.710	0.249	0.433
1995	0.730	0.288	0.502	0.652	0.178	0.319
1996	0.746	0.231	0.370	0.664	0.111	0.184
1997	0.723	0.165	0.258	0.650	0.052	0.083
1998	0.930	0.212	0.258	0.837	0.065	0.081
1999	0.987	0.246	0.286	0.875	0.075	0.090
2000	1.126	0.395	0.432	1.005	0.221	0.248
2001	1.103	0.299	0.316	0.988	0.124	0.134
2002	1.017	0.167	0.180	0.896	-0.016	-0.018
2003	1.126	0.150	0.143	0.991	-0.050	-0.049
2004	1.240	0.300	0.277	1.085	0.088	0.084
2005	1.259	0.271	0.243	1.098	0.048	0.044

Pharmaceutical Products
Source: Compiled from the UN (2008c; 2008d; 2008e; 2008f; 2008g)

5.4.3.2 VOLLRATH REVEALED (EXPORT, TRADE AND COMPETITIVE) ADVANTAGE INDEX; CATEGORY: 84

According to Table 5.20, the Australian VRXAI has a positive value, which shows that Australia possesses a RXA in category 84, however, this value is decreasing overtime. By observing the VRTAI and the VRCAI, both values are negative for the entire period. This RCD magnitude is similar between a proportion of the total trade and in the goods trade, which shows a RCD for Australia in this category, while in overall this RCD is deteriorating overtime.

Of the 8 remaining countries in Table 5.20, the countries for which the VRTAI and the VRCAI are positive are Singapore, Thailand, The United Kingdom and Malaysia since 1992, which shows a RCA in this category for these countries. The VRTAI and VRCAI for The United States of America are positive as a proportion of the goods trade. However, it is negative as a proportion of the total trade and as such, possesses both a RCA and a RCD for this category which depends from which perspective the total trade is observed[96]. For the rest of the countries; China, France and Germany the VRTAI and VRCAI are a negative values that shows a RCD in this category for these countries.

Table: 5.20 (Part A)

VRXAI, VRTAI, VRCAI: CATEGORY 84*						
Country	**AUSTRALIA**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	0.333	-1.272	-1.573	0.334	-1.143	-1.486
1991	0.369	-1.156	-1.420	0.373	-1.050	-1.340
1992	0.442	-0.981	-1.169	0.449	-0.903	-1.103
1993	0.373	-1.005	-1.307	0.375	-0.960	-1.269
1994	0.427	-0.941	-1.164	0.416	-0.901	-1.153
1995	0.467	-0.873	-1.054	0.447	-0.835	-1.053
1996	0.439	-0.869	-1.092	0.421	-0.825	-1.085
1997	0.367	-0.826	-1.178	0.358	-0.784	-1.159
1998	0.367	-0.906	-1.244	0.358	-0.884	-1.243
1999	0.331	-0.882	-1.299	0.316	-0.876	-1.326
2000	0.279	-1.032	-1.548	0.269	-1.009	-1.559
2001	0.253	-0.974	-1.578	0.252	-0.955	-1.565
2002	0.265	-0.949	-1.521	0.262	-0.957	-1.538
2003	0.276	-0.890	-1.441	0.264	-0.908	-1.489
2004	0.256	-0.953	-1.553	0.247	-0.951	-1.579
2005	0.244	-1.020	-1.643	0.242	-1.014	-1.647

***Nuclear Reactors, Boilers, Machinery and Mechanical Appliances; Parts Thereof**
Source: Compiled from the UN (2008c; 2008d; 2008e; 2008f; 2008g)

[96] This is one of the advantages of clearly specifying what the total trade consists of, and by calculating these indices side by side (as a proportion of the goods and combined for the goods and services).

Table: 5.20 Continued (Part B)

VRXAI, VRTAI, VRCAI: CATEGORY 84*						
Country	**CHINA**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	-	-	-	-	-	-
1991	-	-	-	-	-	-
1992	1.741	0.432	0.285	1.963	0.490	0.287
1993	1.370	0.387	0.332	1.533	0.412	0.313
1994	1.190	-0.020	-0.017	1.300	-0.020	-0.015
1995	1.293	-0.145	-0.107	1.411	-0.056	-0.039
1996	1.148	-0.165	-0.134	1.277	-0.138	-0.103
1997	1.008	-0.438	-0.361	1.126	-0.379	-0.290
1998	1.230	-0.407	-0.286	1.388	-0.347	-0.223
1999	1.158	-0.266	-0.207	1.305	-0.203	-0.145
2000	1.054	-0.337	-0.278	1.188	-0.305	-0.229
2001	1.045	-0.272	-0.231	1.189	-0.243	-0.186
2002	1.049	-0.152	-0.136	1.204	-0.114	-0.090
2003	0.941	-0.069	-0.071	1.096	-0.037	-0.033
2004	0.813	-0.053	-0.063	0.949	-0.023	-0.024
2005	0.841	-0.095	-0.107	0.987	-0.057	-0.057
Country	**FRANCE**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	1.038	-0.155	-0.139	0.941	-0.236	-0.224
1991	1.043	-0.164	-0.146	0.938	-0.244	-0.232
1992	1.263	0.073	0.060	1.127	-0.017	-0.015
1993	0.932	-0.155	-0.154	0.819	-0.196	-0.215
1994	0.913	-0.145	-0.147	0.864	-0.204	-0.212
1995	0.883	-0.078	-0.084	0.843	-0.128	-0.141
1996	0.884	-0.052	-0.057	0.853	-0.090	-0.101
1997	0.832	-0.140	-0.156	0.814	-0.168	-0.187
1998	1.054	-0.176	-0.154	1.039	-0.216	-0.189
1999	0.999	-0.143	-0.134	0.994	-0.194	-0.178
2000	0.926	-0.206	-0.201	0.913	-0.270	-0.259
2001	0.901	-0.250	-0.245	0.898	-0.306	-0.293
2002	0.828	-0.290	-0.301	0.824	-0.332	-0.339
2003	0.783	-0.261	-0.288	0.782	-0.292	-0.317
2004	0.789	-0.259	-0.284	0.791	-0.282	-0.304
2005	0.803	-0.293	-0.311	0.801	-0.318	-0.334
Country	**GERMANY**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	-	-	-	-	-	-
1991	0.810	-0.165	-0.186	0.898	-0.113	-0.119
1992	0.903	-0.048	-0.052	1.011	0.040	0.041
1993	0.661	-0.215	-0.282	0.740	-0.128	-0.160
1994	0.670	-0.221	-0.285	0.749	-0.124	-0.153
1995	0.677	-0.202	-0.261	0.746	-0.110	-0.138
1996	0.684	-0.202	-0.259	0.752	-0.106	-0.131
1997	0.659	-0.222	-0.290	0.723	-0.129	-0.165
1998	0.839	-0.319	-0.322	0.932	-0.202	-0.196
1999	0.822	-0.406	-0.401	0.916	-0.274	-0.262
2000	0.876	-0.360	-0.344	0.965	-0.234	-0.217
2001	0.874	-0.435	-0.404	0.971	-0.295	-0.265
2002	0.879	-0.441	-0.407	0.970	-0.309	-0.276
2003	0.928	-0.364	-0.331	1.024	-0.235	-0.207
2004	1.101	-0.252	-0.206	1.217	-0.112	-0.088
2005	1.059	-0.256	-0.216	1.167	-0.127	-0.104
Country	**MALAYSIA**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	0.438	-0.312	-0.538	0.489	-0.298	-0.476
1991	0.741	-0.194	-0.232	0.835	-0.163	-0.179
1992	1.243	0.317	0.294	1.415	0.421	0.353
1993	1.141	0.354	0.371	1.290	0.454	0.435
1994	1.395	0.533	0.481	1.516	0.612	0.517
1995	1.575	0.717	0.608	1.691	0.793	0.633
1996	1.824	0.805	0.582	1.898	0.862	0.606
1997	2.138	1.123	0.745	2.200	1.177	0.766
1998	2.839	1.722	0.933	3.057	1.915	0.985
1999	3.572	2.572	1.273	3.902	2.875	1.335
2000	3.695	2.701	1.313	3.982	2.956	1.357
2001	3.279	2.050	0.981	3.502	2.249	1.028
2002	3.551	2.142	0.924	3.824	2.360	0.960
2003	2.890	1.434	0.685	3.225	1.722	0.764
2004	2.926	1.270	0.569	3.244	1.506	0.624
2005	3.081	1.177	0.481	3.391	1.425	0.545

****Nuclear Reactors, Boilers, Machinery and Mechanical Appliances; Parts Thereof***
Source: Compiled from the UN (2008c; 2008d; 2008e; 2008f; 2008g)

Table: 5.20 Continued (Part C)

VRXAI, VRTAI, VRCAI: CATEGORY 84*						
Country	SINGAPORE					
	Goods Only			Total Trade		
Year	VRXAI	VRTAI	VRCAI	VRXAI	VRTAI	VRCAI
1990	3.449	1.552	0.598	3.401	1.329	0.495
1991	3.341	1.473	0.581	3.349	1.280	0.482
1992	4.745	2.932	0.962	4.674	2.631	0.827
1993	4.034	2.175	0.775	3.999	1.899	0.644
1994	4.479	2.570	0.853	4.375	2.254	0.724
1995	4.129	2.303	0.816	4.183	2.222	0.757
1996	4.352	2.468	0.837	4.419	2.398	0.783
1997	4.159	2.266	0.787	4.270	2.240	0.744
1998	5.234	3.050	0.874	5.349	3.040	0.840
1999	4.478	2.404	0.770	4.574	2.447	0.766
2000	3.635	1.658	0.609	3.749	1.730	0.619
2001	3.550	1.475	0.537	3.642	1.604	0.580
2002	3.401	1.358	0.509	3.486	1.483	0.554
2003	3.188	0.975	0.365	3.226	1.121	0.427
2004	2.848	0.763	0.312	2.870	0.886	0.370
2005	2.767	0.531	0.213	2.814	0.670	0.272
Country	THAILAND					
	Goods Only			Total Trade		
Year	VRXAI	VRTAI	VRCAI	VRXAI	VRTAI	VRCAI
1990	1.178	-0.266	-0.204	1.146	-0.352	-0.268
1991	1.160	0.012	0.010	1.161	-0.022	-0.019
1992	1.479	0.381	0.298	1.450	0.358	0.283
1993	1.184	0.064	0.055	1.155	0.056	0.050
1994	1.449	0.394	0.317	1.439	0.427	0.352
1995	1.624	0.679	0.542	1.580	0.665	0.546
1996	2.075	1.160	0.819	1.936	1.055	0.788
1997	2.021	1.005	0.687	1.943	0.975	0.697
1998	2.730	1.417	0.732	2.698	1.455	0.775
1999	2.515	1.433	0.843	2.476	1.438	0.869
2000	2.249	1.043	0.623	2.307	1.130	0.673
2001	2.219	0.892	0.514	2.299	0.982	0.557
2002	2.151	-	-	2.187	-	-
2003	2.022	0.677	0.408	2.116	0.786	0.464
2004	1.971	0.760	0.487	2.066	0.875	0.551
2005	2.217	0.850	0.484	2.346	0.993	0.550
Country	UNITED KINGDOM					
	Goods Only			Total Trade		
Year	VRXAI	VRTAI	VRCAI	VRXAI	VRTAI	VRCAI
1990	2.008	0.400	0.222	1.883	0.234	0.133
1991	1.909	0.309	0.177	1.809	0.180	0.105
1992	2.254	0.707	0.376	2.094	0.525	0.288
1993	1.702	0.241	0.153	1.592	0.106	0.069
1994	1.714	0.349	0.228	1.585	0.225	0.153
1995	1.762	0.396	0.255	1.619	0.253	0.170
1996	1.670	0.372	0.252	1.520	0.229	0.163
1997	1.750	0.457	0.302	1.570	0.287	0.202
1998	2.216	0.585	0.307	1.911	0.322	0.185
1999	2.179	0.523	0.275	1.839	0.256	0.150
2000	2.023	0.318	0.171	1.718	0.103	0.062
2001	2.112	0.652	0.369	1.782	0.378	0.239
2002	1.944	0.533	0.320	1.606	0.257	0.175
2003	1.897	0.478	0.291	1.531	0.198	0.138
2004	1.753	0.334	0.212	1.369	0.039	0.029
2005	1.765	0.343	0.216	1.395	0.068	0.050
Country	UNITED STATES					
	Goods Only			Total Trade		
Year	VRXAI	VRTAI	VRCAI	VRXAI	VRTAI	VRCAI
1990	2.128	0.620	0.344	1.865	0.324	0.191
1991	2.067	0.461	0.253	1.803	0.158	0.092
1992	2.480	0.831	0.408	2.171	0.437	0.225
1993	1.755	0.163	0.098	1.544	-0.163	-0.101
1994	1.748	0.096	0.057	1.527	-0.236	-0.144
1995	1.737	0.057	0.033	1.521	-0.270	-0.163
1996	1.692	0.084	0.051	1.475	-0.238	-0.150
1997	1.666	0.125	0.078	1.468	-0.175	-0.113
1998	1.932	0.154	0.083	1.700	-0.196	-0.109
1999	1.871	0.187	0.105	1.622	-0.185	-0.108
2000	1.891	0.331	0.192	1.652	-0.014	-0.008
2001	1.886	0.429	0.258	1.656	0.093	0.058
2002	1.776	0.265	0.161	1.535	-0.081	-0.051
2003	1.747	0.309	0.194	1.512	-0.018	-0.012
2004	1.730	0.250	0.156	1.490	-0.074	-0.049
2005	1.778	0.268	0.163	1.524	-0.075	-0.048

Nuclear Reactors, Boilers, Machinery and Mechanical Appliances; Parts Thereof
Source: Compiled from the UN (2008c; 2008d; 2008e; 2008f; 2008g)

5.4.3.3 VOLLRATH REVEALED (EXPORT, TRADE AND COMPETITIVE) ADVANTAGE INDEX; CATEGORY: 85

According to Table 5.21, the Australian VRXAI has a positive value, which shows that Australia possesses a RXA in category 85, however, this value is decreasing overtime. By observing the VRTAI and the VRCAI, both values are negative for the entire period, which shows a RCD for Australia in this category. Furthermore, the magnitude of the RCD remains almost unchanged since 1990 levels, while the RCD extent is similar between a proportion of the total trade and in the goods trade.

Out of the 8 remaining countries in Table 5.21, none of the countries have a VRTAI and VRCAI positive for the whole period of the analysis. The VRTAI and VRCAI in category 85 for the countries France, Germany, The United Kingdom and The United States of America are predominantly positive which shows a RCA. However, for Malaysia, Singapore and Thailand these indices are predominantly negative, which shows a RCD in this category for these countries.

Table: 5.21 (Part A)

VRXAI, VRTAI, VRCAI: CATEGORY 85*						
Country	**AUSTRALIA**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	0.150	-0.919	-1.964	0.152	-0.840	-1.877
1991	0.160	-0.861	-1.851	0.163	-0.796	-1.770
1992	0.206	-0.751	-1.535	0.211	-0.706	-1.468
1993	0.168	-0.717	-1.662	0.171	-0.694	-1.622
1994	0.204	-0.659	-1.444	0.201	-0.638	-1.430
1995	0.203	-0.717	-1.513	0.197	-0.690	-1.504
1996	0.187	-0.709	-1.566	0.182	-0.678	-1.553
1997	0.178	-0.606	-1.481	0.176	-0.582	-1.459
1998	0.207	-0.692	-1.468	0.204	-0.679	-1.465
1999	0.196	-0.778	-1.604	0.190	-0.773	-1.625
2000	0.185	-0.813	-1.686	0.180	-0.796	-1.688
2001	0.190	-0.736	-1.583	0.192	-0.725	-1.566
2002	0.162	-0.719	-1.696	0.161	-0.729	-1.708
2003	0.171	-0.711	-1.642	0.165	-0.726	-1.684
2004	0.160	-0.751	-1.741	0.156	-0.751	-1.761
2005	0.138	-0.770	-1.887	0.138	-0.769	-1.885

****Electrical Machinery and Equipment and Parts Thereof; Sound Recorders and Producers, Television Image and Sound Recorders and Reproducers, and Parts and Accessories of Such Articles***
Source: Compiled from the UN (2008c; 2008d; 2008e; 2008f; 2008g)

Table: 5.21 Continued (Part B)

VRXAI, VRTAI, VRCAI: CATEGORY 85*						
Country	**CHINA**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	-	-	-	-	-	-
1991	-	-	-	-	-	-
1992	4.296	-0.803	-0.171	4.727	-0.748	-0.147
1993	3.642	-0.243	-0.065	3.945	-0.328	-0.080
1994	2.908	-1.345	-0.380	3.087	-1.312	-0.354
1995	2.800	-1.968	-0.532	2.981	-1.503	-0.408
1996	2.299	-1.360	-0.465	2.519	-1.257	-0.405
1997	1.859	-2.017	-0.735	2.056	-1.756	-0.617
1998	2.079	-1.639	-0.581	2.327	-1.458	-0.486
1999	1.917	-0.943	-0.400	2.143	-0.794	-0.315
2000	1.823	-0.739	-0.340	2.044	-0.645	-0.274
2001	1.742	-0.528	-0.265	1.973	-0.456	-0.208
2002	1.664	-0.519	-0.271	1.904	-0.454	-0.214
2003	1.497	-0.235	-0.146	1.743	-0.187	-0.102
2004	1.384	-0.188	-0.127	1.618	-0.140	-0.083
2005	1.247	-0.385	-0.269	1.468	-0.344	-0.211
Country	**FRANCE**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	0.843	-0.081	-0.092	0.765	-0.149	-0.178
1991	0.832	-0.070	-0.081	0.752	-0.138	-0.168
1992	0.939	0.155	0.180	0.841	0.081	0.101
1993	0.715	-0.033	-0.045	0.631	-0.073	-0.109
1994	0.666	0.002	0.003	0.635	-0.043	-0.065
1995	0.700	0.034	0.049	0.672	-0.008	-0.011
1996	0.749	0.070	0.098	0.726	0.036	0.050
1997	0.764	0.041	0.056	0.749	0.014	0.019
1998	1.002	0.089	0.093	0.988	0.051	0.053
1999	0.927	0.073	0.082	0.924	0.030	0.033
2000	0.935	0.085	0.096	0.922	0.027	0.030
2001	0.912	0.106	0.123	0.909	0.058	0.066
2002	0.854	0.069	0.084	0.850	0.032	0.038
2003	0.785	0.040	0.052	0.787	0.013	0.017
2004	0.764	0.037	0.050	0.769	0.018	0.024
2005	0.779	0.002	0.002	0.780	-0.020	-0.025
Country	**GERMANY**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	-	-	-	-	-	-
1991	0.990	0.064	0.067	1.099	0.136	0.133
1992	1.119	0.322	0.340	1.253	0.436	0.427
1993	0.776	0.033	0.044	0.872	0.133	0.165
1994	0.772	0.005	0.007	0.868	0.114	0.140
1995	0.778	0.038	0.050	0.863	0.137	0.173
1996	0.791	0.062	0.081	0.874	0.164	0.208
1997	0.790	0.102	0.138	0.871	0.200	0.261
1998	0.949	0.068	0.075	1.058	0.190	0.198
1999	0.908	0.056	0.063	1.016	0.184	0.199
2000	0.870	0.026	0.030	0.964	0.139	0.156
2001	0.973	-0.009	-0.009	1.084	0.130	0.128
2002	0.922	-0.017	-0.019	1.021	0.106	0.110
2003	0.924	0.023	0.025	1.024	0.140	0.147
2004	0.984	0.023	0.024	1.094	0.145	0.142
2005	0.938	0.016	0.018	1.040	0.127	0.130
Country	**MALAYSIA**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	4.622	0.542	0.125	4.958	0.871	0.193
1991	4.704	0.558	0.126	5.096	0.870	0.187
1992	5.432	1.638	0.359	5.960	2.072	0.427
1993	4.478	0.723	0.176	4.842	1.086	0.254
1994	4.763	0.694	0.157	4.881	0.896	0.203
1995	4.795	0.825	0.189	4.851	0.964	0.222
1996	4.575	0.583	0.136	4.471	0.705	0.172
1997	4.169	0.573	0.148	4.068	0.683	0.184
1998	5.189	-0.884	-0.157	5.352	-0.222	-0.041
1999	4.732	-1.329	-0.247	5.023	-0.514	-0.097
2000	4.246	-1.665	-0.331	4.463	-0.974	-0.197
2001	4.679	-0.802	-0.158	4.821	-0.221	-0.045
2002	4.764	-1.372	-0.253	4.961	-0.795	-0.149
2003	4.734	-1.397	-0.259	5.123	-0.580	-0.107
2004	4.175	-0.588	-0.132	4.515	-0.158	-0.034
2005	4.092	-0.805	-0.180	4.402	-0.330	-0.072

Electrical Machinery and Equipment and Parts Thereof; Sound Recorders and Producers, Television Image and Sound Recorders and Reproducers, and Parts and Accessories of Such Articles
Source: Compiled from the UN (2008c; 2008d; 2008e; 2008f; 2008g)

Table: 5.21 Continued (Part C)

VRXAI, VRTAI, VRCAI: CATEGORY 85*						
Country	**SINGAPORE**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	3.265	-3.060	-0.661	3.196	-3.392	-0.723
1991	3.165	-2.940	-0.657	3.148	-3.300	-0.717
1992	3.646	-1.704	-0.383	3.586	-2.194	-0.477
1993	2.707	-2.633	-0.679	2.695	-3.058	-0.758
1994	3.407	-2.799	-0.600	3.297	-3.166	-0.673
1995	2.992	-2.265	-0.564	3.018	-2.279	-0.562
1996	2.794	-1.457	-0.420	2.849	-1.501	-0.423
1997	2.565	-1.003	-0.330	2.655	-1.038	-0.330
1998	3.301	-1.235	-0.318	3.396	-1.178	-0.298
1999	3.278	-1.029	-0.273	3.341	-0.836	-0.223
2000	3.593	-0.563	-0.146	3.627	-0.373	-0.098
2001	3.466	-0.602	-0.160	3.495	-0.258	-0.071
2002	3.668	-0.489	-0.125	3.668	-0.151	-0.040
2003	4.475	-0.176	-0.039	4.331	0.252	0.060
2004	4.736	0.183	0.039	4.509	0.527	0.124
2005	4.596	0.073	0.016	4.443	0.408	0.096
Country	**THAILAND**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	1.399	-0.190	-0.127	1.354	-0.289	-0.193
1991	1.475	-0.102	-0.067	1.466	-0.146	-0.095
1992	1.892	0.310	0.179	1.835	0.280	0.166
1993	1.437	-0.111	-0.074	1.388	-0.110	-0.076
1994	1.494	-0.214	-0.134	1.475	-0.127	-0.083
1995	1.419	-0.223	-0.146	1.377	-0.179	-0.122
1996	1.502	-0.176	-0.111	1.404	-0.172	-0.116
1997	1.502	-0.431	-0.252	1.447	-0.334	-0.208
1998	1.876	-1.059	-0.447	1.863	-0.777	-0.349
1999	1.849	-0.766	-0.346	1.824	-0.567	-0.271
2000	1.909	-0.517	-0.240	1.952	-0.323	-0.153
2001	1.898	-0.568	-0.262	1.963	-0.401	-0.186
2002	2.123	-	-	2.139	-	-
2003	2.185	-0.107	-0.048	2.264	0.064	0.029
2004	2.100	0.056	0.027	2.182	0.224	0.109
2005	1.864	-0.031	-0.017	1.971	0.128	0.067
Country	**UNITED KINGDOM**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	0.963	-0.098	-0.097	0.916	-0.179	-0.178
1991	0.918	-0.132	-0.135	0.883	-0.195	-0.199
1992	1.060	0.111	0.110	1.000	0.027	0.028
1993	0.809	-0.043	-0.052	0.770	-0.107	-0.131
1994	0.868	0.002	0.002	0.815	-0.057	-0.067
1995	0.926	0.004	0.005	0.863	-0.068	-0.076
1996	0.968	-0.048	-0.048	0.891	-0.125	-0.131
1997	0.903	-0.026	-0.028	0.823	-0.105	-0.120
1998	1.213	0.158	0.140	1.060	0.023	0.022
1999	1.123	0.077	0.071	0.963	-0.048	-0.048
2000	1.160	0.025	0.022	0.993	-0.089	-0.085
2001	1.305	0.316	0.277	1.109	0.151	0.146
2002	1.289	0.428	0.403	1.069	0.237	0.250
2003	0.931	0.051	0.057	0.763	-0.071	-0.089
2004	0.829	-0.080	-0.092	0.658	-0.200	-0.266
2005	1.086	0.204	0.208	0.863	0.033	0.040
Country	**UNITED STATES**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	1.351	-0.221	-0.152	1.193	-0.410	-0.295
1991	1.287	-0.273	-0.193	1.131	-0.465	-0.344
1992	1.533	0.140	0.096	1.350	-0.118	-0.084
1993	1.151	-0.073	-0.061	1.019	-0.301	-0.259
1994	1.203	-0.014	-0.011	1.054	-0.254	-0.216
1995	1.257	-0.023	-0.018	1.100	-0.272	-0.221
1996	1.289	0.132	0.108	1.122	-0.120	-0.101
1997	1.284	0.215	0.184	1.130	-0.019	-0.017
1998	1.582	0.285	0.199	1.387	-0.005	-0.004
1999	1.653	0.416	0.290	1.420	0.084	0.061
2000	1.642	0.433	0.306	1.419	0.119	0.088
2001	1.555	0.453	0.344	1.357	0.167	0.132
2002	1.495	0.351	0.268	1.283	0.053	0.042
2003	1.478	0.404	0.319	1.270	0.120	0.099
2004	1.406	0.361	0.296	1.204	0.091	0.078
2005	1.333	0.221	0.182	1.139	-0.045	-0.039

Electrical Machinery and Equipment and Parts Thereof; Sound Recorders and Producers, Television Image and Sound Recorders and Reproducers, and Parts and Accessories of Such Articles
Source: Compiled from the UN (2008c; 2008d; 2008e; 2008f; 2008g)

5.4.3.4 VOLLRATH REVEALED (EXPORT, TRADE AND COMPETITIVE) ADVANTAGE INDEX; CATEGORY: 87

Table 5.22 shows the Australian VRXAI has a positive value, which shows that Australia records RXA in category 87. The VRXAI recorded an increase overtime between 1990-2003, and it has declined in 2004, however, it has risen again in 2005. These patterns of RXA are more pronounced as a proportion of the total trade than in the total goods trade only. Although Australian VRTAI and VRCAI are both negative for the entire period of the analysis which shows a RCD, both these indices are improving overtime. This improvements in VRTAI and VRCAI are more pronounced as a proportion of the trade in goods than as a proportion in the total trade.

Of the 8 remaining countries in Table 5.22, countries for which the VRTAI and VRCAI are positive are France and Germany which shows a RCA in this category for these countries, while Thailand since 1998 has gained a RCA in this category also. The countries which VRTAI and VRCAI are negative for the entire period in this category are China, Malaysia, Singapore, The United Kingdom and The United States of America that shows a RCD in this category for these countries.

Table: 5.22 (Part A)

VRXAI, VRTAI, VRCAI: CATEGORY 87*

Country	AUSTRALIA					
	Goods Only			Total Trade		
Year	VRXAI	VRTAI	VRCAI	VRXAI	VRTAI	VRCAI
1990	0.136	-0.948	-2.078	0.152	-0.853	-1.890
1991	0.141	-0.807	-1.907	0.156	-0.736	-1.744
1992	0.177	-0.880	-1.788	0.155	-0.855	-1.875
1993	0.162	-1.005	-1.974	0.178	-0.955	-1.853
1994	0.149	-1.127	-2.150	0.156	-1.072	-2.061
1995	0.160	-1.086	-2.055	0.161	-1.031	-2.000
1996	0.203	-0.998	-1.777	0.204	-0.941	-1.726
1997	0.213	-1.061	-1.787	0.219	-0.998	-1.716
1998	0.239	-1.295	-1.859	0.243	-1.244	-1.812
1999	0.318	-1.183	-1.553	0.306	-1.161	-1.568
2000	0.361	-1.373	-1.570	0.349	-1.328	-1.569
2001	0.406	-1.120	-1.323	0.403	-1.090	-1.309
2002	0.404	-1.125	-1.330	0.407	-1.118	-1.321
2003	0.430	-1.227	-1.350	0.424	-1.226	-1.360
2004	0.387	-1.310	-1.479	0.388	-1.277	-1.457
2005	0.380	-1.556	-1.629	0.403	-1.499	-1.552

Vehicles Other Than Railway or Tramway Rolling-Stock, and Parts and Accessories Thereof
Source: Compiled from the UN (2008c; 2008d; 2008e; 2008f; 2008g)

Table: 5.22 Continued (Part B)

VRXAI, VRTAI, VRCAI: CATEGORY 87*						
Country	**CHINA**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	-	-	-	-	-	-
1991	-	-	-	-	-	-
1992	0.377	-0.313	-0.603	0.431	-0.352	-0.597
1993	0.541	-0.251	-0.381	0.614	-0.295	-0.393
1994	0.360	-0.367	-0.703	0.398	-0.401	-0.696
1995	0.156	-0.420	-1.305	0.173	-0.423	-1.236
1996	0.120	-0.288	-1.226	0.135	-0.310	-1.194
1997	0.115	-0.357	-1.409	0.130	-0.369	-1.342
1998	0.100	-0.265	-1.299	0.114	-0.280	-1.241
1999	0.063	-0.094	-0.917	0.072	-0.098	-0.861
2000	0.054	-0.098	-1.043	0.061	-0.105	-0.999
2001	0.049	-0.078	-0.953	0.057	-0.084	-0.912
2002	0.049	-0.051	-0.711	0.057	-0.054	-0.668
2003	0.047	-0.036	-0.561	0.056	-0.038	-0.524
2004	0.031	-0.028	-0.638	0.037	-0.030	-0.600
2005	0.025	-0.027	-0.723	0.030	-0.029	-0.673
Country	**FRANCE**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	1.292	0.165	0.137	1.159	0.048	0.042
1991	1.322	0.247	0.207	1.177	0.122	0.110
1992	1.671	0.564	0.412	1.472	0.408	0.325
1993	1.206	0.135	0.119	1.049	0.049	0.048
1994	1.250	0.180	0.155	1.173	0.092	0.081
1995	1.306	0.130	0.105	1.235	0.051	0.043
1996	1.291	0.066	0.053	1.234	0.007	0.006
1997	1.273	0.278	0.246	1.233	0.229	0.206
1998	1.565	0.294	0.208	1.528	0.232	0.165
1999	1.599	0.281	0.193	1.574	0.207	0.141
2000	1.734	0.428	0.283	1.685	0.325	0.214
2001	1.727	0.414	0.274	1.695	0.326	0.214
2002	1.830	0.472	0.298	1.787	0.389	0.245
2003	1.873	0.475	0.293	1.836	0.406	0.250
2004	1.949	0.462	0.271	1.917	0.406	0.238
2005	1.935	0.326	0.185	1.896	0.265	0.151
Country	**GERMANY**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	-	-	-	-	-	-
1991	1.877	0.685	0.454	2.058	0.826	0.513
1992	2.777	1.687	0.935	3.057	1.947	1.013
1993	1.464	0.654	0.592	1.624	0.819	0.703
1994	1.658	0.846	0.714	1.834	1.037	0.834
1995	1.795	0.873	0.666	1.955	1.056	0.777
1996	1.949	0.918	0.636	2.112	1.116	0.752
1997	1.988	0.998	0.697	2.147	1.191	0.808
1998	2.520	1.367	0.781	2.753	1.623	0.891
1999	2.530	1.372	0.782	2.767	1.645	0.903
2000	2.599	1.567	0.924	2.812	1.809	1.031
2001	2.736	1.647	0.921	2.980	1.923	1.036
2002	2.662	1.539	0.863	2.878	1.788	0.971
2003	2.763	1.595	0.861	2.989	1.849	0.964
2004	2.682	1.474	0.798	2.917	1.729	0.898
2005	2.788	1.620	0.870	3.021	1.870	0.965
Country	**MALAYSIA**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	0.041	-0.480	-2.545	0.046	-0.504	-2.479
1991	0.042	-0.434	-2.423	0.048	-0.465	-2.365
1992	0.078	-0.236	-1.394	0.090	-0.252	-1.335
1993	0.076	-0.233	-1.407	0.087	-0.245	-1.338
1994	0.064	-0.255	-1.608	0.071	-0.267	-1.564
1995	0.065	-0.333	-1.812	0.071	-0.349	-1.775
1996	0.067	-0.371	-1.875	0.072	-0.378	-1.836
1997	0.065	-0.345	-1.837	0.070	-0.349	-1.795
1998	0.082	-0.065	-0.585	0.091	-0.062	-0.520
1999	0.061	-0.178	-1.369	0.069	-0.179	-1.285
2000	0.052	-0.216	-1.639	0.058	-0.222	-1.570
2001	0.046	-0.208	-1.705	0.051	-0.213	-1.638
2002	0.049	-0.202	-1.640	0.054	-0.211	-1.585
2003	0.049	-0.223	-1.717	0.056	-0.229	-1.630
2004	0.062	-0.238	-1.570	0.071	-0.250	-1.506
2005	0.075	-0.304	-1.620	0.085	-0.314	-1.547

Vehicles Other Than Railway or Tramway Rolling-Stock, and Parts and Accessories Thereof
Source: Compiled from the UN (2008c; 2008d; 2008e; 2008f; 2008g)

Table: 5.22 Continued (Part C)

VRXAI, VRTAI, VRCAI: CATEGORY 87*						
Country	**SINGAPORE**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	0.092	-0.186	-1.104	0.096	-0.215	-1.178
1991	0.089	-0.136	-0.926	0.094	-0.160	-0.998
1992	0.127	-0.111	-0.627	0.132	-0.141	-0.726
1993	0.111	-0.146	-0.840	0.117	-0.179	-0.929
1994	0.092	-0.123	-0.850	0.096	-0.148	-0.934
1995	0.090	-0.131	-0.902	0.096	-0.147	-0.931
1996	0.090	-0.106	-0.779	0.097	-0.119	-0.802
1997	0.089	-0.090	-0.699	0.096	-0.100	-0.713
1998	0.083	-0.072	-0.628	0.090	-0.079	-0.630
1999	0.073	-0.089	-0.795	0.079	-0.092	-0.773
2000	0.071	-0.153	-1.155	0.076	-0.159	-1.127
2001	0.067	-0.149	-1.173	0.072	-0.148	-1.117
2002	0.073	-0.119	-0.968	0.078	-0.116	-0.912
2003	0.114	-0.122	-0.728	0.121	-0.113	-0.660
2004	0.127	-0.118	-0.658	0.133	-0.108	-0.594
2005	0.138	-0.123	-0.636	0.145	-0.112	-0.573
Country	**THAILAND**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	0.091	-0.778	-2.255	0.091	-0.819	-2.304
1991	0.099	-0.531	-1.849	0.101	-0.554	-1.865
1992	0.120	-0.581	-1.765	0.120	-0.583	-1.765
1993	0.162	-0.749	-1.729	0.161	-0.735	-1.715
1994	0.184	-0.708	-1.578	0.187	-0.670	-1.521
1995	0.132	-0.782	-1.933	0.132	-0.754	-1.901
1996	0.145	-0.685	-1.747	0.140	-0.659	-1.741
1997	0.198	-0.236	-0.783	0.198	-0.221	-0.751
1998	0.280	0.120	0.560	0.288	0.132	0.616
1999	0.396	0.057	0.155	0.404	0.073	0.199
2000	0.450	0.020	0.045	0.473	0.047	0.105
2001	0.520	0.092	0.195	0.552	0.120	0.245
2002	0.517	-	-	0.539	-	-
2003	0.607	0.084	0.149	0.647	0.122	0.210
2004	0.720	0.219	0.363	0.767	0.268	0.430
2005	0.975	0.491	0.701	1.046	0.560	0.768
Country	**UNITED KINGDOM**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	0.707	-0.502	-0.537	0.677	-0.568	-0.609
1991	0.744	-0.192	-0.230	0.719	-0.244	-0.292
1992	0.918	-0.088	-0.092	0.869	-0.161	-0.170
1993	0.644	-0.489	-0.565	0.615	-0.543	-0.633
1994	0.702	-0.518	-0.553	0.662	-0.555	-0.609
1995	0.822	-0.438	-0.428	0.768	-0.494	-0.497
1996	0.940	-0.384	-0.343	0.867	-0.449	-0.417
1997	0.929	-0.464	-0.405	0.847	-0.530	-0.486
1998	1.099	-0.527	-0.392	0.968	-0.616	-0.493
1999	1.111	-0.499	-0.371	0.958	-0.581	-0.474
2000	1.084	-0.381	-0.301	0.939	-0.455	-0.395
2001	0.908	-0.626	-0.524	0.786	-0.685	-0.627
2002	1.065	-0.533	-0.406	0.895	-0.624	-0.529
2003	1.136	-0.547	-0.393	0.929	-0.640	-0.524
2004	1.223	-0.454	-0.316	0.963	-0.598	-0.483
2005	1.245	-0.449	-0.308	0.992	-0.579	-0.460
Country	**UNITED STATES**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	0.774	-1.343	-1.006	0.692	-1.446	-1.128
1991	0.789	-1.259	-0.954	0.702	-1.376	-1.085
1992	1.104	-0.695	-0.488	0.982	-0.901	-0.651
1993	0.897	-0.999	-0.749	0.801	-1.222	-0.927
1994	0.947	-0.959	-0.700	0.839	-1.188	-0.882
1995	0.935	-0.880	-0.663	0.830	-1.100	-0.844
1996	0.915	-0.784	-0.619	0.809	-0.998	-0.804
1997	0.898	-0.770	-0.619	0.804	-0.972	-0.793
1998	1.036	-0.946	-0.649	0.926	-1.184	-0.824
1999	0.995	-1.159	-0.772	0.877	-1.422	-0.964
2000	0.999	-1.193	-0.786	0.887	-1.439	-0.964
2001	0.974	-1.195	-0.801	0.869	-1.437	-0.976
2002	1.066	-1.169	-0.741	0.932	-1.436	-0.932
2003	1.062	-0.971	-0.649	0.929	-1.217	-0.837
2004	1.081	-0.835	-0.572	0.940	-1.073	-0.761
2005	1.207	-0.768	-0.492	1.043	-1.038	-0.691

****Vehicles Other Than Railway or Tramway Rolling-Stock, and Parts and Accessories Thereof***
Source: Compiled from the UN (2008c; 2008d; 2008e; 2008f; 2008g)

5.4.3.5 SUMMARY - VOLLRATH REVEALED (EXPORT, TRADE AND COMPETITIVE) ADVANTAGE INDEX; HS-2

The overall summary of the Vollrath (1991) indices analyses in respect to the 4 selected categories based on HS-2 level of aggregation, shows that Australia RCD in all 4 categories, while specific findings about the VRXAI, VRTAI, VRCAI are as follows:

The VRXAI is positive which indicates RXA for Australia in all 4 categories. The VRXAI is improving for categories 30, 87, and deteriorating for categories 84 and 85, while these results are more pronounced as a proportion of the total trade than as a proportion in the total trade in goods.

The VRTAI for Australia is negative for all 4 categories and this index is improving overtime for categories 30, 84, 85 and is deteriorating for category 87, without major distinction between a proportion of the total trade and the proportion in the total goods trade.

The VRCAI is negative for Australia in all 4 categories, while this index is improving for categories 30, 87; deteriorating for category 84 and for category 85 it is deteriorating as a proportion of the total trade, while improving as a proportion of the total trade in the goods. In overall, the VRCAI is more distinct as a proportion of the total trade in goods.

Finally, one of the findings that is important to note is that categories 84 and 87 were VRTAI and VRCAI are moving in opposite direction. For category 84, the VRTAI is improving while at the same time the VRCAI is deteriorating, while for category 87 VRTAI is deteriorating while at the same time the VRCAI is improving.

Now that Vollrath (1991) indices have been analysed for all 4 selected goods categories, the selected 5 categories will be analysed based on HS-4 level of aggregation in the following sections:

5.4.4 REVEALED TRADE AND COMPETITIVE ADVANTAGE INDEX, HS-4

According to Vollrath (1991), when post-trade data are used on a higher level of aggregation for the calculation of RCA, it may induce some bias especially when trade goods consist of multiple sub-products. Vollrath (1991) further suggests that it is not unusual that a country can possess a RCD based on a higher level of aggregation, while at a lower level of aggregation for specific sub-categories possess a RCA.

This section analyses the 5 selected TD goods categories based on HS-4 level of aggregation, using Vollrath (1991) indices presented in Equations 5.8-5.15. Before comments are made in respect to Vollrath (1991) indices calculated, the tables in this section are structured as follows:

Tables 5.23-5.27 shows the VRXAI, VRTAI and VRCAI for the 5 selected TD categories based on HS-4 level of aggregation in respect to Australia and 8 selected TD countries, while each Table consists of 3 parts (Part A, B and C). Tables 5.23-5.27 are compiled from Appendix Tables; the VRXAI is obtained from Appendix Tables 5.34-5.38, the VRMAI used for calculating the VRTAI is obtained from Appendix Tables 5.39-5.43, the VRTAI is obtained from Appendix Tables 5.44-5.48 and the VRCAI is obtained from Appendix Tables 5.49-5.53. All these Appendix Tables 5.34-5.53 contains the VRXAI, VRMAI, VRTAI and VRCAI for Australia and 8 selected TD countries and has been reproduced in Tables 5.23-5.27

5.4.4.1 VOLLRATH REVEALED (EXPORT, TRADE AND COMPETITIVE) ADVANTAGE INDEX; CATEGORY: 3004

According to Table 5.23, the Australian VRXAI is positive, which shows that Australia possesses a RXA in category 3004 and this index is increasing overtime, while this increase is more pronounced as a proportion of the total trade in goods than as a proportion of the total trade. The VRTAI and VRCAI values are both negative for the entire period of the analysis, which shows a RCD in this category for Australia, however, they are improving overtime and this improvement is more pronounced once again as a proportion of the total trade in goods, than as a proportion of the total trade in goods and services combined.

The countries for which VRTAI and VRCAI indices are positive in the remainder of the 8 countries in Table 5.23, are France, Germany and The United Kingdom and this indicates a RCA in this category for these countries. The VRTAI and VRCAI for The United States of America are mixed; initially record RCA and more recently records RCD, while for Singapore in 2005 the VRTAI and VRCAI indices are positive for the first time. Countries with a negative VRTAI and VRCAI are China, Malaysia and Thailand, which shows a RCD for these countries in this category.

Table: 5.23 (Part A)

VRXAI, VRTAI, VRCAI: CATEGORY 3004*						
Country	**AUSTRALIA**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	0.567	-1.669	-1.372	0.565	-1.518	-1.305
1991	0.581	-1.413	-1.233	0.583	-1.297	-1.171
1992	0.665	-1.475	-1.169	0.671	-1.378	-1.116
1993	0.728	-1.105	-0.924	0.724	-1.062	-0.903
1994	0.848	-0.956	-0.755	0.819	-0.930	-0.759
1995	0.894	-0.864	-0.676	0.851	-0.843	-0.688
1996	0.941	-1.042	-0.745	0.895	-1.005	-0.753
1997	0.839	-1.048	-0.811	0.810	-1.004	-0.806
1998	0.934	-1.227	-0.839	0.903	-1.211	-0.851
1999	1.114	-1.038	-0.659	1.054	-1.066	-0.699
2000	1.367	-1.264	-0.655	1.303	-1.268	-0.680
2001	1.128	-1.085	-0.674	1.111	-1.069	-0.674
2002	0.811	-1.022	-0.815	0.792	-1.047	-0.842
2003	0.999	-0.766	-0.569	0.947	-0.825	-0.627
2004	1.056	-0.963	-0.648	1.008	-0.991	-0.685
2005	1.178	-0.974	-0.603	1.153	-0.984	-0.617

****Medicaments (Excluding Goods of 3002, 3005 or 3006) Consisting of Mixed or Unmixed Products for Therapeutic or Prophylactic Uses, Put Up in Measured Doses or in Forms or Packagings for Retail Sale***
Source: Compiled from the UN (2008c; 2008d; 2008e; 2008f; 2008g)

Table: 5.23 Continued (Part B)

VRXAI, VRTAI, VRCAI: CATEGORY 3004*						
Country	CHINA					
	Goods Only			Total Trade		
Year	VRXAI	VRTAI	VRCAI	VRXAI	VRTAI	VRCAI
1990	-	-	-	-	-	-
1991	-	-	-	-	-	-
1992	0.526	-0.378	-0.542	0.594	-0.420	-0.535
1993	0.471	-0.115	-0.219	0.526	-0.138	-0.233
1994	0.410	-0.195	-0.389	0.447	-0.212	-0.388
1995	0.384	-0.208	-0.434	0.418	-0.189	-0.373
1996	0.351	-0.166	-0.387	0.389	-0.168	-0.359
1997	0.285	-0.178	-0.484	0.317	-0.167	-0.424
1998	0.291	-0.180	-0.481	0.328	-0.175	-0.427
1999	0.237	-0.121	-0.411	0.266	-0.114	-0.356
2000	0.188	-0.095	-0.408	0.211	-0.093	-0.366
2001	0.138	-0.064	-0.382	0.156	-0.064	-0.342
2002	0.078	-0.038	-0.393	0.089	-0.038	-0.352
2003	0.058	-0.021	-0.309	0.068	-0.021	-0.273
2004	0.041	-0.023	-0.453	0.047	-0.024	-0.417
2005	0.037	-0.025	-0.526	0.043	-0.026	-0.478
Country	FRANCE					
	Goods Only			Total Trade		
Year	VRXAI	VRTAI	VRCAI	VRXAI	VRTAI	VRCAI
1990	2.002	0.894	0.592	1.819	0.724	0.507
1991	1.988	0.897	0.600	1.796	0.722	0.514
1992	1.885	0.751	0.508	1.693	0.597	0.435
1993	1.995	0.774	0.491	1.757	0.611	0.428
1994	1.908	0.796	0.540	1.804	0.681	0.474
1995	2.047	0.747	0.454	1.952	0.640	0.397
1996	2.023	0.693	0.419	1.946	0.610	0.376
1997	2.070	0.732	0.436	2.015	0.668	0.402
1998	2.446	0.788	0.389	2.406	0.714	0.352
1999	2.507	0.891	0.439	2.487	0.809	0.393
2000	2.740	1.119	0.525	2.688	0.999	0.465
2001	2.747	1.215	0.584	2.718	1.119	0.530
2002	2.561	1.258	0.676	2.526	1.181	0.631
2003	2.525	1.201	0.645	2.502	1.141	0.609
2004	2.455	1.080	0.580	2.442	1.037	0.553
2005	2.680	1.203	0.596	2.651	1.145	0.565
Country	GERMANY					
	Goods Only			Total Trade		
Year	VRXAI	VRTAI	VRCAI	VRXAI	VRTAI	VRCAI
1990	-	-	-	-	-	-
1991	1.375	0.355	0.299	1.514	0.459	0.361
1992	1.204	0.301	0.288	1.341	0.421	0.376
1993	1.340	0.504	0.472	1.484	0.657	0.585
1994	1.337	0.360	0.313	1.480	0.524	0.437
1995	1.314	0.386	0.348	1.436	0.531	0.462
1996	1.331	0.392	0.349	1.450	0.541	0.467
1997	1.479	0.594	0.513	1.608	0.750	0.628
1998	1.936	0.917	0.641	2.135	1.132	0.756
1999	1.843	0.861	0.630	2.035	1.079	0.755
2000	1.585	0.640	0.518	1.732	0.812	0.632
2001	1.794	0.818	0.609	1.976	1.026	0.732
2002	1.146	-0.332	-0.254	1.256	-0.181	-0.134
2003	1.258	0.008	0.007	1.380	0.157	0.121
2004	1.579	0.202	0.137	1.738	0.379	0.246
2005	1.768	0.233	0.142	1.939	0.424	0.247
Country	MALAYSIA					
	Goods Only			Total Trade		
Year	VRXAI	VRTAI	VRCAI	VRXAI	VRTAI	VRCAI
1990	0.108	-0.725	-2.047	0.119	-0.751	-1.989
1991	0.100	-0.575	-1.913	0.111	-0.606	-1.863
1992	0.091	-0.659	-2.111	0.103	-0.699	-2.051
1993	0.072	-0.405	-1.891	0.081	-0.423	-1.826
1994	0.075	-0.348	-1.729	0.082	-0.361	-1.689
1995	0.064	-0.295	-1.723	0.069	-0.305	-1.691
1996	0.064	-0.277	-1.680	0.067	-0.280	-1.648
1997	0.054	-0.292	-1.859	0.056	-0.293	-1.825
1998	0.058	-0.258	-1.689	0.064	-0.260	-1.624
1999	0.049	-0.278	-1.894	0.055	-0.281	-1.812
2000	0.046	-0.246	-1.850	0.050	-0.250	-1.785
2001	0.039	-0.263	-2.054	0.042	-0.266	-1.990
2002	0.033	-0.203	-1.980	0.036	-0.211	-1.928
2003	0.030	-0.202	-2.042	0.034	-0.207	-1.959
2004	0.031	-0.201	-2.015	0.035	-0.211	-1.955
2005	0.026	-0.224	-2.274	0.029	-0.232	-2.207

Medicaments (Excluding Goods of 3002, 3005 or 3006) Consisting of Mixed or Unmixed Products for Therapeutic or Prophylactic Uses, Put Up in Measured Doses or in Forms or Packagings for Retail Sale
Source: Compiled from the UN (2008c; 2008d; 2008e; 2008f; 2008g)

Table: 5.23 Continued (Part C)

VRXAI, VRTAI, VRCAI: CATEGORY 3004*						
Country	SINGAPORE					
	Goods Only			Total Trade		
Year	VRXAI	VRTAI	VRCAI	VRXAI	VRTAI	VRCAI
1990	0.313	-0.110	-0.302	0.318	-0.146	-0.379
1991	0.280	-0.080	-0.250	0.289	-0.111	-0.325
1992	0.259	-0.079	-0.265	0.265	-0.115	-0.361
1993	0.246	-0.042	-0.158	0.254	-0.072	-0.250
1994	0.243	-0.016	-0.064	0.249	-0.040	-0.149
1995	0.194	-0.030	-0.142	0.204	-0.038	-0.172
1996	0.164	-0.057	-0.299	0.173	-0.066	-0.323
1997	0.142	-0.067	-0.388	0.151	-0.075	-0.403
1998	0.147	-0.100	-0.521	0.156	-0.108	-0.524
1999	0.139	-0.128	-0.654	0.147	-0.130	-0.633
2000	0.147	-0.080	-0.437	0.156	-0.079	-0.412
2001	0.220	0.006	0.026	0.233	0.018	0.080
2002	0.118	-0.057	-0.396	0.124	-0.051	-0.342
2003	0.114	-0.037	-0.282	0.119	-0.029	-0.216
2004	0.112	-0.043	-0.325	0.115	-0.035	-0.265
2005	0.436	0.266	0.941	0.453	0.286	0.999
Country	THAILAND					
	Goods Only			Total Trade		
Year	VRXAI	VRTAI	VRCAI	VRXAI	VRTAI	VRCAI
1990	0.097	-0.450	-1.734	0.094	-0.475	-1.797
1991	0.094	-0.370	-1.593	0.095	-0.384	-1.620
1992	0.112	-0.350	-1.414	0.111	-0.350	-1.423
1993	0.114	-0.281	-1.239	0.112	-0.277	-1.243
1994	0.107	-0.291	-1.314	0.107	-0.277	-1.275
1995	0.097	-0.267	-1.322	0.096	-0.258	-1.307
1996	0.106	-0.297	-1.333	0.102	-0.287	-1.342
1997	0.101	-0.365	-1.533	0.099	-0.347	-1.506
1998	0.096	-0.325	-1.481	0.097	-0.306	-1.423
1999	0.094	-0.398	-1.653	0.095	-0.380	-1.608
2000	0.091	-0.335	-1.541	0.095	-0.324	-1.482
2001	0.075	-0.307	-1.633	0.079	-0.303	-1.582
2002	0.058	-	-	0.060	-	-
2003	0.055	-0.244	-1.695	0.058	-0.240	-1.634
2004	0.054	-0.213	-1.600	0.057	-0.207	-1.531
2005	0.057	-0.225	-1.597	0.061	-0.220	-1.525
Country	UNITED KINGDOM					
	Goods Only			Total Trade		
Year	VRXAI	VRTAI	VRCAI	VRXAI	VRTAI	VRCAI
1990	2.596	1.404	0.779	2.470	1.242	0.699
1991	2.676	1.337	0.692	2.569	1.197	0.627
1992	2.667	1.433	0.770	2.519	1.258	0.692
1993	2.733	1.601	0.881	2.587	1.428	0.803
1994	2.670	1.472	0.801	2.501	1.300	0.734
1995	2.975	1.741	0.880	2.770	1.529	0.803
1996	2.893	1.722	0.904	2.668	1.496	0.823
1997	2.718	1.540	0.836	2.478	1.303	0.747
1998	3.132	1.877	0.914	2.766	1.529	0.805
1999	3.063	1.598	0.737	2.652	1.233	0.625
2000	3.347	1.771	0.753	2.904	1.391	0.652
2001	3.156	1.456	0.618	2.722	1.074	0.502
2002	2.872	1.393	0.663	2.415	0.991	0.528
2003	3.389	1.807	0.762	2.772	1.275	0.616
2004	3.407	1.900	0.815	2.690	1.267	0.636
2005	3.053	1.641	0.771	2.442	1.116	0.610
Country	UNITED STATES					
	Goods Only			Total Trade		
Year	VRXAI	VRTAI	VRCAI	VRXAI	VRTAI	VRCAI
1990	0.446	0.090	0.227	0.400	0.035	0.091
1991	0.443	0.054	0.130	0.396	-0.006	-0.014
1992	0.439	0.051	0.123	0.395	-0.016	-0.040
1993	0.448	0.111	0.284	0.403	0.039	0.103
1994	0.454	0.127	0.328	0.405	0.054	0.144
1995	0.385	0.028	0.074	0.344	-0.039	-0.107
1996	0.423	0.003	0.007	0.377	-0.073	-0.177
1997	0.430	-0.082	-0.175	0.387	-0.161	-0.348
1998	0.595	-0.121	-0.186	0.535	-0.233	-0.362
1999	0.702	-0.012	-0.017	0.623	-0.147	-0.212
2000	0.841	0.148	0.193	0.751	0.009	0.012
2001	0.848	0.055	0.067	0.761	-0.091	-0.113
2002	0.735	-0.107	-0.136	0.649	-0.255	-0.331
2003	0.836	-0.132	-0.147	0.738	-0.295	-0.336
2004	0.895	-0.036	-0.040	0.785	-0.202	-0.229
2005	0.907	-0.074	-0.078	0.793	-0.249	-0.273

Medicaments (Excluding Goods of 3002, 3005 or 3006) Consisting of Mixed or Unmixed Products for Therapeutic or Prophylactic Uses, Put Up in Measured Doses or in Forms or Packagings for Retail Sale
Source: Compiled from the UN (2008c; 2008d; 2008e; 2008f; 2008g)

5.4.4.2 VOLLRATH REVEALED (EXPORT, TRADE AND COMPETITIVE) ADVANTAGE INDEX; CATEGORY: 8471

According to Table 5.24, the Australian VRXAI is positive, which shows that Australia possesses a RXA in category 8471 and this index is marginally increasing overtime, while this increase is more pronounced as a proportion of the total trade in goods. The VRTAI and VRCAI values are both negative for the entire period of the analysis which shows a RCD in this category for Australia, while these values are marginally improving overtime. Furthermore, these improvements is more pronounced as a proportion of the total trade in goods than as a proportion of the total trade in the goods and services combined.

The countries with a positive VRTAI and VRCAI and consequently records a RCA in this category, are Malaysia, Singapore and Thailand, while the countries with a negative VRTAI and VRCAI are China, France, Germany and The United States of America that shows a RCD in this category for these countries.

Table: 5.24 (Part A)

VRXAI, VRTAI, VRCAI: CATEGORY 8471*						
Country	**AUSTRALIA**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	0.171	-1.604	-2.338	0.171	-1.475	-2.263
1991	0.189	-1.371	-2.111	0.190	-1.276	-2.043
1992	0.198	-1.349	-2.058	0.200	-1.277	-1.999
1993	0.187	-1.231	-2.027	0.187	-1.193	-2.000
1994	0.232	-1.235	-1.843	0.225	-1.194	-1.840
1995	0.195	-1.342	-2.065	0.187	-1.290	-2.069
1996	0.169	-1.301	-2.162	0.162	-1.244	-2.162
1997	0.129	-1.311	-2.413	0.125	-1.255	-2.401
1998	0.165	-1.407	-2.254	0.160	-1.375	-2.259
1999	0.127	-1.398	-2.483	0.121	-1.379	-2.516
2000	0.098	-1.560	-2.831	0.094	-1.524	-2.848
2001	0.122	-1.350	-2.489	0.121	-1.330	-2.484
2002	0.186	-1.308	-2.085	0.182	-1.317	-2.108
2003	0.227	-1.208	-1.842	0.217	-1.225	-1.895
2004	0.194	-1.372	-2.089	0.186	-1.366	-2.122
2005	0.208	-1.464	-2.084	0.205	-1.457	-2.094

****Automatic Data Processing Machines and Units Thereof; Magnetic or Optical Readers, Machines for Transcribing Data onto Data Media in Coded Form and Machines for Processing Such Data, Not Elsewhere Specified or Included***
Source: Compiled from the UN (2008c; 2008d; 2008e; 2008f; 2008g)

Table: 5.24 Continued (Part B)

VRXAI, VRTAI, VRCAI: CATEGORY 8471*						
Country	**CHINA**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	-	-	-	-	-	-
1991	-	-	-	-	-	-
1992	1.475	0.303	0.230	1.663	0.347	0.234
1993	0.963	0.151	0.171	1.077	0.154	0.155
1994	0.862	-0.057	-0.064	0.941	-0.061	-0.063
1995	0.844	-0.180	-0.194	0.921	-0.129	-0.131
1996	0.912	-0.312	-0.294	1.012	-0.307	-0.265
1997	0.761	-0.596	-0.578	0.848	-0.569	-0.513
1998	0.985	-0.545	-0.441	1.109	-0.518	-0.383
1999	0.966	-0.303	-0.273	1.085	-0.261	-0.216
2000	0.786	-0.288	-0.312	0.884	-0.271	-0.268
2001	0.833	-0.233	-0.247	0.944	-0.216	-0.206
2002	0.930	-0.027	-0.028	1.063	0.015	0.014
2003	0.644	-0.036	-0.054	0.747	-0.014	-0.018
2004	0.483	-0.044	-0.087	0.562	-0.028	-0.049
2005	0.504	-0.042	-0.081	0.588	-0.020	-0.033
Country	**FRANCE**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	0.641	-0.599	-0.659	0.585	-0.640	-0.740
1991	0.713	-0.443	-0.483	0.645	-0.490	-0.565
1992	0.937	-0.228	-0.218	0.843	-0.281	-0.288
1993	0.670	-0.394	-0.462	0.593	-0.405	-0.521
1994	0.670	-0.324	-0.395	0.636	-0.369	-0.458
1995	0.781	-0.168	-0.194	0.746	-0.211	-0.249
1996	0.810	-0.127	-0.145	0.782	-0.161	-0.187
1997	0.769	-0.175	-0.205	0.752	-0.201	-0.237
1998	0.944	-0.247	-0.233	0.932	-0.285	-0.267
1999	0.808	-0.242	-0.263	0.805	-0.287	-0.305
2000	0.782	-0.255	-0.282	0.771	-0.311	-0.339
2001	0.692	-0.305	-0.365	0.689	-0.353	-0.413
2002	0.619	-0.391	-0.490	0.615	-0.429	-0.529
2003	0.518	-0.461	-0.636	0.517	-0.489	-0.666
2004	0.506	-0.556	-0.742	0.508	-0.580	-0.762
2005	0.465	-0.628	-0.854	0.464	-0.651	-0.877
Country	**GERMANY**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	-	-	-	-	-	-
1991	0.631	-0.531	-0.611	0.697	-0.506	-0.545
1992	0.708	-0.448	-0.490	0.790	-0.387	-0.399
1993	0.529	-0.512	-0.677	0.589	-0.441	-0.559
1994	0.518	-0.482	-0.658	0.576	-0.402	-0.530
1995	0.534	-0.432	-0.592	0.586	-0.355	-0.474
1996	0.473	-0.437	-0.655	0.517	-0.363	-0.532
1997	0.480	-0.412	-0.619	0.524	-0.339	-0.499
1998	0.641	-0.608	-0.667	0.709	-0.516	-0.546
1999	0.592	-0.647	-0.738	0.657	-0.547	-0.606
2000	0.669	-0.509	-0.566	0.734	-0.413	-0.446
2001	0.625	-0.649	-0.712	0.691	-0.546	-0.582
2002	0.651	-0.588	-0.644	0.715	-0.490	-0.522
2003	0.703	-0.425	-0.473	0.773	-0.331	-0.357
2004	0.862	-0.311	-0.308	0.951	-0.207	-0.197
2005	0.714	-0.437	-0.477	0.786	-0.352	-0.370
Country	**MALAYSIA**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	0.145	-0.185	-0.823	0.161	-0.185	-0.766
1991	0.232	-0.074	-0.277	0.261	-0.067	-0.228
1992	0.528	0.254	0.655	0.600	0.306	0.712
1993	0.490	0.231	0.637	0.554	0.279	0.700
1994	0.856	0.596	1.189	0.932	0.658	1.226
1995	1.156	0.889	1.463	1.245	0.964	1.491
1996	1.792	1.403	1.528	1.873	1.476	1.553
1997	2.442	2.017	1.748	2.528	2.098	1.770
1998	2.892	2.359	1.691	3.139	2.592	1.746
1999	2.949	2.423	1.723	3.262	2.720	1.796
2000	2.892	2.509	2.022	3.162	2.766	2.077
2001	3.665	2.872	1.531	3.955	3.144	1.584
2002	3.804	3.118	1.713	4.143	3.427	1.755
2003	3.495	2.931	1.824	3.914	3.328	1.899
2004	4.241	3.403	1.621	4.710	3.825	1.672
2005	4.720	3.629	1.465	5.204	4.069	1.523

Automatic Data Processing Machines and Units Thereof; Magnetic or Optical Readers, Machines for Transcribing Data onto Data Media in Coded Form and Machines for Processing Such Data, Not Elsewhere Specified or Included
Source: Compiled from the UN (2008c; 2008d; 2008e; 2008f; 2008g)

Table: 5.24 Continued (Part C)

VRXAI, VRTAI, VRCAI: CATEGORY 8471*						
Country	**SINGAPORE**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	6.704	5.361	1.608	6.644	5.171	1.506
1991	6.418	5.107	1.588	6.463	5.006	1.490
1992	10.061	8.796	2.073	9.994	8.566	1.945
1993	7.325	5.805	1.573	7.332	5.612	1.450
1994	7.133	5.289	1.353	7.082	5.030	1.239
1995	6.765	5.342	1.559	6.922	5.386	1.506
1996	7.235	5.568	1.468	7.419	5.623	1.419
1997	6.535	4.889	1.379	6.776	5.003	1.341
1998	8.217	6.442	1.532	8.518	6.626	1.504
1999	7.050	5.498	1.513	7.291	5.682	1.511
2000	5.630	4.050	1.271	5.857	4.229	1.280
2001	5.414	3.774	1.194	5.610	3.977	1.234
2002	5.280	3.932	1.365	5.460	4.120	1.405
2003	4.542	3.161	1.191	4.640	3.302	1.244
2004	3.616	2.348	1.048	3.678	2.452	1.099
2005	3.037	1.798	0.897	3.121	1.914	0.950
Country	**THAILAND**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	0.728	0.437	0.916	0.712	0.408	0.850
1991	0.911	0.584	1.027	0.914	0.576	0.996
1992	1.125	0.731	1.049	1.109	0.715	1.035
1993	1.241	0.886	1.251	1.213	0.862	1.240
1994	2.096	1.690	1.642	2.083	1.691	1.671
1995	2.159	1.789	1.764	2.109	1.748	1.766
1996	2.483	2.127	1.943	2.341	1.997	1.917
1997	1.668	1.353	1.665	1.627	1.324	1.681
1998	1.468	1.202	1.707	1.483	1.227	1.758
1999	1.354	1.057	1.517	1.361	1.074	1.554
2000	1.200	0.821	1.153	1.248	0.875	1.208
2001	1.163	0.505	0.570	1.222	0.563	0.617
2002	1.878	-	-	1.930	-	-
2003	2.439	1.468	0.921	2.561	1.596	0.976
2004	2.356	1.677	1.244	2.478	1.806	1.305
2005	3.414	2.685	1.545	3.616	2.891	1.606
Country	**UNITED KINGDOM**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	1.905	0.356	0.207	1.807	0.213	0.125
1991	1.799	0.215	0.127	1.723	0.104	0.062
1992	2.194	0.642	0.346	2.066	0.485	0.268
1993	1.664	-0.022	-0.013	1.572	-0.146	-0.089
1994	1.756	0.224	0.137	1.640	0.111	0.070
1995	1.899	0.358	0.209	1.762	0.218	0.132
1996	1.699	0.357	0.236	1.563	0.224	0.154
1997	1.684	0.312	0.205	1.530	0.167	0.115
1998	2.125	0.442	0.233	1.868	0.217	0.124
1999	2.094	0.452	0.243	1.805	0.222	0.131
2000	2.007	0.278	0.149	1.736	0.083	0.049
2001	1.871	0.303	0.177	1.614	0.098	0.063
2002	1.480	0.016	0.011	1.250	-0.156	-0.118
2003	1.336	-0.166	-0.117	1.103	-0.317	-0.252
2004	1.165	-0.369	-0.275	0.931	-0.515	-0.440
2005	1.088	-0.362	-0.287	0.879	-0.481	-0.437
Country	**UNITED STATES**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	2.053	0.498	0.278	1.826	0.234	0.137
1991	1.953	0.177	0.095	1.729	-0.094	-0.053
1992	2.575	0.593	0.262	2.291	0.204	0.093
1993	1.596	-0.270	-0.156	1.423	-0.579	-0.341
1994	1.639	-0.211	-0.121	1.451	-0.526	-0.309
1995	1.545	-0.306	-0.180	1.371	-0.604	-0.365
1996	1.487	-0.356	-0.215	1.314	-0.651	-0.402
1997	1.352	-0.472	-0.300	1.209	-0.736	-0.476
1998	1.548	-0.430	-0.245	1.385	-0.730	-0.423
1999	1.505	-0.321	-0.194	1.328	-0.635	-0.391
2000	1.596	-0.172	-0.102	1.418	-0.471	-0.287
2001	1.543	-0.076	-0.048	1.378	-0.359	-0.232
2002	1.360	-0.467	-0.295	1.195	-0.757	-0.491
2003	1.261	-0.553	-0.363	1.109	-0.819	-0.553
2004	1.239	-0.588	-0.389	1.084	-0.847	-0.577
2005	1.235	-0.630	-0.412	1.076	-0.899	-0.607

Automatic Data Processing Machines and Units Thereof; Magnetic or Optical Readers, Machines for Transcribing Data onto Data Media in Coded Form and Machines for Processing Such Data, Not Elsewhere Specified or Included
Source: Compiled from the UN (2008c; 2008d; 2008e; 2008f; 2008g)

5.4.4.3 VOLLRATH REVEALED (EXPORT, TRADE AND COMPETITIVE) ADVANTAGE INDEX; CATEGORY: 8473

According to Table 5.25, the Australian VRXAI is positive, which shows that Australia possesses a RXA in category 8473, however, this index is deteriorating which shows deterioration of the RXA overtime for Australia in this category. The VRTAI and VRCAI values are both negative for the entire period of the analysis, which shows a RCD in this category for Australia. The VRTAI is improving and VRCAI is deteriorating overtime, while both of these movements are more pronounced as a proportion of the total trade in goods, than as a proportion of the total trade in the goods and services combined.

For the remaining 8 countries in Table 5.25, the values for VRTAI and VRCAI are mixed. China, France and Germany alongside with Australia has a negative value, which shows a RCD in this category for these countries. Malaysia and The United States of America holds in overall a RCA in this category, while Singapore, Thailand and The United Kingdom index values are mixed, which interchangeably shows a RCA and RCD in this category for these countries.

Table: 5.25 (Part A)

VRXAI, VRTAI, VRCAI: CATEGORY 8473*						
Country	**AUSTRALIA**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	0.562	-1.132	-1.103	0.560	-1.016	-1.034
1991	0.639	-1.196	-1.054	0.641	-1.085	-0.991
1992	0.824	-0.934	-0.758	0.832	-0.850	-0.704
1993	0.744	-0.943	-0.819	0.741	-0.902	-0.796
1994	0.888	-0.680	-0.569	0.858	-0.662	-0.572
1995	0.967	-0.373	-0.327	0.920	-0.371	-0.339
1996	0.918	-0.336	-0.312	0.873	-0.330	-0.321
1997	0.705	-0.407	-0.455	0.681	-0.389	-0.451
1998	0.710	-0.479	-0.516	0.687	-0.478	-0.528
1999	0.619	-0.378	-0.476	0.587	-0.398	-0.517
2000	0.444	-0.571	-0.827	0.425	-0.571	-0.852
2001	0.480	-0.546	-0.759	0.474	-0.540	-0.760
2002	0.441	-0.561	-0.820	0.432	-0.577	-0.849
2003	0.349	-0.558	-0.955	0.332	-0.582	-1.013
2004	0.259	-0.582	-1.178	0.248	-0.589	-1.215
2005	0.178	-0.619	-1.501	0.175	-0.620	-1.516

***Parts and Accessories (Other Than Covers, Carrying Cases and the Like) Suitable for Use Solely or Principally with Office Machines**
Source: Compiled from the UN (2008c; 2008d; 2008e; 2008f; 2008g)

Table: 5.25 Continued (Part B)

VRXAI, VRTAI, VRCAI: CATEGORY 8473*						
Country	**CHINA**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	-	-	-	-	-	-
1991	-	-	-	-	-	-
1992	3.976	1.655	0.538	4.464	1.867	0.542
1993	3.162	1.404	0.587	3.515	1.526	0.569
1994	2.550	0.528	0.232	2.768	0.574	0.232
1995	2.888	0.448	0.169	3.132	0.646	0.231
1996	2.410	0.444	0.204	2.661	0.549	0.231
1997	2.189	-0.039	-0.017	2.424	0.106	0.045
1998	2.649	-0.037	-0.014	2.968	0.123	0.042
1999	2.292	-0.048	-0.021	2.564	0.091	0.036
2000	2.121	-0.463	-0.197	2.375	-0.390	-0.152
2001	2.316	-0.285	-0.116	2.615	-0.201	-0.074
2002	2.168	-0.321	-0.138	2.469	-0.245	-0.094
2003	2.328	-0.033	-0.014	2.687	0.061	0.023
2004	2.257	0.117	0.053	2.610	0.226	0.091
2005	2.411	-0.020	-0.008	2.802	0.112	0.041
Country	**FRANCE**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	0.815	-0.126	-0.144	0.742	-0.189	-0.227
1991	0.759	-0.177	-0.210	0.688	-0.234	-0.293
1992	0.769	-0.122	-0.148	0.692	-0.169	-0.219
1993	0.543	-0.283	-0.419	0.481	-0.296	-0.480
1994	0.506	-0.343	-0.517	0.481	-0.378	-0.580
1995	0.444	-0.412	-0.656	0.425	-0.440	-0.710
1996	0.464	-0.378	-0.596	0.449	-0.399	-0.637
1997	0.443	-0.369	-0.606	0.433	-0.386	-0.637
1998	0.502	-0.433	-0.623	0.496	-0.460	-0.657
1999	0.487	-0.394	-0.593	0.486	-0.431	-0.636
2000	0.480	-0.396	-0.601	0.474	-0.441	-0.657
2001	0.425	-0.487	-0.763	0.424	-0.530	-0.811
2002	0.362	-0.413	-0.762	0.360	-0.442	-0.801
2003	0.302	-0.419	-0.871	0.301	-0.441	-0.901
2004	0.285	-0.399	-0.875	0.286	-0.414	-0.896
2005	0.262	-0.360	-0.865	0.261	-0.375	-0.889
Country	**GERMANY**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	-	-	-	-	-	-
1991	0.470	-0.403	-0.619	0.519	-0.385	-0.555
1992	0.508	-0.308	-0.474	0.567	-0.266	-0.385
1993	0.354	-0.441	-0.809	0.393	-0.394	-0.694
1994	0.363	-0.436	-0.789	0.403	-0.379	-0.663
1995	0.387	-0.366	-0.666	0.424	-0.310	-0.549
1996	0.373	-0.381	-0.704	0.407	-0.323	-0.584
1997	0.321	-0.388	-0.791	0.351	-0.337	-0.673
1998	0.407	-0.470	-0.768	0.450	-0.413	-0.651
1999	0.431	-0.545	-0.818	0.478	-0.473	-0.688
2000	0.460	-0.452	-0.684	0.504	-0.384	-0.566
2001	0.474	-0.570	-0.790	0.524	-0.491	-0.662
2002	0.437	-0.634	-0.897	0.480	-0.563	-0.776
2003	0.403	-0.643	-0.954	0.443	-0.582	-0.838
2004	0.551	-0.492	-0.638	0.608	-0.422	-0.527
2005	0.568	-0.425	-0.558	0.625	-0.357	-0.452
Country	**MALAYSIA**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	1.387	0.154	0.117	1.534	0.246	0.175
1991	2.347	0.805	0.420	2.620	0.981	0.469
1992	3.794	2.154	0.838	4.287	2.535	0.895
1993	3.527	2.137	0.932	3.948	2.484	0.992
1994	3.753	2.355	0.988	4.051	2.593	1.022
1995	3.793	2.309	0.939	4.053	2.509	0.965
1996	3.584	1.559	0.571	3.729	1.681	0.599
1997	3.641	1.352	0.464	3.765	1.471	0.495
1998	5.495	3.063	0.815	5.939	3.463	0.875
1999	7.676	5.667	1.340	8.412	6.361	1.412
2000	7.575	5.409	1.252	8.195	5.974	1.306
2001	5.647	3.550	0.991	6.076	3.941	1.046
2002	6.378	3.459	0.782	6.916	3.892	0.827
2003	4.889	1.266	0.300	5.466	1.744	0.384
2004	4.057	0.309	0.079	4.518	0.595	0.141
2005	3.936	-0.030	-0.008	4.358	0.265	0.063

***Parts and Accessories (Other Than Covers, Carrying Cases and the Like) Suitable for Use Solely or Principally with Office Machines**
Source: Compiled from the UN (2008c; 2008d; 2008e; 2008f; 2008g)

Table: 5.25 Continued (Part C)

VRXAI, VRTAI, VRCAI: CATEGORY 8473*						
Country	SINGAPORE					
	Goods Only			Total Trade		
Year	VRXAI	VRTAI	VRCAI	VRXAI	VRTAI	VRCAI
1990	2.713	-0.524	-0.177	2.741	-1.362	-0.403
1991	2.564	-0.438	-0.158	2.629	-1.208	-0.378
1992	3.331	0.163	0.050	3.393	-0.690	-0.185
1993	3.247	0.333	0.108	3.327	-0.443	-0.125
1994	4.679	2.040	0.573	4.726	1.354	0.337
1995	3.993	0.718	0.198	4.148	0.003	0.001
1996	3.964	0.654	0.180	4.141	-0.052	-0.012
1997	4.013	0.610	0.165	4.230	-0.075	-0.018
1998	5.285	1.201	0.258	5.572	0.358	0.066
1999	4.582	0.507	0.117	4.808	-0.392	-0.078
2000	3.770	0.114	0.031	3.960	-0.637	-0.149
2001	4.190	0.222	0.055	4.379	-0.667	-0.142
2002	4.034	-0.338	-0.081	4.203	-1.367	-0.282
2003	3.965	-0.567	-0.134	4.075	-1.674	-0.344
2004	4.308	0.028	0.006	4.390	-1.010	-0.207
2005	4.869	0.174	0.036	4.992	-0.892	-0.164
Country	THAILAND					
	Goods Only			Total Trade		
Year	VRXAI	VRTAI	VRCAI	VRXAI	VRTAI	VRCAI
1990	3.719	1.538	0.534	3.602	1.339	0.465
1991	3.177	1.157	0.453	3.163	1.088	0.421
1992	4.082	1.899	0.626	3.992	1.826	0.611
1993	2.533	0.638	0.290	2.465	0.608	0.283
1994	1.990	-0.024	-0.012	1.983	0.055	0.028
1995	2.295	0.565	0.282	2.246	0.574	0.295
1996	3.130	1.283	0.527	2.956	1.186	0.513
1997	4.088	1.796	0.579	3.952	1.780	0.598
1998	7.253	4.595	1.004	7.188	4.670	1.049
1999	6.136	3.688	0.919	6.058	3.718	0.951
2000	4.942	2.220	0.596	5.071	2.423	0.650
2001	5.272	2.664	0.704	5.458	2.871	0.747
2002	3.813	-	-	3.894	-	-
2003	2.730	0.631	0.263	2.869	0.792	0.323
2004	2.374	0.152	0.066	2.501	0.317	0.136
2005	1.785	-0.391	-0.198	1.904	-0.253	-0.125
Country	UNITED KINGDOM					
	Goods Only			Total Trade		
Year	VRXAI	VRTAI	VRCAI	VRXAI	VRTAI	VRCAI
1990	1.392	-0.533	-0.324	1.326	-0.655	-0.401
1991	1.453	-0.379	-0.232	1.396	-0.478	-0.294
1992	1.560	-0.264	-0.156	1.475	-0.383	-0.231
1993	1.161	-0.214	-0.169	1.102	-0.304	-0.243
1994	1.239	-0.140	-0.107	1.163	-0.218	-0.172
1995	1.256	0.010	0.008	1.172	-0.080	-0.066
1996	1.196	-0.079	-0.064	1.106	-0.168	-0.141
1997	1.101	-0.155	-0.132	1.007	-0.244	-0.217
1998	1.249	-0.451	-0.308	1.107	-0.564	-0.411
1999	1.212	-0.528	-0.361	1.054	-0.626	-0.466
2000	1.129	-0.675	-0.469	0.984	-0.743	-0.563
2001	1.126	-0.198	-0.162	0.978	-0.305	-0.271
2002	1.262	0.075	0.061	1.070	-0.075	-0.067
2003	1.028	-0.123	-0.113	0.852	-0.239	-0.248
2004	1.027	-0.055	-0.052	0.823	-0.200	-0.218
2005	1.193	0.066	0.057	0.965	-0.095	-0.094
Country	UNITED STATES					
	Goods Only			Total Trade		
Year	VRXAI	VRTAI	VRCAI	VRXAI	VRTAI	VRCAI
1990	2.345	0.986	0.545	2.091	0.697	0.405
1991	2.172	0.737	0.415	1.927	0.450	0.266
1992	2.430	1.004	0.533	2.169	0.663	0.365
1993	1.693	0.190	0.119	1.513	-0.102	-0.065
1994	1.631	-0.063	-0.038	1.448	-0.366	-0.225
1995	1.780	-0.021	-0.012	1.582	-0.343	-0.196
1996	1.830	0.255	0.150	1.619	-0.063	-0.038
1997	1.777	0.313	0.194	1.590	0.025	0.016
1998	1.909	0.127	0.069	1.709	-0.199	-0.110
1999	1.658	0.001	0.000	1.465	-0.319	-0.197
2000	1.632	0.238	0.158	1.452	-0.040	-0.027
2001	1.518	0.356	0.267	1.358	0.109	0.083
2002	1.345	0.173	0.138	1.183	-0.073	-0.060
2003	1.522	0.420	0.323	1.339	0.163	0.130
2004	1.451	0.250	0.189	1.270	-0.002	-0.001
2005	1.435	0.292	0.228	1.251	0.038	0.031

Parts and Accessories (Other Than Covers, Carrying Cases and the Like) Suitable for Use Solely or Principally with Office Machines
Source: Compiled from the UN (2008c; 2008d; 2008e; 2008f; 2008g)

5.4.4.4 VOLLRATH REVEALED (EXPORT, TRADE AND COMPETITIVE) ADVANTAGE INDEX; CATEGORY: 8517

Table 5.26 show that the Australian VRXAI value is positive, which indicates that Australia has a RXA in category 8517; however, this value is decreasing overtime for both as a proportion of the total trade in goods and as a proportion of the total trade in the goods and services combined. The VRTAI and VRCAI values are both negative for the entire period of the analysis, which shows a RCD in this category for Australia, while the RCD is deteriorating overtime and this deterioration is more pronounced as a proportion of the total trade than as a proportion of the total trade in goods.

The remaining 8 countries in Table 5.26, shows mixed values for VRTAI and VRCAI; the most distinct country with a RCD in this category next to Australia is China, while the rest of the countries shows interchangeably both RCA and RCD in this category embodied by a positive and negative value of VRTAI and VRCAI overtime.

Table: 5.26 (Part A)

VRXAI, VRTAI, VRCAI: CATEGORY 8517*						
Country	**AUSTRALIA**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	0.306	-0.988	-1.443	0.305	-0.900	-1.374
1991	0.299	-0.992	-1.464	0.300	-0.917	-1.401
1992	0.431	-0.768	-1.023	0.436	-0.714	-0.970
1993	0.283	-0.844	-1.382	0.283	-0.817	-1.358
1994	0.405	-0.704	-1.007	0.392	-0.683	-1.009
1995	0.365	-0.987	-1.309	0.349	-0.953	-1.317
1996	0.317	-0.956	-1.390	0.303	-0.918	-1.394
1997	0.386	-0.700	-1.034	0.374	-0.671	-1.028
1998	0.378	-0.782	-1.120	0.367	-0.770	-1.131
1999	0.363	-1.258	-1.497	0.345	-1.250	-1.532
2000	0.395	-1.344	-1.482	0.379	-1.319	-1.500
2001	0.337	-1.055	-1.418	0.334	-1.040	-1.414
2002	0.195	-1.016	-1.828	0.191	-1.027	-1.852
2003	0.234	-0.987	-1.653	0.223	-1.005	-1.708
2004	0.208	-1.041	-1.792	0.200	-1.040	-1.825
2005	0.168	-1.019	-1.954	0.166	-1.017	-1.965

Electrical Apparatus for Line Telephony or Line Telegraphy, Including Line Telephone Sets with Cordless Handsets and Telecommunication Apparatus for Carrier-Current Line Systems or for Digital Line Systems; Videophones
Source: Compiled from the UN (2008c; 2008d; 2008e; 2008f; 2008g)

Table: 5.26 Continued (Part B)

VRXAI, VRTAI, VRCAI: CATEGORY 8517*						
Country	**CHINA**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	-	-	-	-	-	-
1991	-	-	-	-	-	-
1992	4.640	0.775	0.183	5.202	0.894	0.189
1993	3.927	0.299	0.079	4.353	0.267	0.063
1994	3.282	-0.521	-0.147	3.550	-0.550	-0.144
1995	3.189	-1.283	-0.338	3.452	-1.063	-0.268
1996	2.733	-0.948	-0.298	3.014	-0.918	-0.266
1997	2.141	-2.029	-0.667	2.371	-1.930	-0.596
1998	2.416	-1.666	-0.524	2.709	-1.593	-0.463
1999	2.151	-0.712	-0.286	2.406	-0.609	-0.226
2000	1.862	-0.662	-0.304	2.086	-0.612	-0.257
2001	1.752	-0.624	-0.305	1.981	-0.590	-0.261
2002	1.883	-0.609	-0.280	2.146	-0.568	-0.235
2003	1.777	-0.182	-0.097	2.054	-0.127	-0.060
2004	1.549	-0.077	-0.049	1.794	-0.019	-0.010
2005	1.336	-0.289	-0.196	1.558	-0.244	-0.146
Country	**FRANCE**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	0.784	0.058	0.076	0.714	-0.005	-0.007
1991	0.727	0.043	0.061	0.658	-0.015	-0.023
1992	0.832	0.234	0.331	0.749	0.170	0.258
1993	0.577	0.044	0.078	0.510	0.008	0.016
1994	0.567	0.060	0.112	0.538	0.025	0.047
1995	0.650	0.121	0.206	0.623	0.086	0.150
1996	0.709	0.127	0.197	0.684	0.098	0.154
1997	0.798	0.108	0.146	0.779	0.083	0.112
1998	1.160	0.336	0.342	1.143	0.300	0.305
1999	1.134	0.329	0.343	1.128	0.290	0.297
2000	1.274	0.483	0.476	1.252	0.425	0.415
2001	1.011	0.200	0.220	1.005	0.156	0.169
2002	0.967	0.245	0.292	0.960	0.212	0.250
2003	0.854	0.164	0.213	0.851	0.140	0.180
2004	0.799	0.103	0.138	0.800	0.086	0.114
2005	0.708	-0.061	-0.083	0.706	-0.080	-0.108
Country	**GERMANY**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	-	-	-	-	-	-
1991	0.639	-0.161	-0.225	0.705	-0.124	-0.161
1992	0.828	0.110	0.143	0.923	0.190	0.231
1993	0.577	-0.095	-0.152	0.641	-0.024	-0.037
1994	0.623	-0.065	-0.099	0.691	0.018	0.026
1995	0.639	0.024	0.038	0.700	0.099	0.153
1996	0.699	0.127	0.201	0.764	0.209	0.320
1997	0.738	0.177	0.274	0.804	0.260	0.391
1998	0.787	0.080	0.107	0.870	0.174	0.223
1999	0.859	0.147	0.188	0.952	0.257	0.315
2000	0.809	0.119	0.159	0.887	0.213	0.275
2001	0.915	0.015	0.016	1.012	0.134	0.143
2002	0.885	-0.021	-0.023	0.972	0.089	0.096
2003	0.786	-0.001	-0.002	0.865	0.092	0.112
2004	0.876	-0.069	-0.076	0.966	0.033	0.035
2005	0.808	-0.152	-0.172	0.890	-0.060	-0.066
Country	**MALAYSIA**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	2.531	-0.293	-0.110	2.793	-0.144	-0.050
1991	2.591	-1.020	-0.332	2.890	-0.925	-0.278
1992	3.073	0.392	0.136	3.475	0.622	0.197
1993	2.205	-0.322	-0.136	2.474	-0.176	-0.069
1994	2.396	0.075	0.032	2.593	0.182	0.073
1995	2.248	0.111	0.050	2.411	0.192	0.083
1996	2.170	0.423	0.217	2.266	0.498	0.248
1997	2.031	0.501	0.283	2.110	0.571	0.316
1998	2.277	0.769	0.412	2.478	0.938	0.476
1999	1.931	0.620	0.387	2.144	0.802	0.468
2000	2.049	0.662	0.390	2.247	0.821	0.455
2001	2.393	0.875	0.455	2.594	1.047	0.517
2002	2.004	0.267	0.143	2.196	0.391	0.196
2003	1.940	0.423	0.246	2.181	0.613	0.330
2004	1.901	0.526	0.324	2.126	0.677	0.384
2005	1.814	0.550	0.361	2.017	0.703	0.428

Electrical Apparatus for Line Telephony or Line Telegraphy, Including Line Telephone Sets with Cordless Handsets and Telecommunication Apparatus for Carrier-Current Line Systems or for Digital Line Systems; Videophones
Source: Compiled from the UN (2008c; 2008d; 2008e; 2008f; 2008g)

Table: 5.26 Continued (Part C)

VRXAI, VRTAI, VRCAI: CATEGORY 8517*						
Country	**SINGAPORE**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	2.726	-0.164	-0.058	2.752	-0.406	-0.138
1991	2.494	-0.394	-0.147	2.556	-0.640	-0.223
1992	3.107	0.638	0.230	3.165	0.385	0.130
1993	2.373	0.003	0.001	2.435	-0.240	-0.094
1994	2.745	0.442	0.175	2.784	0.225	0.084
1995	2.250	0.151	0.070	2.347	0.087	0.038
1996	1.834	0.110	0.062	1.926	0.070	0.037
1997	1.598	0.012	0.008	1.696	-0.013	-0.008
1998	1.682	0.121	0.075	1.790	0.123	0.071
1999	1.527	0.125	0.086	1.617	0.163	0.106
2000	1.247	0.109	0.092	1.321	0.145	0.116
2001	1.222	-0.097	-0.076	1.289	-0.027	-0.020
2002	1.409	-0.024	-0.017	1.480	0.056	0.038
2003	2.005	0.045	0.023	2.070	0.178	0.090
2004	2.162	0.012	0.006	2.213	0.146	0.068
2005	1.963	-0.055	-0.028	2.025	0.067	0.034
Country	**THAILAND**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	1.343	-0.478	-0.304	1.310	-0.581	-0.367
1991	1.416	-0.153	-0.103	1.418	-0.197	-0.130
1992	1.743	0.162	0.098	1.716	0.145	0.088
1993	1.117	-0.324	-0.254	1.093	-0.321	-0.257
1994	1.136	-0.469	-0.345	1.135	-0.402	-0.303
1995	1.135	-0.163	-0.134	1.116	-0.140	-0.118
1996	1.160	0.024	0.021	1.105	0.013	0.011
1997	0.981	-0.308	-0.273	0.962	-0.266	-0.244
1998	1.139	0.150	0.141	1.152	0.208	0.199
1999	1.101	0.136	0.132	1.109	0.179	0.176
2000	1.026	0.093	0.095	1.069	0.153	0.155
2001	1.013	-0.533	-0.422	1.064	-0.474	-0.368
2002	1.198	-	-	1.235	-	-
2003	1.367	-0.037	-0.027	1.442	0.049	0.035
2004	1.075	0.011	0.010	1.137	0.087	0.080
2005	0.843	-0.205	-0.218	0.902	-0.140	-0.144
Country	**UNITED KINGDOM**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	1.001	-0.083	-0.080	0.954	-0.164	-0.158
1991	0.959	-0.104	-0.103	0.923	-0.166	-0.166
1992	1.192	0.245	0.230	1.129	0.161	0.154
1993	0.840	-0.002	-0.002	0.798	-0.064	-0.077
1994	0.986	0.006	0.006	0.927	-0.056	-0.059
1995	1.272	0.130	0.108	1.187	0.038	0.033
1996	1.353	0.062	0.047	1.249	-0.040	-0.031
1997	1.427	0.123	0.090	1.302	0.003	0.003
1998	2.122	0.689	0.393	1.869	0.459	0.282
1999	1.922	0.444	0.263	1.661	0.232	0.150
2000	1.993	0.419	0.236	1.722	0.216	0.134
2001	2.233	0.988	0.584	1.919	0.712	0.464
2002	2.408	1.251	0.733	2.017	0.902	0.593
2003	1.675	0.438	0.303	1.378	0.207	0.163
2004	1.107	-0.192	-0.160	0.884	-0.342	-0.327
2005	2.166	0.822	0.477	1.730	0.468	0.315
Country	**UNITED STATES**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	1.367	-0.384	-0.248	1.222	-0.572	-0.384
1991	1.282	-0.407	-0.276	1.141	-0.596	-0.420
1992	1.743	0.359	0.231	1.558	0.097	0.064
1993	1.221	0.090	0.076	1.093	-0.125	-0.108
1994	1.238	0.148	0.127	1.100	-0.069	-0.061
1995	1.313	0.285	0.244	1.169	0.067	0.059
1996	1.277	0.384	0.358	1.132	0.175	0.168
1997	1.277	0.480	0.472	1.144	0.290	0.292
1998	1.498	0.465	0.372	1.342	0.233	0.191
1999	1.409	0.304	0.243	1.244	0.052	0.043
2000	1.253	-0.003	-0.003	1.116	-0.230	-0.188
2001	1.247	0.083	0.068	1.116	-0.137	-0.115
2002	1.134	-0.186	-0.152	0.998	-0.417	-0.349
2003	1.077	-0.248	-0.208	0.948	-0.464	-0.398
2004	1.040	-0.273	-0.233	0.911	-0.479	-0.422
2005	0.951	-0.465	-0.398	0.830	-0.672	-0.593

Electrical Apparatus for Line Telephony or Line Telegraphy, Including Line Telephone Sets with Cordless Handsets and Telecommunication Apparatus for Carrier-Current Line Systems or for Digital Line Systems; Videophones
Source: Compiled from the UN (2008c; 2008d; 2008e; 2008f; 2008g)

5.4.4.5 VOLLRATH REVEALED (EXPORT, TRADE AND COMPETITIVE) ADVANTAGE INDEX; CATEGORY: 8703

According to Table 5.27, the Australian VRXAI is positive, which shows that Australia possesses a RXA in category 8703, while this index is increasing overtime. This increase is more pronounced as a proportion of the total trade in goods than as a proportion of the total trade in goods and services combined. The VRTAI and VRCAI values are both negative for the entire period of the analysis, which show a RCD in this category for Australia. The VRTAI is deteriorating, while the VRCAI is improving overtime and both indices movements are more pronounced as a proportion of total trade in goods than as a proportion of the total trade in the goods and services combined.

The remainder of the 8 countries in Table 5.27, countries for which the VRTAI and VRCAI indices are positive are Germany and France which shows a RCA in this category for these countries, however, France has recorded a few periods of negative values. The countries with a negative VRTAI and VRCAI are China, Malaysia, Singapore, The United Kingdom and The United States of America that shows a RCD for these countries in this category. Finally, since 2001 Thailand has recorded a RCA in this category with positive values of both the VRTAI and VRCAI.

Table: 5.27 (Part A)

VRXAI, VRTAI, VRCAI: CATEGORY 8703*						
Country	**AUSTRALIA**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	0.150	-0.701	-1.734	0.151	-0.643	-1.659
1991	0.143	-0.712	-1.788	0.145	-0.662	-1.719
1992	0.185	-0.792	-1.663	0.188	-0.749	-1.604
1993	0.165	-0.864	-1.830	0.166	-0.838	-1.799
1994	0.138	-0.937	-2.054	0.134	-0.907	-2.048
1995	0.144	-1.015	-2.088	0.138	-0.977	-2.090
1996	0.221	-0.898	-1.622	0.212	-0.860	-1.621
1997	0.238	-1.043	-1.683	0.232	-0.997	-1.669
1998	0.278	-1.245	-1.700	0.271	-1.215	-1.702
1999	0.386	-1.067	-1.326	0.368	-1.061	-1.357
2000	0.465	-1.239	-1.299	0.446	-1.214	-1.315
2001	0.530	-1.094	-1.120	0.524	-1.071	-1.112
2002	0.496	-1.124	-1.183	0.487	-1.134	-1.203
2003	0.524	-1.293	-1.244	0.499	-1.317	-1.292
2004	0.511	-1.291	-1.260	0.490	-1.287	-1.288
2005	0.522	-1.515	-1.361	0.514	-1.500	-1.366

Motor Cars and Other Motor Vehicles Principally Designed for the Transport of Persons (Other Than Public Transport Type), Including Station Wagons and Racing Cars
Source: Compiled from the UN (2008c; 2008d; 2008e; 2008f; 2008g)

Table: 5.27 Continued (Part B)

VRXAI, VRTAI, VRCAI: CATEGORY 8703*						
Country	**CHINA**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	-	-	-	-	-	-
1991	-	-	-	-	-	-
1992	0.247	-0.357	-0.895	0.280	-0.402	-0.890
1993	0.433	-0.370	-0.618	0.487	-0.427	-0.630
1994	0.190	-0.408	-1.147	0.209	-0.445	-1.143
1995	0.045	-0.440	-2.370	0.050	-0.450	-2.306
1996	0.039	-0.293	-2.139	0.044	-0.317	-2.110
1997	0.052	-0.402	-2.166	0.058	-0.419	-2.102
1998	0.059	-0.249	-1.658	0.067	-0.264	-1.603
1999	0.039	-0.070	-1.021	0.045	-0.073	-0.966
2000	0.041	-0.092	-1.168	0.047	-0.098	-1.125
2001	0.052	-0.084	-0.967	0.059	-0.090	-0.926
2002	0.059	-0.052	-0.625	0.069	-0.054	-0.583
2003	0.067	-0.039	-0.460	0.078	-0.041	-0.423
2004	0.043	-0.030	-0.524	0.050	-0.032	-0.486
2005	0.034	-0.030	-0.627	0.040	-0.031	-0.578
Country	**FRANCE**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	1.235	0.104	0.088	1.117	0.000	0.000
1991	1.228	0.200	0.178	1.103	0.093	0.088
1992	1.638	0.490	0.355	1.459	0.353	0.277
1993	1.151	-0.019	-0.017	1.010	-0.085	-0.081
1994	1.156	0.052	0.046	1.091	-0.024	-0.022
1995	1.139	0.002	0.002	1.085	-0.062	-0.055
1996	1.154	-0.108	-0.089	1.110	-0.156	-0.132
1997	1.237	0.298	0.275	1.203	0.255	0.239
1998	1.481	0.280	0.210	1.454	0.228	0.170
1999	1.444	0.169	0.125	1.431	0.107	0.078
2000	1.555	0.255	0.179	1.523	0.168	0.117
2001	1.661	0.436	0.304	1.641	0.362	0.249
2002	1.826	0.570	0.374	1.796	0.500	0.326
2003	1.900	0.608	0.386	1.876	0.549	0.346
2004	1.998	0.638	0.385	1.980	0.592	0.355
2005	1.982	0.500	0.291	1.955	0.447	0.260
Country	**GERMANY**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	-	-	-	-	-	-
1991	1.932	0.682	0.435	2.123	0.830	0.496
1992	3.232	2.098	1.048	3.570	2.416	1.129
1993	1.947	0.995	0.715	2.150	1.208	0.825
1994	2.205	1.287	0.876	2.430	1.532	0.995
1995	2.265	1.219	0.773	2.463	1.446	0.885
1996	2.420	1.302	0.772	2.621	1.542	0.887
1997	2.497	1.422	0.843	2.697	1.658	0.954
1998	3.110	1.901	0.945	3.402	2.217	1.054
1999	3.146	1.931	0.951	3.446	2.266	1.072
2000	3.256	2.205	1.130	3.528	2.505	1.238
2001	3.364	2.243	1.099	3.672	2.583	1.216
2002	3.265	2.133	1.060	3.538	2.438	1.168
2003	3.376	2.183	1.040	3.663	2.496	1.144
2004	3.140	1.899	0.928	3.426	2.203	1.030
2005	3.352	2.202	1.070	3.644	2.508	1.166
Country	**MALAYSIA**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	0.047	-0.534	-2.522	0.052	-0.558	-2.460
1991	0.044	-0.473	-2.469	0.049	-0.504	-2.415
1992	0.075	-0.243	-1.444	0.086	-0.258	-1.386
1993	0.058	-0.265	-1.711	0.066	-0.278	-1.644
1994	0.039	-0.322	-2.232	0.042	-0.337	-2.189
1995	0.045	-0.417	-2.320	0.049	-0.435	-2.285
1996	0.047	-0.412	-2.279	0.050	-0.419	-2.243
1997	0.049	-0.359	-2.127	0.051	-0.363	-2.089
1998	0.055	-0.115	-1.134	0.060	-0.115	-1.069
1999	0.034	-0.261	-2.156	0.038	-0.267	-2.072
2000	0.021	-0.280	-2.679	0.023	-0.289	-2.612
2001	0.012	-0.256	-3.143	0.013	-0.263	-3.077
2002	0.019	-0.235	-2.613	0.021	-0.246	-2.559
2003	0.010	-0.242	-3.254	0.011	-0.252	-3.169
2004	0.016	-0.245	-2.798	0.018	-0.259	-2.736
2005	0.017	-0.274	-2.818	0.020	-0.285	-2.748

Motor Cars and Other Motor Vehicles Principally Designed for the Transport of Persons (Other Than Public Transport Type), Including Station Wagons and Racing Cars
Source: Compiled from the UN (2008c; 2008d; 2008e; 2008f; 2008g)

Table: 5.27 Continued (Part C)

VRXAI, VRTAI, VRCAI: CATEGORY 8703*						
Country	**SINGAPORE**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	0.015	-0.111	-2.145	0.015	-0.124	-2.221
1991	0.013	-0.098	-2.148	0.013	-0.111	-2.222
1992	0.035	-0.099	-1.329	0.037	-0.116	-1.427
1993	0.034	-0.130	-1.580	0.035	-0.152	-1.671
1994	0.021	-0.110	-1.845	0.021	-0.125	-1.930
1995	0.031	-0.102	-1.445	0.033	-0.112	-1.474
1996	0.024	-0.088	-1.529	0.026	-0.096	-1.552
1997	0.025	-0.070	-1.321	0.027	-0.077	-1.335
1998	0.020	-0.068	-1.477	0.022	-0.073	-1.479
1999	0.011	-0.093	-2.281	0.011	-0.097	-2.260
2000	0.010	-0.157	-2.788	0.011	-0.163	-2.762
2001	0.011	-0.154	-2.671	0.012	-0.155	-2.616
2002	0.013	-0.124	-2.379	0.013	-0.124	-2.324
2003	0.027	-0.154	-1.913	0.028	-0.149	-1.846
2004	0.032	-0.152	-1.753	0.033	-0.147	-1.691
2005	0.035	-0.167	-1.762	0.036	-0.162	-1.701
Country	**THAILAND**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	0.025	-0.229	-2.336	0.024	-0.242	-2.397
1991	0.043	-0.211	-1.782	0.043	-0.221	-1.807
1992	0.013	-0.455	-3.597	0.013	-0.457	-3.603
1993	0.014	-0.671	-3.870	0.014	-0.662	-3.865
1994	0.006	-0.594	-4.579	0.006	-0.574	-4.532
1995	0.006	-0.480	-4.463	0.006	-0.468	-4.443
1996	0.004	-0.340	-4.500	0.004	-0.330	-4.505
1997	0.023	-0.164	-2.083	0.023	-0.158	-2.055
1998	0.028	-0.044	-0.934	0.029	-0.040	-0.876
1999	0.045	-0.164	-1.541	0.046	-0.158	-1.495
2000	0.072	-0.040	-0.445	0.075	-0.035	-0.386
2001	0.225	0.152	1.132	0.238	0.165	1.180
2002	0.160	-	-	0.166	-	-
2003	0.202	0.083	0.529	0.215	0.096	0.588
2004	0.252	0.157	0.974	0.268	0.173	1.042
2005	0.460	0.383	1.784	0.494	0.416	1.852
Country	**UNITED KINGDOM**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	0.581	-0.662	-0.760	0.556	-0.724	-0.833
1991	0.715	-0.208	-0.256	0.690	-0.258	-0.318
1992	0.945	-0.089	-0.090	0.895	-0.162	-0.166
1993	0.626	-0.523	-0.607	0.597	-0.578	-0.677
1994	0.723	-0.509	-0.533	0.681	-0.551	-0.593
1995	0.927	-0.329	-0.304	0.866	-0.395	-0.376
1996	1.047	-0.280	-0.237	0.966	-0.356	-0.314
1997	1.031	-0.549	-0.427	0.941	-0.625	-0.510
1998	1.202	-0.590	-0.399	1.062	-0.691	-0.501
1999	1.287	-0.459	-0.305	1.113	-0.565	-0.411
2000	1.170	-0.362	-0.269	1.016	-0.447	-0.365
2001	0.943	-0.770	-0.597	0.818	-0.831	-0.701
2002	1.203	-0.562	-0.383	1.015	-0.672	-0.508
2003	1.310	-0.527	-0.338	1.076	-0.648	-0.471
2004	1.466	-0.359	-0.219	1.161	-0.549	-0.387
2005	1.555	-0.287	-0.170	1.244	-0.474	-0.323
Country	**UNITED STATES**					
	Goods Only			**Total Trade**		
Year	**VRXAI**	**VRTAI**	**VRCAI**	**VRXAI**	**VRTAI**	**VRCAI**
1990	0.481	-1.924	-1.609	0.433	-2.010	-1.730
1991	0.504	-1.837	-1.536	0.451	-1.935	-1.666
1992	0.780	-1.229	-0.946	0.700	-1.409	-1.103
1993	0.549	-1.594	-1.363	0.494	-1.796	-1.534
1994	0.589	-1.723	-1.367	0.527	-1.934	-1.542
1995	0.564	-1.707	-1.394	0.504	-1.910	-1.566
1996	0.530	-1.602	-1.391	0.473	-1.794	-1.567
1997	0.461	-1.646	-1.520	0.416	-1.824	-1.684
1998	0.509	-2.051	-1.616	0.459	-2.265	-1.780
1999	0.494	-2.233	-1.708	0.440	-2.473	-1.890
2000	0.478	-2.432	-1.806	0.429	-2.661	-1.975
2001	0.518	-2.251	-1.676	0.467	-2.482	-1.843
2002	0.611	-2.236	-1.538	0.541	-2.481	-1.721
2003	0.641	-1.877	-1.369	0.566	-2.096	-1.548
2004	0.656	-1.667	-1.265	0.576	-1.867	-1.444
2005	0.814	-1.503	-1.046	0.711	-1.735	-1.236

Motor Cars and Other Motor Vehicles Principally Designed for the Transport of Persons (Other Than Public Transport Type), Including Station Wagons and Racing Cars
Source: Compiled from the UN (2008c; 2008d; 2008e; 2008f; 2008g)

5.4.4.6 SUMMARY - VOLLRATH REVEALED (EXPORT, TRADE AND COMPETITIVE) ADVANTAGE INDEX; HS-4

The overall summary of the Vollrath (1991) indices analyses in respect to the 5 selected categories based on HS-4 level of aggregation, Australia shows a RCD in all 5 categories and the specific comments about Vollrath (1991) indices calculated are as follows:

A VRXAI is positive for Australia in all 5 categories, which indicate a RXA for Australia in these categories. The VRXAI is improving for categories 3004, 8471, 8703 and deteriorating for categories 8473 and 8517. These results are more pronounced as a proportion of the total trade in goods than as a proportion in the total trade in the goods and services combined. However, when VRXAI is improving, it is more pronounced as a proportion in the total trade in the goods and services combined than as a proportion in the total goods trade.

The VRTAI for Australia is negative for all 5 categories and this index is improving overtime for categories 3004, 8471, 8473 and is deteriorating for categories 8517 and 8703. These results are more pronounced as a proportion of the total trade in goods than as a proportion in the total trade in the goods and services combined.

The VRCAI is negative for Australia in all 5 categories, while this index is improving for categories 3004, 8471, 8703 and deteriorating for categories 8473 and 8517. These results are more pronounced as a proportion of the total trade in the goods than as a proportion of the total trade in the goods and services combined.

Finally, one of the findings that may be of interest is that based on HS-2 and HS-4 level of aggregation for categories 84, 87 and 8473, 8703 the VRTAI and VRCAI are moving in opposite directions. For category, 84 and 8473, the VRTAI is improving while at the same time the VRCAI is deteriorating, while for category 87 and 8703, the VRTAI is deteriorating while at the same time the VRCAI is improving overtime. By observing a number of studies which include Chuankamnerdkarn (1997), Havrila & Gunawardana (2003), Havrila (2004) and Gunawardana & Khorchurklang (2007) this occurrence is found only in the study by Gunawardana & Khorchurklang (2007), however, this has not been reported.

Vollrath (1991) has suggested that the indices are sensitive for small volumes of the X and M, however, it has been established in chapter 4, that the Australian X and M account for a significant volumes in these categories, which is further supported with the analysis of the world's Top X and M countries in this chapter. Further investigation is required to answer this question; however, such an investigation is beyond the scope of this research.

5.4.5 TRADE INDICES

The trade indices used in this section is to evaluate the trade performance in the selected TD categories between Australia and the RoW. For this purpose 4 indices in this section were selected which includes the TSI, XPI, MPI and XMR. All these indices are calculated according to the quarterly time series data for the period 1990 and 2006, and all data are obtained from the TDI and the ABS, while indices are presented in Tables 5.28-5.29. Table 5.28 shows the indices calculated for 4 selected goods categories based on HS-2 and 1 selected service category based on the Australian and New Zealand Standard Industrial Classification - Main Divisional Level of Aggregation (ANZSIC-1). While Table 5.29 shows the indices calculated for 5 selected goods categories based on HS-4 and 1 service category based on the Australian and New Zealand Standard Industrial Classification - First Sub-divisional Level of Aggregation (ANZSIC-2). The following sections comment individually for each of these selected indices:

5.4.5.1 TRADE SPECIALIZATION INDEX

Balassa (1965) first introduced the TSI, presumably because of criticism of the non-inclusion of the M levels in the BRCAI and this augmented formula for calculating CA is presented in TSI in Equation 5.16

$$TSI_{ij}^{\ t} = \left(X_{ij}^{\ t} - M_{ij}^{\ t}\right) / \left(X_{ij}^{\ t} + M_{ij}^{\ t}\right) \qquad (5.16)$$

where: 'X' is Export, 'M' is Import, 'i' is the industry for the category i 'j' is a country j and 't' is a time period.

TSI is a ratio between NX[97] over the total trade, while this index takes values between – 1 and + 1. The positive value of TSI shows that a country j specializes in the production of the products in the industry i and as a result, possesses a RCA in that category. In contrast, when this index is a negative the country is net importer of the products in the industry i and as a result possesses a RCD in that category. The data

[97] Where NX = X - M

used for calculating the TSI are obtained from the TDI for the goods and the ABS for the services categories.

By referring to Table 5.28, the TSI is negative for all 5 categories which shows that Australia has a RCD in all these categories; consequently, Australia is a net importer of all these categories[98]. According to the TSI, the RCD for categories 30, 84 and 87 is improving overtime, while the RCD for categories 85 and 1 is deteriorating. According to Table 5.29 were 6 selected categories are analysed at a lower level of aggregation, it shows once again the RCD in all categories. For categories, 3004, 8471, 8473 and 8703, the RCD is improving, while for categories 8517 and 1.2, the RCD is deteriorating overtime.

5.4.5.2 EXPORT PROPENSITY INDEX

The XPI is designed to measure the proportion of the X in respect to the domestic production in observed industries, and the formula for calculating this index is presented in Equation 5.17

$$XPI_{ij}^{\,t} = \left(X_{ij}^{\,t} / Q_{ij}^{\,t}\right) \times 100 \tag{5.17}$$

where: $'X'$ is Export, $'Q'$ is the domestic output in the industry i, $'i'$ is the industry for the category i, $'j'$ is a country j and $'t'$ is a time period.

Calculation of the XPI has been a challenging task because the specific data for the selected categories are not available. Due to this limitation, proxies have been used for the domestic outputs in the selected categories. The X data are obtained from the TDI for goods and the ABS for services categories, while proxies for domestic output in the selected categories are obtained from the ABS (2008c) *'Gross Value Added by Industry Catalogue'* for the broad industry groups. The domestic output for categories 30, 87, 3004 and 8703 used is „*Total Manufacturing*' value added, while for categories 84, 85, 8471, 8473 and 8517 „*Manufacturing; Machinery and Equipment*' value added and for categories 1 and 1.2 „*Transport and Storage*' value added has been used. Assigning the most appropriate value added for categories 30, 87, 3004 and 8703 has been challenging. Initially, the proxy for the domestic output for these categories was taken according to „*Other Manufacturing*', however, the results were implausible and in support of this remark, they are presented in Table 5.28, Part B

[98] This finding is consistent with the expected outcome, given that the categories selected for analysis in this research are in fact the Australian TD categories only.

under 30* and 87*. The XPI for these two categories shows especially at periods that are more recent that a proportion of the total X for these categories is unusually larger than a domestic value added, with index greater than 100. Due to this, value added for categories 30, 87, 3004 and 8703 used is „*Total Manufacturing*', which generated results that are more plausible and further comments are made according to the value added in „*Total Manufacturing*' only, for these categories.

Table 5.28 shows that the XPI is increasing overtime[99] for all 5 categories based on HS-2 and ANZSIC-1 level of aggregation. The most noticeable increase of the export in observed category as a proportion of the domestic output in that category is for category 84, from 12.3 to 53.2 percent, while the rest of the categories recorded an increase over the same period between 1.68 percent for category 1, and 9.54 percent for category 85. By observing the selected categories based on HS-4 and ANZSIC-2 in Table 5.29, all categories recorded increase overtime in XPI, except for the service category 1.2, which have recorded a decrease from 2.36 to 1.64 percent. The most noticeable increase of XPI is for category 3004, recording 5.2 percent in 2006 compared to 0.2 percent in 1990, followed by category 8703, 8471, 8473 and the category with the lowest increase is category 8517, with 0.35 percent increase over this period.

5.4.5.3 IMPORT PENETRATION INDEX

The MPI is designed to measure the proportion of M from the RoW as a proportion of domestic consumption in the observed category, and the formula of this index is:

$$MPI_{ij}^{t} = \left(M_{ij}^{t} / \left(Q_{ij}^{t} - X_{ij}^{t} + M_{ij}^{t}\right)\right) \times 100 \qquad (5.18)$$

where: 'M' is Import, 'X' is Export, 'Q' is the domestic output in the industry i, 'i' is the industry for the category i, 'j' is a country j, 't' is a time period, while domestic consumption is defined as a domestic output minus $X+M$ in the category i.

The main inherent disadvantage of Equation 5.18 is when both the X and M are increasing overtime, which leads to an unreliable M competition estimate (Cleveland, 1985). Athukorala & Hazari (1988) have addressed this by expressing the MPI as a proportion of the M in respect to domestic production in a given industry. This

[99] Overtime refer to the period between 1990:1 and 2006:4

augmented formula for MPI is presented in Equation 5.19 and is used for calculating the MPI between Australia and the RoW in the selected categories.

$$MPI_{ij}^{t} = \left(M_{ij}^{t} / Q_{ij}^{t}\right) \times 100 \tag{5.19}$$

The M data are obtained from the TDI for the goods and from the ABS for the services categories, while proxies for domestic output in the selected categories are obtained from the ABS according to the same principles explained in previous section for the calculation of the XPI.

According to Table 5.28, the MPI has increased overtime for all 5 selected categories, which show the evidence of an increase international competition faced the Australian producers in the selected categories. The highest increase in the MPI is for category 84 in absolute percentage terms, while in a relative percentage terms, the highest increase is for category 30. By observing Table 5.29, all selected categories once again have recorded an increase in MPI; the highest absolute increase in international competition is for the category 8471, while the highest increase in relative terms is for category 3004.

5.4.5.4 EXPORT/ IMPORT RATIO

The XMR ratio is used for calculating the proportion of the X in respect to M levels in the observed industry. The earliest usage of this index presented in Equation 5.20 in the current literature dates back to 1960, where Verdoorn (1960) has employed this index for the examination of the international changing trade patterns.

$$XMR_{ij}^{t} = \left(X_{ij}^{t} / M_{ij}^{t}\right) \times 100 \tag{5.20}$$

where: 'X' is Export, 'M' is Import, 'i' is the industry for the category i, 'j' is a country j and 't' is a time period.

The data used for calculating the XMR are obtained from the TDI for the goods and the ABS for the services categories and the calculated XMR indices are presented in Tables 5.28-5.29.

According to Table 5.28, 3 categories - 30, 84 and 87 have recorded an increase of XMR overtime, while categories 1 and 85 have recorded a decrease in the XMR for the same period, which shows a decrease in proportion of the X relative to M levels in these categories overtime. Table 5.29 shows an increase in the XMR overtime for categories 3004, 8471, 8473 and 8703, while for categories 8517 and 1.2, the XMR has recorded a decrease. The highest absolute increase in XMR is for category 3004, while the highest relative increase overtime in XMR is for category 8703.

5.4.5.5 TRADE INDICES TABLES

The Trade indices analysed in the previous sections are compiled together in this section according to Equations 5.16-5.20 and these trade indices are presented in Tables 5.28 and 5.29. Table 5.28 shows indices for 4 goods and 1 service category based on HS-2 and ANZSIC-1 level of aggregation, while Table 5.29 shows the trade indices for 5 selected goods and 1 service categories based on HS-4 and ANZSIC-2 level of aggregation.

Table 5.28 is compiled together from Appendix Tables; where the TSI is obtained from Appendix Tables 5.64-5.65, the XPI is obtained from Appendix Tables 5.66-5.67, the MPI is obtained from Appendix Tables 5.68-5.69 and the XMR is obtained from Appendix Tables 5.70-5.71. While the indices in Table 5.29 are compiled from the following Appendix Tables; the TSI is obtained from Appendix Tables 5.72-5.73, the XPI is obtained from Appendix Tables 5.74-5.75, the MPI is obtained from Appendix Tables 5.76-5.77 and the XMR is obtained from Appendix Tables 5.78-5.79

Table: 5.28 (Part A)

TRADE INDICES HS-2, ANZSIC-1												
Unit: %	CATEGORY: 30				CATEGORY: 84				CATEGORY: 85			
	TSI	XPI	MPI	XMR	TSI	XPI	MPI	XMR	TSI	XPI	MPI	XMR
Mar-90	-0.52	0.29	0.93	31.55	-0.74	12.33	83.66	14.74	-0.79	4.76	40.02	11.90
Jun-90	-0.49	0.31	0.89	34.16	-0.65	15.23	70.68	21.55	-0.75	5.34	37.92	14.09
Sep-90	-0.50	0.32	0.95	33.63	-0.62	15.74	67.47	23.32	-0.69	6.91	37.02	18.66
Dec-90	-0.54	0.31	1.03	30.00	-0.57	18.97	68.30	27.77	-0.67	7.74	38.62	20.05
Mar-91	-0.52	0.33	1.04	31.58	-0.59	18.75	73.12	25.64	-0.70	6.78	38.33	17.69
Jun-91	-0.48	0.34	0.98	34.87	-0.54	19.87	66.36	29.94	-0.63	8.14	35.62	22.85
Sep-91	-0.41	0.41	0.96	42.17	-0.55	19.27	65.87	29.26	-0.66	8.35	41.05	20.35
Dec-91	-0.35	0.42	0.86	48.61	-0.49	22.59	65.66	34.41	-0.61	10.69	44.44	24.05
Mar-92	-0.46	0.45	1.22	37.28	-0.53	20.96	68.57	30.57	-0.69	8.41	45.71	18.41
Jun-92	-0.38	0.54	1.18	45.19	-0.50	23.58	70.07	33.65	-0.64	9.89	44.44	22.26
Sep-92	-0.42	0.52	1.27	40.60	-0.49	24.09	69.70	34.55	-0.67	9.44	47.28	19.96
Dec-92	-0.40	0.52	1.21	42.68	-0.52	25.73	81.49	31.57	-0.52	15.20	48.08	31.62
Mar-93	-0.44	0.55	1.42	39.06	-0.51	23.66	73.88	32.02	-0.65	10.15	47.17	21.52
Jun-93	-0.41	0.61	1.46	41.51	-0.46	27.23	74.47	36.56	-0.54	15.02	50.11	29.97
Sep-93	-0.34	0.68	1.38	49.59	-0.46	28.70	77.52	37.02	-0.62	12.16	51.59	23.57
Dec-93	-0.27	0.69	1.20	57.33	-0.40	30.77	71.38	43.11	-0.59	13.14	51.29	25.62
Mar-94	-0.34	0.71	1.46	48.88	-0.45	27.13	72.38	37.49	-0.60	11.93	47.93	24.89
Jun-94	-0.34	0.77	1.56	49.31	-0.46	27.12	72.68	37.32	-0.40	20.96	48.80	42.96
Sep-94	-0.32	0.76	1.47	51.50	-0.47	28.89	80.42	35.93	-0.60	13.50	54.01	24.99
Dec-94	-0.30	0.75	1.38	54.24	-0.44	32.14	81.88	39.26	-0.62	14.16	60.50	23.40
Mar-95	-0.32	0.85	1.63	51.88	-0.49	30.90	90.10	34.29	-0.57	16.45	60.94	26.99
Jun-95	-0.27	0.98	1.71	57.72	-0.45	35.96	93.99	38.25	-0.61	15.15	62.25	24.34
Sep-95	-0.28	0.95	1.69	56.29	-0.40	37.29	87.97	42.39	-0.57	17.88	66.16	27.03
Dec-95	-0.27	0.95	1.64	57.58	-0.36	38.42	81.03	47.42	-0.58	17.65	65.46	26.96
Mar-96	-0.28	1.02	1.81	56.13	-0.41	37.37	90.12	41.47	-0.61	15.59	65.33	23.86
Jun-96	-0.30	1.09	2.03	53.59	-0.42	36.32	89.98	40.36	-0.55	16.85	58.13	28.99
Sep-96	-0.29	1.09	2.00	54.64	-0.41	35.74	84.47	42.31	-0.58	15.27	57.30	26.65
Dec-96	-0.33	1.02	2.02	50.60	-0.40	40.11	94.08	42.63	-0.57	17.18	62.99	27.27
Mar-97	-0.34	1.06	2.14	49.71	-0.43	35.37	88.42	40.00	-0.58	13.93	52.06	26.76
Jun-97	-0.32	1.24	2.41	51.37	-0.40	39.18	92.24	42.48	-0.56	17.11	60.39	28.33
Sep-97	-0.33	1.26	2.48	50.79	-0.38	39.88	89.79	44.41	-0.51	19.42	59.38	32.70
Dec-97	-0.37	1.15	2.49	46.35	-0.38	40.14	89.99	44.61	-0.52	19.36	61.25	31.60
Mar-98	-0.37	1.19	2.56	46.44	-0.45	33.85	89.66	37.75	-0.57	15.33	56.73	27.03
Jun-98	-0.44	1.20	3.07	39.07	-0.47	32.73	89.82	36.43	-0.55	16.88	58.88	28.66
Sep-98	-0.40	1.35	3.12	43.29	-0.46	31.14	84.18	37.00	-0.59	14.71	57.40	25.62
Dec-98	-0.38	1.24	2.74	45.40	-0.38	35.85	79.26	45.23	-0.57	16.27	58.81	27.66
Mar-99	-0.42	1.25	3.07	40.79	-0.47	30.29	83.67	36.21	-0.65	13.75	63.83	21.55
Jun-99	-0.34	1.66	3.35	49.63	-0.46	32.52	88.01	36.96	-0.63	17.33	75.73	22.89
Sep-99	-0.40	1.52	3.53	42.89	-0.46	30.78	83.41	36.91	-0.56	19.39	67.87	28.57
Dec-99	-0.31	1.85	3.50	52.73	-0.45	31.76	83.59	38.00	-0.62	18.20	76.99	23.64
Mar-00	-0.33	2.11	4.24	49.85	-0.49	31.52	91.21	34.55	-0.66	16.69	80.11	20.84
Jun-00	-0.27	2.35	4.08	57.55	-0.47	30.84	85.30	36.15	-0.62	18.00	76.30	23.60
Sep-00	-0.34	2.23	4.50	49.61	-0.42	32.45	79.19	40.97	-0.59	20.40	79.31	25.73
Dec-00	-0.20	2.83	4.26	66.35	-0.36	35.98	77.22	46.60	-0.61	20.37	84.33	24.16
Mar-01	-0.25	2.84	4.77	59.64	-0.41	32.16	76.14	42.24	-0.60	17.40	69.69	24.97
Jun-01	-0.25	2.86	4.76	60.11	-0.34	36.53	73.80	49.50	-0.57	18.59	67.50	27.54
Sep-01	-0.22	3.23	5.00	64.54	-0.36	34.23	72.05	47.51	-0.63	15.92	71.25	22.34
Dec-01	-0.29	2.70	4.88	55.37	-0.36	38.35	81.21	47.23	-0.57	20.90	76.45	27.35
Mar-02	-0.39	2.55	5.80	43.95	-0.37	35.88	78.65	45.62	-0.64	13.24	61.09	21.67
Jun-02	-0.40	2.40	5.63	42.71	-0.38	32.70	72.34	45.21	-0.65	14.17	67.27	21.07
Sep-02	-0.43	2.32	5.77	40.11	-0.45	33.94	88.57	38.32	-0.65	15.16	70.30	21.56
Dec-02	-0.41	2.20	5.21	42.33	-0.45	33.47	89.04	37.59	-0.66	15.53	76.88	20.20
Mar-03	-0.45	2.32	6.07	38.15	-0.46	29.63	81.06	36.56	-0.65	13.56	64.23	21.11
Jun-03	-0.31	2.92	5.48	53.23	-0.45	29.49	77.56	38.03	-0.67	13.05	65.68	19.86
Sep-03	-0.32	3.09	6.00	51.46	-0.47	31.46	86.25	36.47	-0.68	13.38	69.24	19.33
Dec-03	-0.31	2.92	5.61	52.14	-0.48	32.05	90.85	35.28	-0.69	14.49	79.80	18.16
Mar-04	-0.47	2.51	6.94	36.13	-0.51	30.87	95.04	32.48	-0.70	13.16	75.63	17.40
Jun-04	-0.39	2.91	6.64	43.87	-0.48	34.11	97.54	34.97	-0.73	12.92	82.03	15.75
Sep-04	-0.43	3.07	7.77	39.46	-0.50	37.31	111.31	33.52	-0.73	14.74	95.48	15.44
Dec-04	-0.38	3.26	7.29	44.73	-0.48	43.18	122.36	35.29	-0.73	17.00	108.26	15.70
Mar-05	-0.45	3.46	9.03	38.34	-0.51	36.76	113.86	32.28	-0.73	13.73	87.37	15.72
Jun-05	-0.32	4.34	8.52	50.95	-0.47	40.84	113.16	36.09	-0.75	12.47	88.90	14.03
Sep-05	-0.35	4.41	9.15	48.24	-0.47	41.79	116.05	36.01	-0.77	11.94	89.78	13.30
Dec-05	-0.34	4.55	9.18	49.59	-0.47	45.76	126.71	36.11	-0.77	13.48	103.20	13.06
Mar-06	-0.33	5.27	10.51	50.16	-0.49	46.02	135.63	33.93	-0.79	11.88	101.76	11.68
Jun-06	-0.31	5.40	10.25	52.64	-0.49	48.86	141.04	34.65	-0.78	13.18	105.16	12.53
Sep-06	-0.31	5.96	11.35	52.49	-0.47	52.71	147.22	35.81	-0.77	14.66	110.19	13.31
Dec-06	-0.25	5.99	10.06	59.49	-0.51	53.16	163.69	32.47	-0.80	14.30	131.41	10.88

Source: Compiled from Trade Data International, 2007 and the ABS (2008c; 2008j; 2008k; 2007f; 2007g)

Table: 5.28 Continued (Part B)

TRADE INDICES HS-2, ANZSIC-1												
Unit: %	CATEGORY: 87				CATEGORY: 1				30*:		87*:	
	TSI	XPI	MPI	XMR	TSI	XPI	MPI	XMR	XPI*	MPI*	XPI*	MPI*
Mar-90	-0.85	0.58	7.02	8.30	-0.09	19.15	22.80	83.96	7.41	23.47	14.62	176.27
Jun-90	-0.72	1.02	6.15	16.56	-0.11	18.12	22.62	80.08	6.41	18.76	21.40	129.16
Sep-90	-0.71	1.12	6.56	17.13	-0.11	19.09	23.66	80.71	7.59	22.56	26.83	156.68
Dec-90	-0.72	1.00	6.07	16.43	-0.04	19.71	21.29	92.59	7.42	24.73	24.03	146.26
Mar-91	-0.72	0.93	5.63	16.52	-0.01	19.19	19.70	97.40	9.37	29.66	26.54	160.70
Jun-91	-0.56	1.44	5.16	27.84	-0.08	17.97	21.02	85.49	10.12	29.01	42.36	152.18
Sep-91	-0.68	1.03	5.42	19.10	-0.12	18.40	23.61	77.93	10.67	25.31	27.16	142.22
Dec-91	-0.72	0.97	5.91	16.40	-0.07	19.03	21.99	86.55	10.24	21.07	23.71	144.54
Mar-92	-0.74	0.91	6.23	14.69	-0.06	19.23	21.90	87.80	13.31	35.70	26.85	182.79
Jun-92	-0.70	1.15	6.38	17.98	-0.11	19.09	23.59	80.94	14.06	31.12	30.15	167.68
Sep-92	-0.65	1.35	6.31	21.36	-0.13	20.30	26.11	77.73	12.84	31.62	33.56	157.13
Dec-92	-0.69	1.23	6.73	18.24	-0.08	21.43	25.32	84.62	13.24	31.03	31.48	172.65
Mar-93	-0.74	0.99	6.45	15.27	-0.01	22.67	23.36	97.07	15.49	39.64	27.58	180.64
Jun-93	-0.64	1.52	6.91	21.98	-0.06	21.15	23.78	88.90	16.68	40.18	41.82	190.29
Sep-93	-0.65	1.42	6.75	21.06	-0.11	22.26	27.94	79.68	18.31	36.93	38.08	180.82
Dec-93	-0.63	1.57	6.83	22.99	-0.02	23.02	23.97	96.01	17.75	30.96	40.52	176.26
Mar-94	-0.72	1.11	6.81	16.24	-0.04	24.00	25.90	92.67	18.58	38.00	28.75	177.00
Jun-94	-0.72	1.19	7.16	16.61	-0.08	22.13	26.04	85.01	19.47	39.49	30.12	181.37
Sep-94	-0.72	1.28	7.89	16.26	-0.12	24.22	30.89	78.40	19.54	37.94	33.02	203.15
Dec-94	-0.72	1.35	8.26	16.39	-0.13	22.93	29.61	77.45	19.66	36.25	35.46	216.33
Mar-95	-0.75	1.22	8.56	14.24	-0.07	25.20	29.26	86.14	22.83	44.01	32.81	230.41
Jun-95	-0.72	1.40	8.70	16.09	-0.09	23.44	28.20	83.15	25.84	44.77	36.77	228.49
Sep-95	-0.69	1.42	7.81	18.23	-0.08	24.24	28.33	85.58	24.37	43.30	36.41	199.69
Dec-95	-0.69	1.39	7.53	18.47	-0.04	24.40	26.58	91.81	24.52	42.58	36.04	195.17
Mar-96	-0.68	1.35	6.95	19.38	-0.03	24.86	26.14	95.11	30.33	54.03	40.13	207.05
Jun-96	-0.68	1.59	8.20	19.34	-0.11	22.20	27.93	79.49	29.39	54.83	42.78	221.21
Sep-96	-0.65	1.76	8.35	21.05	-0.10	22.99	28.37	81.04	27.52	50.37	44.28	210.36
Dec-96	-0.53	2.61	8.58	30.43	-0.05	24.07	26.81	89.78	27.72	54.79	70.95	233.18
Mar-97	-0.57	2.26	8.18	27.64	-0.02	26.03	26.89	96.80	30.07	60.49	63.92	231.27
Jun-97	-0.62	2.11	8.92	23.64	-0.10	23.17	28.46	81.42	31.95	62.19	54.41	230.20
Sep-97	-0.66	2.04	9.94	20.53	-0.12	23.40	29.78	78.58	31.27	61.57	50.74	247.08
Dec-97	-0.63	2.30	10.02	22.99	-0.10	22.64	27.62	82.00	29.53	63.72	58.96	256.45
Mar-98	-0.73	1.73	11.07	15.60	-0.05	25.21	27.76	90.80	31.92	68.73	46.37	297.19
Jun-98	-0.73	1.76	11.39	15.41	-0.13	22.29	29.14	76.51	32.11	82.19	46.94	304.67
Sep-98	-0.64	2.29	10.61	21.60	-0.12	23.50	29.61	79.37	35.99	83.15	61.08	282.78
Dec-98	-0.58	2.58	9.81	26.26	-0.08	23.79	27.73	85.78	29.14	64.20	60.47	230.26
Mar-99	-0.66	2.17	10.66	20.37	-0.06	25.41	28.52	89.09	32.11	78.72	55.61	273.05
Jun-99	-0.63	2.44	10.89	22.42	-0.14	21.82	28.77	75.84	45.74	92.18	67.22	299.81
Sep-99	-0.61	2.82	11.50	24.50	-0.15	21.93	29.58	74.14	40.50	94.41	75.26	307.12
Dec-99	-0.45	3.97	10.44	38.02	-0.12	22.45	28.75	78.10	47.46	90.01	101.91	268.05
Mar-00	-0.54	3.18	10.71	29.72	-0.10	24.53	29.89	82.05	54.20	108.72	81.67	274.84
Jun-00	-0.59	3.12	12.11	25.78	-0.18	22.51	32.12	70.07	56.35	97.91	74.80	290.21
Sep-00	-0.53	3.89	12.76	30.52	-0.17	23.51	32.96	71.35	53.55	107.94	93.35	305.84
Dec-00	-0.48	4.43	12.50	35.49	-0.10	25.88	31.82	81.34	67.27	101.40	105.49	297.24
Mar-01	-0.45	4.22	11.19	37.66	-0.06	27.34	31.00	88.18	78.92	132.34	116.98	310.61
Jun-01	-0.45	4.43	11.81	37.52	-0.13	24.19	31.21	77.52	71.57	119.07	110.82	295.36
Sep-01	-0.48	4.06	11.66	34.83	-0.12	23.99	30.83	77.81	77.78	120.50	97.90	281.11
Dec-01	-0.36	5.47	11.73	46.67	-0.11	22.43	28.02	80.06	59.05	106.65	119.62	256.29
Mar-02	-0.46	4.17	11.20	37.20	-0.07	23.59	27.40	86.11	62.42	142.03	102.03	274.30
Jun-02	-0.51	4.04	12.53	32.21	-0.15	20.30	27.48	73.86	55.10	129.00	92.53	287.26
Sep-02	-0.56	3.74	13.22	28.29	-0.17	20.17	28.32	71.23	49.58	123.59	80.02	282.85
Dec-02	-0.38	5.62	12.63	44.50	-0.14	19.87	26.13	76.03	47.13	111.33	120.19	270.12
Mar-03	-0.50	4.22	12.74	33.12	-0.10	22.18	27.34	81.12	58.48	153.27	106.56	321.71
Jun-03	-0.55	4.08	14.22	28.71	-0.21	18.19	27.77	65.51	70.80	133.00	99.05	345.01
Sep-03	-0.49	4.71	13.92	33.83	-0.23	19.35	30.62	63.18	65.43	127.16	99.76	294.92
Dec-03	-0.47	5.04	13.98	36.03	-0.20	20.32	30.33	66.99	59.08	113.30	101.74	282.36
Mar-04	-0.53	4.40	14.39	30.57	-0.20	21.67	32.17	67.36	57.54	159.27	101.02	330.42
Jun-04	-0.54	4.69	15.90	29.49	-0.26	20.58	35.03	58.74	66.07	150.61	106.41	360.84
Sep-04	-0.57	4.43	16.17	27.41	-0.27	20.37	35.78	56.93	62.20	157.63	89.91	328.06
Dec-04	-0.53	5.19	16.68	31.11	-0.27	21.01	36.49	57.57	70.87	158.43	112.82	362.63
Mar-05	-0.62	4.38	18.93	23.15	-0.23	22.08	35.37	62.43	89.70	233.95	113.51	490.38
Jun-05	-0.57	5.76	20.87	27.60	-0.29	20.29	36.76	55.19	115.48	226.62	153.27	555.31
Sep-05	-0.54	5.79	19.58	29.55	-0.29	20.92	38.22	54.74	105.03	217.71	137.65	465.73
Dec-05	-0.51	6.23	19.40	32.11	-0.28	21.66	38.40	56.41	121.47	244.94	166.22	517.72
Mar-06	-0.63	4.52	20.16	22.44	-0.24	22.69	36.89	61.52	141.72	282.51	121.65	542.04
Jun-06	-0.58	6.21	23.48	26.46	-0.29	20.73	38.02	54.54	137.72	261.64	158.59	599.34
Sep-06	-0.64	5.15	23.36	22.03	-0.30	21.43	39.91	53.68	149.80	285.37	129.35	587.10
Dec-06	-0.59	6.09	23.76	25.64	-0.30	21.18	39.40	53.75	154.66	259.96	157.41	613.81

Source: Compiled from Trade Data International, 2007 and the ABS (2008c; 2008j; 2008k; 2007f; 2007g)

Table: 5.29 (Part A)

TRADE INDICES
HS-4, ANZSIC-2

Unit: %	CATEGORY: 3004				CATEGORY: 8471				CATEGORY: 8473			
	TSI	XPI	MPI	XMR	TSI	XPI	MPI	XMR	TSI	XPI	MPI	XMR
Mar-90	-0.54	0.20	0.67	30.27	-0.84	1.38	16.39	8.44	-0.58	2.45	9.22	26.53
Jun-90	-0.52	0.20	0.62	31.73	-0.81	1.62	15.35	10.58	-0.46	3.13	8.35	37.44
Sep-90	-0.48	0.23	0.66	34.68	-0.82	1.36	13.62	9.97	-0.42	3.14	7.69	40.82
Dec-90	-0.57	0.20	0.74	27.16	-0.79	1.67	14.23	11.72	-0.35	3.70	7.69	48.08
Mar-91	-0.50	0.23	0.71	33.14	-0.71	2.19	12.83	17.07	-0.38	3.96	8.83	44.80
Jun-91	-0.47	0.24	0.67	36.44	-0.78	1.88	15.34	12.23	-0.40	4.26	9.87	43.13
Sep-91	-0.35	0.31	0.66	48.01	-0.80	1.52	13.39	11.37	-0.36	4.14	8.87	46.63
Dec-91	-0.30	0.32	0.59	54.10	-0.66	2.47	12.00	20.62	-0.22	5.29	8.32	63.58
Mar-92	-0.42	0.36	0.88	40.97	-0.81	1.47	13.76	10.67	-0.33	5.16	10.18	50.72
Jun-92	-0.30	0.44	0.81	54.01	-0.79	2.04	17.38	11.74	-0.36	5.33	11.31	47.11
Sep-92	-0.37	0.42	0.91	45.83	-0.78	1.82	14.51	12.56	-0.27	5.48	9.61	57.05
Dec-92	-0.37	0.40	0.87	46.32	-0.76	2.11	15.16	13.94	-0.21	6.10	9.28	65.67
Mar-93	-0.38	0.45	1.01	44.58	-0.80	1.59	14.60	10.89	-0.27	5.87	10.13	57.94
Jun-93	-0.36	0.47	1.00	47.11	-0.78	2.29	18.48	12.38	-0.25	6.46	10.85	59.56
Sep-93	-0.30	0.54	1.00	54.21	-0.73	2.45	15.35	15.93	-0.22	6.70	10.44	64.19
Dec-93	-0.27	0.54	0.94	57.29	-0.57	3.93	14.14	27.75	-0.14	7.00	9.30	75.26
Mar-94	-0.28	0.58	1.05	55.74	-0.66	2.83	13.92	20.35	-0.09	7.97	9.56	83.32
Jun-94	-0.29	0.63	1.14	55.51	-0.74	2.64	17.48	15.12	-0.18	7.38	10.56	69.85
Sep-94	-0.28	0.61	1.09	56.07	-0.69	3.02	16.64	18.15	-0.16	7.34	10.06	72.94
Dec-94	-0.26	0.61	1.03	58.93	-0.61	3.88	16.13	24.04	-0.09	8.58	10.29	83.32
Mar-95	-0.24	0.69	1.13	61.23	-0.73	2.67	17.45	15.28	-0.15	8.21	11.05	74.29
Jun-95	-0.22	0.79	1.23	64.45	-0.79	2.76	23.82	11.61	-0.08	10.15	11.86	85.55
Sep-95	-0.26	0.75	1.27	59.32	-0.71	3.35	20.12	16.63	-0.03	9.96	10.56	94.32
Dec-95	-0.22	0.75	1.16	64.53	-0.67	3.48	17.55	19.85	0.07	11.34	9.88	114.75
Mar-96	-0.23	0.82	1.31	62.54	-0.77	2.54	19.34	13.13	0.01	11.62	11.39	102.01
Jun-96	-0.26	0.91	1.55	59.14	-0.77	3.05	23.34	13.08	-0.02	9.90	10.27	96.35
Sep-96	-0.24	0.91	1.50	60.90	-0.70	3.35	18.90	17.71	-0.02	8.91	9.29	95.90
Dec-96	-0.27	0.84	1.46	57.32	-0.75	2.61	18.45	14.15	0.01	9.61	9.45	101.74
Mar-97	-0.26	0.89	1.52	58.44	-0.78	2.47	19.88	12.43	-0.02	9.30	9.75	95.45
Jun-97	-0.28	1.00	1.80	55.76	-0.78	3.11	24.99	12.46	-0.12	9.02	11.52	78.32
Sep-97	-0.26	1.03	1.77	58.11	-0.79	2.51	21.43	11.69	0.00	9.59	9.68	99.14
Dec-97	-0.32	0.90	1.76	51.41	-0.73	3.14	20.47	15.35	0.06	10.54	9.37	112.40
Mar-98	-0.32	0.99	1.91	52.02	-0.76	3.03	21.77	13.90	-0.06	9.48	10.61	89.41
Jun-98	-0.43	0.99	2.49	39.87	-0.78	2.88	22.83	12.63	-0.14	8.38	11.00	76.17
Sep-98	-0.37	1.12	2.45	45.99	-0.74	2.80	18.73	14.92	-0.13	6.93	8.98	77.13
Dec-98	-0.35	1.06	2.19	48.52	-0.74	2.64	17.52	15.05	-0.06	6.87	7.75	88.62
Mar-99	-0.40	1.03	2.38	43.17	-0.78	2.45	20.23	12.09	-0.09	7.82	9.43	82.97
Jun-99	-0.29	1.44	2.62	55.01	-0.84	2.12	24.83	8.53	-0.10	8.09	9.81	82.46
Sep-99	-0.39	1.26	2.86	44.14	-0.82	1.93	19.75	9.79	-0.05	7.21	8.02	89.88
Dec-99	-0.28	1.61	2.86	56.29	-0.82	2.02	20.71	9.78	-0.07	7.09	8.20	86.43
Mar-00	-0.30	1.86	3.45	53.89	-0.86	1.76	22.66	7.75	-0.16	7.01	9.72	72.10
Jun-00	-0.23	2.06	3.31	62.31	-0.88	1.63	24.71	6.59	-0.21	6.31	9.70	65.03
Sep-00	-0.31	1.97	3.77	52.20	-0.86	1.71	23.11	7.39	-0.13	6.89	9.03	76.31
Dec-00	-0.16	2.55	3.50	72.71	-0.78	2.59	20.51	12.63	-0.02	8.25	8.64	95.52
Mar-01	-0.20	2.58	3.90	66.19	-0.76	2.38	17.85	13.32	-0.05	8.06	8.85	91.02
Jun-01	-0.23	2.55	4.04	63.01	-0.81	2.04	19.27	10.60	-0.04	8.30	9.05	91.75
Sep-01	-0.16	2.98	4.11	72.50	-0.75	2.36	16.44	14.35	0.00	7.56	7.61	99.27
Dec-01	-0.24	2.50	4.08	61.29	-0.68	3.73	19.47	19.16	0.00	8.56	8.53	100.33
Mar-02	-0.30	2.37	4.43	53.50	-0.67	3.80	19.32	19.66	-0.04	8.20	8.87	92.50
Jun-02	-0.37	2.15	4.62	46.45	-0.71	3.29	19.15	17.17	-0.11	6.58	8.13	80.90
Sep-02	-0.41	2.11	5.00	42.15	-0.65	3.97	18.99	20.93	-0.15	6.42	8.68	73.99
Dec-02	-0.36	1.95	4.18	46.65	-0.66	3.62	17.64	20.50	-0.10	6.80	8.34	81.52
Mar-03	-0.42	2.03	4.97	40.76	-0.63	3.85	17.08	22.54	-0.24	5.06	8.29	61.01
Jun-03	-0.28	2.55	4.52	56.33	-0.69	3.59	19.24	18.64	-0.24	4.42	7.16	61.71
Sep-03	-0.27	2.80	4.91	57.14	-0.65	3.92	18.64	21.05	-0.26	4.62	7.88	58.65
Dec-03	-0.30	2.60	4.87	53.38	-0.61	4.59	18.98	24.17	-0.30	4.16	7.69	54.12
Mar-04	-0.46	2.25	6.10	36.87	-0.70	3.77	21.21	17.76	-0.39	3.73	8.42	44.33
Jun-04	-0.36	2.60	5.58	46.53	-0.72	4.19	26.04	16.09	-0.35	4.01	8.25	48.65
Sep-04	-0.42	2.73	6.71	40.65	-0.73	3.90	24.47	15.94	-0.38	4.00	8.86	45.17
Dec-04	-0.35	2.91	6.07	47.85	-0.66	5.32	25.88	20.55	-0.37	4.17	8.97	46.43
Mar-05	-0.42	3.16	7.79	40.51	-0.66	5.13	24.85	20.65	-0.45	3.15	8.35	37.70
Jun-05	-0.30	3.92	7.35	53.37	-0.69	5.45	29.46	18.49	-0.48	3.08	8.81	34.91
Sep-05	-0.31	4.07	7.68	52.95	-0.67	5.02	25.48	19.69	-0.49	2.85	8.43	33.78
Dec-05	-0.31	4.16	7.88	52.78	-0.65	5.59	26.66	20.96	-0.45	3.34	8.78	38.04
Mar-06	-0.30	4.84	9.03	53.63	-0.69	5.48	30.01	18.27	-0.48	3.70	10.53	35.18
Jun-06	-0.30	4.86	8.96	54.26	-0.70	5.82	33.51	17.38	-0.51	3.44	10.67	32.23
Sep-06	-0.28	5.41	9.71	55.67	-0.71	5.41	31.61	17.12	-0.47	3.88	10.73	36.19
Dec-06	-0.25	5.23	8.70	60.15	-0.71	5.92	35.12	16.87	-0.33	5.13	10.20	50.30

Source: Compiled from Trade Data International, 2007 and the ABS (2008c; 2008j; 2008k; 2007f; 2007g)

Table: 5.29 Continued (Part B)

TRADE INDICES HS-4, ANZSIC-2												
Unit: %	CATEGORY: 8517				CATEGORY: 8703				CATEGORY: 1.2			
	TSI	XPI	MPI	XMR	TSI	XPI	MPI	XMR	TSI	XPI	MPI	XMR
Mar-90	-0.64	0.73	3.32	21.87	-0.83	0.25	2.78	9.15	-0.68	2.36	12.40	19.01
Jun-90	-0.57	0.88	3.17	27.77	-0.61	0.61	2.53	23.91	-0.61	2.71	11.30	23.95
Sep-90	-0.44	1.09	2.84	38.59	-0.61	0.74	3.05	24.11	-0.64	2.74	12.44	22.04
Dec-90	-0.30	1.28	2.40	53.33	-0.66	0.57	2.77	20.51	-0.61	2.71	11.36	23.89
Mar-91	-0.28	1.39	2.46	56.50	-0.71	0.47	2.76	17.05	-0.63	2.49	10.96	22.75
Jun-91	-0.21	1.51	2.31	65.14	-0.49	0.91	2.68	34.11	-0.57	2.92	10.76	27.15
Sep-91	-0.42	0.98	2.41	40.55	-0.68	0.51	2.71	19.01	-0.62	2.76	11.61	23.76
Dec-91	-0.03	3.35	3.55	94.33	-0.74	0.47	3.14	14.95	-0.63	2.52	11.14	22.61
Mar-92	-0.50	1.29	3.86	33.38	-0.79	0.40	3.34	11.84	-0.62	2.60	11.22	23.19
Jun-92	-0.38	1.58	3.48	45.30	-0.68	0.61	3.26	18.81	-0.62	2.81	11.88	23.65
Sep-92	-0.52	1.17	3.68	31.86	-0.59	0.78	3.06	25.51	-0.63	2.91	12.68	22.92
Dec-92	0.18	5.70	3.97	143.42	-0.69	0.64	3.48	18.53	-0.67	2.70	13.45	20.06
Mar-93	-0.55	1.22	4.19	29.04	-0.76	0.44	3.25	13.57	-0.63	2.70	11.76	22.93
Jun-93	0.01	4.51	4.41	102.40	-0.60	0.87	3.49	25.00	-0.57	3.11	11.42	27.23
Sep-93	-0.49	1.37	3.98	34.49	-0.64	0.73	3.30	22.28	-0.46	4.67	12.53	37.25
Dec-93	-0.40	1.88	4.40	42.67	-0.55	0.93	3.25	28.65	-0.43	4.73	11.99	39.43
Mar-94	-0.38	1.64	3.68	44.56	-0.71	0.52	3.02	17.27	-0.44	4.87	12.62	38.57
Jun-94	0.49	9.95	3.40	292.31	-0.70	0.59	3.32	17.72	-0.40	5.25	12.34	42.58
Sep-94	-0.43	1.56	3.91	39.79	-0.72	0.61	3.73	16.26	-0.49	4.90	14.28	34.33
Dec-94	-0.42	1.84	4.52	40.72	-0.71	0.65	3.88	16.82	-0.53	4.28	14.06	30.46
Mar-95	-0.01	4.51	4.59	98.20	-0.76	0.59	4.28	13.78	-0.43	5.24	13.26	39.53
Jun-95	-0.39	2.23	5.06	44.08	-0.73	0.67	4.38	15.37	-0.40	5.14	12.05	42.63
Sep-95	-0.15	3.91	5.27	74.23	-0.71	0.65	3.79	17.20	-0.41	5.06	12.19	41.48
Dec-95	-0.36	2.56	5.39	47.53	-0.71	0.61	3.61	16.91	-0.41	5.06	11.98	42.22
Mar-96	-0.15	3.71	5.06	73.22	-0.67	0.59	2.98	19.84	-0.44	4.67	11.96	39.09
Jun-96	-0.06	4.06	4.54	89.44	-0.66	0.78	3.80	20.57	-0.45	4.63	12.11	38.21
Sep-96	-0.35	2.26	4.70	48.02	-0.65	0.92	4.27	21.49	-0.52	3.95	12.58	31.40
Dec-96	-0.33	2.77	5.47	50.63	-0.43	1.78	4.48	39.86	-0.53	3.86	12.51	30.90
Mar-97	-0.46	1.94	5.21	37.26	-0.48	1.42	4.02	35.27	-0.54	3.54	11.92	29.68
Jun-97	-0.30	2.91	5.45	53.39	-0.62	1.09	4.61	23.65	-0.56	3.61	12.96	27.90
Sep-97	-0.03	4.73	5.02	94.13	-0.69	0.99	5.48	18.16	-0.58	3.63	13.81	26.27
Dec-97	-0.23	4.12	6.60	62.36	-0.56	1.50	5.31	28.19	-0.60	3.44	13.79	24.97
Mar-98	-0.40	2.46	5.73	42.98	-0.72	1.02	6.20	16.38	-0.52	4.29	13.60	31.56
Jun-98	-0.33	3.06	6.12	49.91	-0.73	0.94	6.15	15.29	-0.54	4.15	13.73	30.24
Sep-98	-0.46	2.01	5.48	36.71	-0.57	1.51	5.44	27.79	-0.50	4.56	13.70	33.31
Dec-98	-0.31	3.60	6.86	52.49	-0.49	1.69	4.92	34.33	-0.52	4.24	13.34	31.82
Mar-99	-0.60	2.19	8.76	24.97	-0.61	1.37	5.65	24.30	-0.51	4.36	13.42	32.50
Jun-99	-0.64	2.75	12.64	21.75	-0.61	1.41	5.80	24.30	-0.52	4.28	13.71	31.24
Sep-99	-0.23	6.59	10.54	62.56	-0.55	1.80	6.22	28.92	-0.56	3.99	14.03	28.46
Dec-99	-0.51	3.83	11.81	32.47	-0.30	2.87	5.36	53.65	-0.62	3.36	14.17	23.69
Mar-00	-0.53	4.45	14.59	30.51	-0.43	2.16	5.43	39.84	-0.60	3.55	14.29	24.87
Jun-00	-0.52	5.35	16.89	31.70	-0.52	2.03	6.34	31.94	-0.64	3.36	15.30	21.99
Sep-00	-0.40	6.69	15.47	43.25	-0.45	2.65	6.95	38.19	-0.67	3.06	15.27	20.03
Dec-00	-0.51	4.99	15.48	32.23	-0.38	3.21	7.08	45.43	-0.66	3.01	14.97	20.12
Mar-01	-0.58	3.53	13.25	26.63	-0.38	3.05	6.84	44.61	-0.64	3.27	14.75	22.20
Jun-01	-0.41	4.85	11.68	41.51	-0.40	3.10	7.22	42.98	-0.67	2.69	13.78	19.50
Sep-01	-0.61	3.13	13.09	23.87	-0.42	2.73	6.75	40.50	-0.67	2.78	13.91	19.99
Dec-01	-0.05	7.69	8.57	89.76	-0.25	4.08	6.84	59.69	-0.64	3.06	13.99	21.85
Mar-02	-0.65	1.61	7.67	21.03	-0.38	2.86	6.44	44.47	-0.67	2.65	13.65	19.45
Jun-02	-0.73	1.61	10.42	15.40	-0.48	2.61	7.44	35.06	-0.67	2.63	13.15	19.99
Sep-02	-0.64	1.74	7.94	21.96	-0.56	2.24	8.02	27.98	-0.68	2.58	13.35	19.31
Dec-02	-0.64	1.75	8.01	21.82	-0.28	4.05	7.23	55.98	-0.69	2.43	13.39	18.13
Mar-03	-0.64	1.57	7.27	21.62	-0.46	2.73	7.34	37.20	-0.70	2.51	14.24	17.61
Jun-03	-0.70	1.25	7.14	17.51	-0.55	2.46	8.56	28.74	-0.72	2.58	15.72	16.42
Sep-03	-0.68	1.28	6.77	18.97	-0.48	3.02	8.59	35.10	-0.73	2.43	15.53	15.65
Dec-03	-0.61	1.60	6.50	24.56	-0.41	3.53	8.45	41.81	-0.74	2.33	15.90	14.66
Mar-04	-0.68	1.47	7.83	18.75	-0.47	3.08	8.59	35.87	-0.78	2.00	16.35	12.22
Jun-04	-0.76	1.24	9.11	13.64	-0.48	3.35	9.55	35.07	-0.77	2.32	17.56	13.19
Sep-04	-0.75	1.40	9.81	14.28	-0.51	3.01	9.16	32.85	-0.81	2.00	18.92	10.58
Dec-04	-0.66	1.98	9.66	20.45	-0.44	3.66	9.30	39.30	-0.83	1.85	20.50	9.02
Mar-05	-0.74	1.41	9.63	14.61	-0.57	3.02	11.01	27.40	-0.83	1.82	19.59	9.28
Jun-05	-0.80	1.09	9.65	11.29	-0.49	4.22	12.18	34.67	-0.84	1.70	19.44	8.72
Sep-05	-0.81	0.98	9.36	10.42	-0.46	4.26	11.45	37.22	-0.86	1.52	20.14	7.54
Dec-05	-0.82	0.97	9.73	9.97	-0.40	4.63	10.92	42.37	-0.86	1.51	20.75	7.26
Mar-06	-0.83	0.88	9.21	9.59	-0.54	3.27	11.04	29.67	-0.85	1.61	20.13	8.00
Jun-06	-0.86	0.84	10.88	7.70	-0.48	4.81	13.77	34.91	-0.83	1.83	19.66	9.31
Sep-06	-0.79	1.23	10.33	11.88	-0.58	3.51	13.30	26.39	-0.84	1.74	20.57	8.44
Dec-06	-0.82	1.08	11.18	9.68	-0.49	4.57	13.50	33.85	-0.86	1.64	21.60	7.58

Source: Compiled from Trade Data International, 2007 and the ABS (2008c; 2008j; 2008k; 2007f; 2007g)

5.5 EMPIRICAL FINDINGS

The summary of the major empirical findings are presented in Table 5.30. The BRCAI in Table 5.30 confirms that Australia records a RCD in all goods categories based on HS-2 and HS-4 level of aggregation, except for category 3004 where the RCA is recorded since 1999 and this RCA in this category is further improving overtime. Some encouraging news is that the RCD in some categories are improving overtime, the categories falling in this group are categories 30 and 87 based on HS-2 level of aggregation and categories 8471 and 8703 based on HS-4 level of aggregation. The categories for which the RCD is deteriorating overtime, are categories 84 and 85 based on HS-2 level of aggregation and categories 8473 and 8517 based on HS-4 level of aggregation.

The Australian world's X and M rankings in these categories shows that Australia has improved world's Top X ranking overtime in only one category 3004, while the world's Top X ranking for the rest of the TD categories analysed has dropped to lower rankings overtime. By observing the Australian world's Top M rankings, the categories in which Australia has moved towards a higher rankings overtime are categories 30, 87, 3004, 8703, while categories 84, 85, 8471, 8473 has dropped to a lower rankings, whereas the category 8517 world's Top M rankings remains unchanged overtime.

According to Vollrath (1991) indices, Australia records a RXA in all categories analysed, while the RXA is strengthening for categories 30, 87, 3004, 8471 and 8703 and is weakening for categories 84, 85, 8473 and 8517. By observing the VRTAI and the VRCAI, Australia records a RCD in all categories analysed. According to the VRTAI and VRCAI, the RCD is improving overtime for categories 30, 85, 3004 and 8471, while the VRTAI and the VRCAI is deteriorating overtime for category 8517. The rest of the categories, the VRTAI and VRCAI are moving in opposite directions, for categories 84 and 8473 the VRTAI is improving, while the VRCAI is deteriorating overtime and for categories 87 and 8703, the VRTAI is deteriorating while VRCAI is improving overtime.

The TSI shows that Australia records a RCD in all categories, where RCD is improving overtime in categories 30, 84, 87, 3004, 8471, 8473 and 8703; while it is deteriorating overtime in categories 85, 1, 8517 and 1.2; the XPI shows that the Australian export is increasing overtime as a proportion of the domestic output in all

Table: 5.30

EMPIRICAL FINDINGS - SUMMARY SHEET											
	CATEGORY (HS-2, ANZSIC-1)					CATEGORY (HS-4, ANZSIC-2)					
Indices	**30**	**84**	**85**	**87**	**1**	**3004**	**8471**	**8473**	**8517**	**8703**	**1.2**
BRCAI	**RCD**	**RCD**	**RCD**	**RCD**	*N/A*	**RCA***	**RCD**	**RCD**	**RCD**	**RCD**	*N/A*
Status	*↓ Improving*	*↑ Deteriorating*	*↑ Deteriorating*	*↓ Improving*	*N/A*	*↑ Improving*	*↓ Improving*	*↑ Deteriorating*	*↑ Deteriorating*	*↓ Improving*	*N/A*
X Rank	**16 → 19**	**21→30**	**28 → 36**	**22 → 23**	*N/A*	**17 →14**	**23 → 26**	**16 → 27**	**24 → 32**	**18 → 20**	*N/A*
Status	*↓ Decline*	*↓ Decline*	*↓ Decline*	*↓ Decline*	*N/A*	*↑ Increase*	*↓ Decline*	*↓ Decline*	*↓ Decline*	*↓ Decline*	*N/A*
M Rank	**14 → 12**	**13 → 18**	**18 → 21**	**14 →11**	*N/A*	**13 →12**	**12 → 15**	**12 → 19**	**19 → 19**	**14 → 9**	*N/A*
Status	*↑ Increase*	*↓ Decline*	*↓ Decline*	*↑ Increase*	*N/A*	*↑ Increase*	*↓ Decline*	*↓ Decline*	*Unchanged*	*↑ Increase*	*N/A*
VRXAI	**RXA**	**RXA**	**RXA**	**RXA**	*N/A*	**RXA**	**RXA**	**RXA**	**RXA**	**RXA**	*N/A*
Status	*↑ Improving*	*↓ Deteriorating*	*↓ Deteriorating*	*↑ Improving*	*N/A*	*↑ Improving*	*↑ Improving*	*↓ Deteriorating*	*↓ Deteriorating*	*↑ Improving*	*N/A*
VRTAI	**RCD**	**RCD**	**RCD**	**RCD**	*N/A*	**RCD**	**RCD**	**RCD**	**RCD**	**RCD**	*N/A*
Status	*↓ Improving*	*↓ Improving*	*↓ Improving*	*↑ Deteriorating*	*N/A*	*↓ Improving*	*↓ Improving*	*↓ Improving*	*↑ Deteriorating*	*↑ Deteriorating*	*N/A*
VRCAI	**RCD**	**RCD**	**RCD**	**RCD**	*N/A*	**RCD**	**RCD**	**RCD**	**RCD**	**RCD**	*N/A*
Status	*↓ Improving*	*↑ Deteriorating*	*↓ Improving*	*↓ Improving*	*N/A*	*↓ Improving*	*↓ Improving*	*↑ Deteriorating*	*↑ Deteriorating*	*↓ Improving*	*N/A*
TSI	**RCD**	**RCD**	**RCD**	**RCD**	**RCD**	**RCD**	**RCD**	**RCD**	**RCD**	**RCD**	**RCD**
Status	*↓ Improving*	*↓ Improving*	*↑ Deteriorating*	*↓ Improving*	*↑ Deteriorating*	*↓ Improving*	*↓ Improving*	*↓ Improving*	*↑ Deteriorating*	*↓ Improving*	*↑ Deteriorating*
XPI	**IXP**	**IXP**	**IXP**	**IXP**	**IXP**	**IXP**	**IXP**	**IXP**	**IXP**	**IXP**	**DXP**
Status	*↑ Improving*	*↑ Improving*	*↑ Improving*	*↑ Improving*	*↑ Improving*	*↑ Improving*	*↑ Improving*	*↑ Improving*	*↑ Improving*	*↑ Improving*	*↓ Deteriorating*
MPI	**IMC**	**IMC**	**IMC**	**IMC**	**IMC**	**IMC**	**IMC**	**IMC**	**IMC**	**IMC**	**IMC**
Status	*↑ Deteriorating*	*↑ Deteriorating*	*↑ Deteriorating*	*↑ Deteriorating*	*↑ Deteriorating*	*↑ Deteriorating*	*↑ Deteriorating*	*↑ Deteriorating*	*↑ Deteriorating*	*↑ Deteriorating*	*↑ Deteriorating*
XMR	**IXPM**	**IXPM**	**DXPM**	**IXPM**	**DXPM**	**IXPM**	**IXPM**	**IXPM**	**DXPM**	**IXPM**	**DXPM**
Status	*↑ Improving*	*↑ Improving*	*↓ Deteriorating*	*↑ Improving*	*↓ Deteriorating*	*↑ Improving*	*↑ Improving*	*↑ Improving*	*↓ Deteriorating*	*↑ Improving*	*↓ Deteriorating*

Distinction between an increase and a decrease is made by observing values for the period between 1990:1 and 2006:4 as a function of Time.

BRCAI - Balassa Revealed Comparative Advantage Index
VRXAI - Vollrath Revealed Export Advantage Index
VRTAI - Vollrath Revealed Trade Advantage Index
VRCAI - Vollrath Revealed Competitive Index
RCA - Revealed Comparative Advantage
RCD - Revealed Comparative Disadvantage
RXA - Revealed Export Advantage
IXP - Increasing Export as a Proportion of the Domestic Output
DXP - Decreasing Export as a Proportion of the Domestic Output
IMC - Increasing Import Competition
DMC - Decreasing Import Competition
IXPM - Increasing Export as a Proportion of the Import
DXPM - Decreasing Export as a Proportion of the Import
**** Since 1999***

categories and this proportion is gradually increasing except in category 1.2

The MPI shows strong evidence that the M competition is increasing overtime and this M competition is intensifying overtime in all TD categories analysed.

Finally, the XMR shows evidence that the volumes of the X as a proportion of the M is increasing in categories 30, 84, 87, 3004, 8471, 8473 and 8703; while for categories 85, 1, 8517 and 1.2, the volumes of the X is decreasing as a proportion of the M.

5.6 CONCLUSION

In this chapter, the theoretical development of the basis of the trade between nations is established and the underlying reasons for the countries specialization in the specific industries that influences the X and M levels are explained. A comprehensive review of the existing literature has lead to the identification of the measurements of CA in various categories amongst various countries. The measurements of the CA identified are developed and applied by Balassa (1965) and Vollrath (1991) and these indices have been since used in a numerous empirical studies in the current literature. Balassa's (1965) measure of the CA is BRCAI, while Vollrath (1991) measures are the VRXAI, VRTAI and VRCAI.

According to the current literature, both Balassa (1965) and Vollrath (1991) indices are structured in such a way that they are measuring either a proportion of the total X or M relative to and from the RoW in the categories under examination. By examining the current studies that have utilized these indices for the calculation of the RCA, it is evident that the precise definition of what the total country or world trade, X and M consists of, is unclear. This creates confusion especially when the existing studies are observed and compared with each other. The main cause of such confusion is that the total trade, X and M can be viewed as a total trade, X and M in a broad industry such as manufacturing or the total goods trade in all goods, total trade in all goods and services or even some other combination form of the aggregation.

In order to overcome existing confusion as to what the total trade, X and M consists of, such information must be clearly stated. In this chapter, this issue has been addressed by treating the total trade, X and M as the total in all goods and total in all goods and services combined. This approach has addressed the contextual meaning of the total trade, X and M for the first time, which will make all studies adopting this approach more comparable in the future in this area of international trade analysis. Consequently, the BRCAI VRXAI, VRTAI and VRCAI are calculated for both as a proportion of the total trade in all goods, and secondly, as a proportion of the total trade in all goods and services combined.

Due to data unavailability Balassa (1965) and Vollrath (1991) indices are not calculated for the selected service categories, however, the trade performance indices are calculated and analysed for all the selected TD goods and service categories. A number of the trade performance indicators have been identified in the current literature and being utilized in this chapter are TSI, XPI, MPI and XMR.

The calculated BRCAI has revealed that Australia records a RCD in all selected goods categories based on both HS-2 and HS-4 level of aggregation, except for category 3004, in which Australia records a RCA since 1999, while the overall RCD is more pronounced as a proportion of the total trade in the goods and services combined than as a proportion in the total goods trade for all categories.

According to Vollrath (1991) indices, the Australian VRXAI suggest that Australia records a RXA in all categories analysed, while the VRTAI and VRCAI records a RCD in all goods categories which has been analysed, and this RCD in overall is more pronounced as a proportion of the total trade in goods than as a proportion in the total trade in the goods and services combined. Furthermore, according to Vollrath (1991) indices some interesting findings have been identified. The VRTAI VRCAI in some categories are moving in the opposite directions, and this is found in categories 84, 87, 8473 and 8703. For the categories, 84 and 8473, the VRTAI is improving overtime, while the VRCAI is deteriorating overtime. For categories, 87 and 8703, this is opposite VRTAI is deteriorating overtime while VRCAI is improving overtime. According to the current literature where Vollrath (1991) indices have been utilized in the international trade analysis, none of the studies has actually reported on this occurrence, despite being present. An answer as to why the VRTAI and VRCAI are moving in the opposite directions in these categories is beyond the scope of this research; however, it would be interesting to interpret this occurrence in more detail.

Furthermore, the trade performance indices show that Australia possesses a RCD in all categories analysed by observing the calculated values of the TSI. By referring to the XPI, there is evidence that the Australian X in all categories except for the category 1.2 is increasing overtime as a proportion of the domestic output in all categories. While the XPI is increasing overtime, so does the MPI. According to MPI, the M competition for the Australian producers in all categories is increasing, which suggests an increasing competitive pressure for all selected TD categories. Finally, the trade performance index calculated is the XMR, the XMR suggest that the Australian X as a proportion of the M in the selected categories is increasing in all categories except in categories 85, 1, 8517 and 1.2, where this proportion is decreasing.

In summary, the establishment of an existence of a RCA or a RCD in the TD categories is valuable information, however, the indices BRCAI, VRXAI, VRCAI, VRTAI do not tell anything specific as to what are influencing such outcomes, since these indices are calculated according to post-trade historical data. Consequently, all indices in this chapter which include the BRCAI, VRXAI, VRTAI, VRCAI and other trade performance indices, shows only a „Revealed' advantage or disadvantage and does not tell us anything as to what has initiated such X and M flows which have lead to these specific outcomes. Due to this, an important question remains to be answered and that question is - What are the economic variables that influence the X and M flows between Australia and the selected TD countries? A further analysis in Chapter 6 for the X supply and M demand estimation and in Chapter 8 for the NX estimation, will attempt to establish what economic variables influences these outcomes in the selected TD categories between Australia and selected TD countries.

CHAPTER 6

6. EXPORT SUPPLY AND IMPORT DEMAND ANALYSIS

6.1 INTRODUCTION

According to the trade indices which have been calculated in the previous chapter, it has been established that Australia possesses a Revealed Comparative Disadvantage (RCD) in all of the selected Trade Deficit (TD) goods categories except for Category 3004. In addition, international competition for Australian producers in all TD categories is intensifying, while the proportion of the Australian Export (X) to Import (M) in all categories is increasing, except for categories 85, 1, 8517 and 1.2, where this proportion is decreasing.

These findings are valuable, however, at the same time, these indices do not indicate which specific variables are likely to influence the X and M flows. According to Houthakker & Magee (1969) and Johnson (1967), a country's income levels and price elasticity of the X and M are likely to determine the country's Net Export (NX) levels. This thesis attempts to identify the specific variables that are influencing the X and M volumes. As a result, the X supply and M demand models will be estimated for all of the selected TD categories between Australia and the selected TD countries. This approach is likely to provide an insight to ascertain what economic variables are significantly influencing the X and M flows between Australia and the selected TD countries. Once this is accomplished, it is likely to reveal the key determinants of the X supply from Australia to the Rest of the World (RoW) and the key determinants of the Australian M demand from the RoW in the selected TD categories and countries.

The structure of this chapter is divided into 6 sections; - Section 6.2, data and data sources, Section 6.3, the econometric methodology, Section 6.4, the X supply theoretical framework, which includes the X supply models estimation, followed by Section 6.5, the M demand theoretical framework, which includes the M demand models estimation. The last 2 sections are Section 6.6, summary of empirical findings and finally, Section 6.7 presents the concluding remarks. Section 6.2 defines the data and the data sources, while Section 6.3 comments on the econometric methodology which will be used in this chapter. The models estimated are presented in Section 6.4 and Section 6.5, where Section 6.4.2 contains the X supply models and Section 6.5.2 contains the M demand models, while both Section 6.4 and 6.5 are using the X and M data based on (HS-2[100] and ANZSIC-1[101]) and (HS-4[102] and ANZSIC-2[103]) level of aggregation. Section 6.4.2.10 and Section 6.5.2.10 summarizes the findings for the X supply and the M demand models respectively, while the overall summary of the empirical findings are presented in Section 6.6

6.2 DATA AND DATA SOURCES

In this chapter, all trade data are obtained from the Trade Data International (TDI) (TDI, 2007) and the Gross Domestic Product (GDP) data is obtained from the Australian Bureau of Statistics (ABS) (ABS, 2008d).

The units of the X and M between Australia and the selected TD countries and categories in the monetary values are recorded in Australian Dollars Millions (AUD, mill.) currency in both the Harmonized Commodity Description and Coding System (HS) - the second level of aggregation HS-2 and fourth level of aggregation HS-4. Furthermore, the X and M values in Quantity (QTY) are recorded in the Thousands („000s) of units in the models estimations between Australia and the RoW, while the models estimation between Australia and the selected individual TD countries, the QTY are in a single units. In addition, the models estimated are only for the selected goods categories, as the QTY data for the selected service categories are not available.

Finally, all X and M data used in this chapter are in the quarterly time-series intervals based on HS-2 (Appendix Tables 6.1-6.19) and HS-4 (Appendix Tables 6.20-6.46) level of aggregation, while the Australian GDP data is presented in Appendix Table 6.46. Finally, a detailed procedure of the conversion from nominal to real values, conversion from monthly to quarterly time-series data and all other relevant information are explained in detail in Chapter 4.

6.3 ECONOMETRIC METHODOLOGY

Since this chapter's major objective is to estimate the X supply and M demand functions between Australia and the selected TD countries in the selected TD categories, methodological issues associated with regression models used for estimation must conform to the classical model assumption. This is critical in order to obtain unbiased estimators for the population parameters. According to Gujarati

[100] Harmonized Commodity Description and Coding System - Second Level of aggregation (HS-2).
[101] Australian and New Zealand Standard Industrial Classification - Main Divisional Level of the aggregation (ANZSIC-1).
[102] Harmonized Commodity Description and Coding System - Forth Level of aggregation (HS-4).
[103] Australian and New Zealand Standard Industrial Classification - First Sub-divisional level of the aggregation (ANZSIC-2).

(2003), the main classical model assumptions that are critical in order to obtain the Best Linear Unbiased Estimators (BLUE)[104] for the population parameters are when:

1. The model is correctly specified according to economic theory, which includes a selection of the variables and the functional form.
2. The explanatory variables in the model are independent $Cov(X_i,X_j)=0$; this assumption ensures that a perfect linear relationship amongst the independent variables does not exist and that independent variables are uncorrelated.
3. The variation between dependent and independent variables must exist; without significant variations in dependent and independent variable(s), the model cannot be estimated.
4. The sample size must be greater than the number of independent variables; as a rule of thumb, a ratio of 5:1 applies.
5. The errors (residuals) have zero mean $E(\varepsilon_i)=0$; this assumption ensures that external factors not included in the model, do not have a systematic effect on the average value of dependant variable. Specifically, this assumption requires that the model contains the intercept (constant term) which will absorb any unexplained variations in the dependent variables due to external factors which are not included in the model.
6. The errors (residuals) are „Homoscedastic' (constant variance) $Var(\varepsilon_i)=\zeta^2$; if the errors in the model are „Heteroscedastic[105]', then as the value of dependant variable increases, the variation around the regression line also increases, which refers to an unequal spread of variances.
7. The errors (residuals) are independent (not correlated) $Cov(\varepsilon_i,\varepsilon_j)=0$ where $(i\neq j)$; if the errors are not independent, it implies that errors are „Autocorrelated' or 'Serially Correlated' which means that errors in one period are related to the errors in the next or subsequent period. This problem with „Autocorrelation' is typically found in time-series data.

[104] These classical assumptions are also applicable for nonlinear models, since the Best Unbiased Estimator (BUE) are obtained by satisfying these classical assumptions irrespective of whether models are linear or not (Gujarati, 2003, pp. 563-572).
[105] Heteroscedasticity is usually found in cross-sectional data.

8. The errors (residuals) are independent from independent variable(s) $Cov(\varepsilon_i,X_i)=0$; if the errors are not independent from independent variable(s), individual effect of the independent variable(s) on the dependant variable cannot be established.
9. The errors (residuals) are normally distributed $\varepsilon_i \sim N(0,\zeta^2)$; if the errors are not normally distributed, the average deviation values for the observed variable would not equal to zero.

If one or more of these assumptions are violated, it can lead to problems associated with biased coefficient and standard error estimates, which will ultimately affect the validity of the inferential statistics about estimates and finally, the distribution assumed during the tests will become inappropriate. According to Phillips (1986), if these assumptions are violated, the t-tests and F- tests are unlikely to be reliable. On the other hand, if these 9 classical assumptions are satisfied, the regression model is likely to produce the Best Unbiased Estimators (BUE) for the population regression parameters. However, the classical assumptions for the regression model estimation assumes that the time-series data for both the dependent and independent variable(s) are stationary. This implies that the mean, variances and autocovariances do not change overtime. On the contrary, this assumption is frequently violated and as a result, it is likely to lead to autocorrelation, a non-normality problem and most importantly to cause spurious regression[106] (Walter, 1995; Gujarati, 2003).

The stationary time-series are time independent and the mean, variances and autocovariances will be the same for all time periods, while non-stationary time-series will have different means and/ or variances when observed at different time intervals. A problem that arises when non-stationary[107] time-series data is used for the regression analysis is that the estimates generated are valid only for the period in the sample data, while for any other time-periods, these estimates are inaccurate (Gujarati, 2003). The empirical and theoretical studies that have tested the unit root are ample and numerous literature exists in this area, and such reviews can be found in Hamilton (1994), Johansen (1995), Hatanaka (1996) and Gujarati (2003).

[106] A spurious regression produces a high R^2 and high t-statistics; however, despite these desirable properties of the overall regression results, they are without any economic meaning. For a more detail explanation of the properties of the spurious regression, refer to Granger & Newbold (1974). According to Gujarati (2003), another indication of spurious regression is when $R^2 > DW$, where DW is Durbin-Watson statistic.
[107] The non-stationarity time-series is also called a „random walk' or „unit root'

Non-stationary time series according to Gujarati (2003) can be random walk without drift and random walk with drift, while non-stationary process uses a random walk without drift is presented in Equation 6.1

$$Y_t = Y_{t-1} + \varepsilon_t \tag{6.1}$$

where: $'Y_t'$ is the variable value of $'Y'$ at a time $'t'$, $'Y_{t-1}'$ is the variable value $'Y'$ at period $'t-1'$ or one period before and $'\varepsilon_t'$ is a random shock or error (residual) at a time $'t'$. This implies that the value of the variable $'Y'$ in the current period is equal to the value of $'Y'$ in the previous period plus a random shock in the current period; hence, the variance of the variable $'Y'$ is time dependent. This example shows that the process in Equation 6.1 is a non-stationary stochastic process.

Another non-stationary process can be illustrated using a random walk with a drift and is presented in Equation 6.2

$$Y_t = \delta + Y_{t-1} + \varepsilon_t \tag{6.2}$$

where: $'\delta'$ is the drift parameter which shows whether $'Y_t'$ drifts upward or downward which depends whether the drift parameter is a positive or negative value, while this process is also know as a First-order Autoregressive AR(1) model. The random walk model with drift is also a non-stationary process where both the mean and variances are time dependant. Both the random walk models with and without a drift are examples of the unit root process.

In order to illustrate the unit root problem, Equation 6.1 for the random walk without a drift can be expressed according to Equation 6.3 below;

$$Y_t = \rho Y_{t-1} + \varepsilon_t \tag{6.3}$$

where: $'\rho'$ is the correlation coefficient with a range between – 1 and + 1, however, if $'\rho = 1'$, then the process is non-stationary and the variable $'Y_t'$ has a unit root. On the other hand, if $'|\rho| < 1'$, the process can be considered stationary and the variable $'Y_t'$ does not have a unit root. However, in this form the hypothesis test cannot be done using the t-test procedure.

As a result, in practice Equation 6.3, is estimated according to Equation 6.4

$$\Delta Y_t = \delta Y_{t-1} + \varepsilon_t \qquad (6.4)$$

where: '$\delta = \rho - 1$' and Δ is change and represents a first difference operator, while for a stationary time-series $\rho < 1$ and δ is negative.

In order to prevent spurious regression, estimation is necessary to verify whether the variables are stationary. A number of different methods exist for verifying whether the time-series data is stationary. According to Gujarati (2003), one of the most basic informal tests for stationarity is to conduct a graphical analysis, followed by a correlogram test. However, these tests are rather imprecise and subjective, especially when the time-series are near the unit root, since what may appear to be a stationary process to one observer, may appear to be a non-stationary process to another observer (Enders, 1995). While conducting a graphical examination for the stationarity at the beginning is sensible, it should always be followed by a formal test for the stationarity which includes a Dickey-Fuller Test (DFT) and an Augmented Dickey-Fuller Test (ADFT) (Dickey & Fuller, 1979).

The most basic informal test for stationarity consists of graphically plotting the data and visually observing whether the data is trending overtime. Despite the fact that this test is a very basic procedure, it can still provide valuable clues as to whether the mean or variance are changing overtime and hence violating the stationarity assumption. Another informal test for stationarity is the correlogram test, where the autocorrelation function is calculated and plotted against different time-lags; while the autocorrelation function is the ratio of the covariance at different time-lags over the sample variance. If the correlogram exhibits small autocorrelation values (positive and negative) and are clustering around the zero as a number of lags increase, the time-series data are probably stationary, which is also called a „white-noise' time-series. However, if the correlogram exhibits a high autocorrelation and declines very slowly towards zero as a number of lags increase, the time-series data is likely to be non-stationary, which is due to the changes in the mean and/or variance overtime.

The formal tests for the unit root that are adopted in the literature are DFT and ADFT which follows the τ (tau) statistics, while both these tests are testing the following hypothesis: H_o: $\delta = 0$; H_A: $\delta < 0$

where: $\delta = 0$ implies that $\rho = 1$, as a result of the presence of the unit root, while $\delta < 0$ imply that $|\rho| < 1$ and as a result, the unit root does not exists, hence the time-series are stationary.

The DFT consists of 3 different null hypothesis for the Y_t - random walk without drift (without intercept) (Equation, 6.4), Y_t - random walk with drift (with intercept) (Equation, 6.5) and Y_t - random walk with drift around stochastic trend (with intercept and time trend) (Equation, 6.6).

$$\Delta Y_t = \alpha_0 + \delta Y_{t-1} + \varepsilon_t \tag{6.5}$$

$$\Delta Y_t = \alpha_0 + \alpha_1 T + \delta Y_{t-1} + \varepsilon_t \tag{6.6}$$

where: T is the time trend.

Once these three models are estimated using the Ordinary Least Squares (OLS), the coefficient estimated for Y_{t-1} in each model are divided by its standard error, which is τ (tau) statistics calculated. The critical values are obtained from the Dickey-Fuller table, while the critical values for each of these three models are different. Under the DFT, three hypothesis are tested, where in each case if H_o is rejected, it implies that the time-series does not contain a unit root, however, if H_o can not be rejected, it implies that the time series contains the unit root and is non-stationary.

Unlike the DFT which automatically assumes that the error term (residual) $'\varepsilon_t'$ is not correlated, the improved formal test for the unit root is ADFT which is an extension of the DFT which attempt to prevent a serial correlation of the error term. The ADFT consists of estimating the OLS as the following model:

$$\Delta Y_t = \alpha_0 + \alpha_1 T + \delta Y_{t-1} + \sum_{i=1}^{k} \beta_i \Delta Y_{t-i} + \varepsilon_t \tag{6.7}$$

where: $\Delta Y_{t-1} = Y_{t-1} - Y_{t-2}$, $\Delta Y_{t-2} = Y_{t-2} - Y_{t-3}$, $\Delta Y_{t-3} = Y_{t-3} - Y_{t-4}, \ldots, \Delta Y_{t-m} = Y_{t-m} - Y_{t-n}$,

$\sum_{i=1}^{k} \beta_i \Delta Y_{t-i}$ is the lag term where $'k'$ chosen is sufficiently large to ensure that $'\varepsilon_t'$ is a pure white noise error term.

The ADFT follows the same τ (tau) statistics, the Dickey-Fuller distribution and all the steps for the unit root testing are the same as in the DFT.

Although both DFT and ADFT methodology are commonly used for testing time-series data for the stationarity, a number of downsides of this approach have been identified. According to Phillips & Perron (1988), Schwert (1989), Cochrane (1991), Agiakoglou & Newbold (1992) and Maddala & Kim (1998), these downsides are evident when the error term is not independent and/or not-normally distributed and also in pure Autoregressive Integrated Moving Averages (ARIMA). Further downsides includes a reduction in the number of degrees of freedom due to a higher number of lags required and the power of tests in respect to a probability of committing a „*Type I Error*'.

Due to these downsides of the DFT and ADFT, some modified tests for the unit root have emerged. Such tests includes the Phillips-Perron Test (PPT) (Phillips & Perron, 1988), which is a non-parametric test for unit root testing; followed by the power of test which is known as the Dickey-Pantula Test (DPT) (Dickey & Pantula, 1987). The DPT is suitable when the time-series are integrated of a higher than order than 1 I(>1) and more than one unit root exists.

Once the time-series data is tested for the unit root, two outcomes are possible: firstly, if the time-series does not contain the unit root, such time-series are stationary and secondly, if the time-series contains the unit root, such time-series are non-stationary. If the time-series are stationary, the regression estimation follows the OLS procedure; however, if the time-series are non-stationary, there are two options on how to transform a non-stationary time-series into stationary, before such variables can be used in a regression estimation. The first method of transforming non-stationary time-series to stationary time-series is by differencing and the second method is by detrending, while which method is adopted depends whether the time-series will be stationary by differencing or detrending.

The method of differencing is achieved by taking the first difference of the variable with a unit root according to Equation 6.8, which removes a stochastic trend.

$$\Delta Y_t = Y_t - Y_{t-1} \tag{6.8}$$

On the other hand, the method of detrending is to run the OLS and estimate according to Equation 6.9, which is the removal of a deterministic trend.

$$Y_t = \alpha_0 + \alpha_1 T + \varepsilon_t \tag{6.9}$$

Once the model is estimated in Equation 6.9, then the trend is removed according to Equation 6.10 and the time-series becomes stationary, while such errors (residuals) '$\hat{\varepsilon}_t$' are called „linearly detrended time-series'.

$$\hat{\varepsilon}_t = Y_t - \hat{\alpha}_0 - \hat{\alpha}_1 T \qquad (6.10)$$

The method chosen is critical, because if the time-series are difference stationary and being treated by Equations 6.9-6.10, it will be under-differenced; however, if they are trend stationary and are treated by Equation 6.8, it will be over-differenced. According to Gujarati (2003), most macroeconomic time-series data are difference stationary.

Now that the significance of the unit root is described and the tests and correction methods for non-stationary time-series data are explained, additional important concepts of cointegration between variables are explained next.

If all variables are stationary in level form I(0), first difference form I(1) or any other 'k' difference form I(k) (so-called integrated variables), such variables can be cointegrated. Cointegrated variables have a long-term economic relationship, as they never diverge far from each other in the long-run, despite exhibiting some deviation in the short-run. The most common tests for cointegration are Engle-Granger Test (EGT), Augmented Engle-Granger Test (AEGT), Cointegrating Durbin-Watson Test (CDWT) and Johansen Maximum Likelihood Procedure (JMLP).

Granger (1981, 1986) and Engle & Granger (1987) developed the cointegration test, which is likely to maintain a long-run relationship between two or more variables that are non-stationary overtime and are integrated of the same order. Suppose 2 variables Y_t and X_t are integrated of order one I(1) and are non-stationary. Consequently, the linear relationship of these two variables are expressed as $Y_t - \alpha X_t = \varepsilon_t = I(0)$, where Y_t and X_t are cointegrated, while 'α' is the cointegrating parameter. This condition ensures a long-run equilibrium relationship amongst these variables.

The EGT and AEGT procedure are equivalent to DFT and ADFT respectively. The only dissimilarity between these 2 tests are their critical values, which are different (Engle & Granger, 1987). The EGT and AEGT tests for cointegration starts by estimating the regression in Equation 6.11, then the errors (residuals) are obtained according to Equation 6.12 and once this is completed, the DFT and ADFT procedure is carried-out on the estimated error term (residuals).

$$Y_t = \alpha_0 + \alpha_1 X_t + \varepsilon_t \tag{6.11}$$

$$\varepsilon_t = Y_t - \alpha_0 - \alpha_1 X_t \tag{6.12}$$

It must be noted that if Y_t and X_t are cointegrated, any linear combination of them will be stationary and consequently ε_t will be stationary.

The CDWT is an alternative method for the cointegration tests, which are according to the critical values developed by Sargan & Bhargava (1983). This method uses the Durbin-Watson (DW) statistics obtained from the cointegration regression and then testing the following hypothesis: H$_o$: $DW = 0$; H$_A$: $DW < 0$. The DW statistics is $'DW = 0'$ rather than $'DW = 2'$, since if the unit root is present, the estimated $'\rho \approx 1'$ will lead that the $'DW \approx 0'$. Despite this, the CDWT is a relatively simple test for cointegration; Engle & Granger (1987) argues that since the critical values of Durbin-Watson proves to be unstable across many empirical studies, the ADFT compared to the CDWT is likely to perform better.

Once the cointegration relationship is established, it is assumed that variables tend to move towards a long-run relationship, even though they exhibit disequilibrium in the short-run. Hence, error term (residuals) in Equation 6.12 is the „equilibrium error' and this error (residual) can be used as an „error correction term'. Furthermore, this error (residual) can be used through the Error Correction Model (ECM) to link the „error term' in the short-run relationship to represent the long-run relationship, while Granger & Weiss (1983) and Sargan (1984) have pioneered the ECM. Engle & Granger (1987) state that if two variables Y_t and X_t are cointegrated as in Equation 6.11, their relationship can be expressed through the ECM, presented in Equation 6.13

$$\Delta Y_t = \alpha_0 + \alpha_1 \Delta X_t + \alpha_2 \varepsilon_{t-1} + u_t \tag{6.13}$$

where: Δ is a change and represents a first difference operator, $'u_t'$ is random error and $\varepsilon_{t-1} = Y_{t-1} - \alpha_0 - \alpha_1 X_{t-1}$ which is one period lagged error term obtained from the cointegrated regression in Equation 6.11

Engle & Granger (1987) have proposed a Two-step Estimator for testing the cointegration. This procedure consists of two steps as the name implies; first, it is to estimate the cointegration regression to test whether the variables have a stochastic trend and the second step is to estimate the ECM using the estimated errors from the first step. Finally, if the result do not show the presence of a unit root, it means that the variables are cointegrated, given that individual variables used initially in the first step did have a unit root.

While Engle & Granger's (1987) test for cointegration is relatively successful, it is only appropriate for bivariate regression analysis, while in multivariate regression analysis, this method is likely to produce biased estimates. In order to address a test for cointegration when potentially several cointegrating vectors exist, the JMLP is used (Johansen, 1988), which is able to obtain more than one single cointegrating relationship. This approach is similar to the ADFT, however, it requires using a Vector Autoregression Model (VARM) approach. The specification of the JMLP in level and in the ECM form is presented in Equations 6.14 and 6.15 respectively.

$$Y_t = \alpha_0 + \beta_1 X_{t-1} + \ldots + \beta_{k-1} Y_{t-k+1} + \beta_k Y_{t-k} + \varepsilon_t \tag{6.14}$$

$$\Delta Y_t = \alpha_0 + \beta_1 \Delta X_{t-1} + \ldots + \beta_{k-1} \Delta Y_{t-k+1} + \beta_k Y_{t-k} + \varepsilon_t \tag{6.15}$$

where: α_0 is the intercept which shows the model with a drift, while the model without a drift would not include this intercept, $\beta's$ are coefficient estimated, ΔY_t is the vector integrated of order zero I(0), $'k'$ is a number of lags and $'\varepsilon_t'$ is a white noise random error term.

When the JMLP is used, a number of things should be considered, which includes establishing a number of cointegrating vectors (Banerjee *et al*., 1993), and evaluation for any structural breaks (Cuthbertson *et al*.; 1992; Hatanaka, 1996). Furthermore, if a cointegration between variables is established by using the VARM, the test for unit root is not required (Holden & Perman, 1994). Finally, hypothesis testing for cointegrating vectors can use a likelihood ratio test by comparing restricted and unrestricted estimators (Johansen, 1988; Johansen & Juselius, 1994; Johansen, 1995).

Up until this point, the tests for cointegration assumed the existence of the cointegrating relationship, while all variables being integrated are of the same order. However, this is not always the case; for instance, if not all variables are integrated of the same order and/or when cointegration relationship does not exist, the Engle & Granger (1987) Two-step Estimator for testing the cointegration is likely to be not appropriate. To address this shortcoming, when not all variable are integrated of the same order and/or cointegration relationship does not exist - an alternative technique is to use the Unrestricted Error Correction Model (UECM)[108]. According to Banerjee *et al*. (1993), the UECM procedure is the estimation of the general dynamic model (Equation 6.16) which contains initially more lags than necessary, followed by subsequent modification (differences and lags) in order to separate short and long-run relationships (Equation 6.17).

$$Y_t = \alpha_0 + \sum_{i=1}^{k} \beta_i Y_{t-i} + \sum_{i=0}^{k} \phi_i X_{t-1} + \varepsilon_t \tag{6.16}$$

where: Y_t is a vector of endogenous variables *(n×1)*, X_t is a vector of independent variables *(m×1)*, β_i is a matrices of parameters *(n×n)* and ϕ_i is a matrices of parameters *(n×m)*.

$$\Delta Y_t = \alpha_0 + \sum_{i=1}^{k-1} \beta_i \Delta Y_{t-i} + \sum_{i=0}^{k-1} \phi_i \Delta X_{t-k} + \psi_0 Y_{t-k} + \psi_1 X_{t-k} + \varepsilon_t \tag{6.17}$$

where: $\psi_0 = -\left(I - \sum_{i=1}^{k} \beta_i\right)$, $\psi_1 = \sum_{i=0}^{k} \phi_i$, while ψ_1 / ψ_0 is a long-run relationship (where $\psi_1 / -\psi_0$ is a long-run elasticity of the Y_t in respect to X_t).

Since the UECM is initially over-parameterised (contains more lags than necessary), it helps to maintain a long-run relationship and prevents the occurrence of spurious regression (Athukorala & Jayasuriya, 1994; Athukorala & Rajapatirana, 2000). In addition, it is a superior model for a relatively small sample compared to other models (Cuthbertson *et al*., 1992). Unlike the Engle & Granger procedure where the short-run dynamics does affect the error term (residuals), the UECM does not. Consequently, the UECM is likely to have better statistical properties (Pattichis, 1999). Furthermore, the UECM throughout the process of diagnostic tests carried-out include a „test for normality of errors (residuals)' (Bera & Jarque, 1981; Jarque & Bera, 1980), a „test for serial-correlation' (Godfrey, 1978a; Godfrey, 1978b), a „heteroscedasticity test' (Goldfeld & Quandt, 1973; White, 1980; White, 1982) and a „Ramsey RESET test for the specification' (Ramsey, 1969), which is progressively simplified to the parsimonious model structure. The UECM model has been applied in numerous empirical studies such as Muscatelli & Hurn (1992), Athukorala & Menon (1994),

[108] London School of Economics (LSE) developed the UECM, while this approach is also known as a „top-down methodology' (Cuthbertson *et al*., 1992; Maddala, 1992, pp. 494-96).

Gunawardana *et al*. (1995), Menon (1996), Prasit (1997), Gunawardana & Prasit (1998), Senhadji (1998), Athukorala & Rajapatirana (2000), Gunawardana & Vojvodic (2002), Havrila (2004), Havrila & Gunawardana (2006) and Ziramba (2007).

Based on the review of the econometric methodology, the adopted estimation procedures in this chapter will commence by testing the variables for the presence of the unit root (non-stationarity) by informal and formal testing methods. The informal methods will be carried-out by plotting the time-series data and observing the trend (both the linear and non-linear) and any possible relationship, while the formal method will include the DFT, ADFT (Dickey & Fuller, 1979) and PPT (Phillips & Perron, 1988) to determine whether the variables have a unit root.

Once the variables used in the model have been tested for a unit root and if proved that none of the variables have a unit root, the OLS will be applied followed by the standard diagnostic tests. If some variables have a unit root and some do not, the first difference or second difference (if required) will be taken off the variables which have a unit root. Once these variables after differencing becomes stationary, the OLS will be applied followed by the standard diagnostic tests. If all variables have a unit root and such variables are stationary in the first difference form I(1) or in any other form i.e. I(2)[109], I(3), such variables can potentially be cointegrated, consequently, the JMLP test for cointegration will be carried out. If the JMLP reveals one cointegrating equation, the ECM will be applied followed by the standard diagnostic tests. However, if the JMLP reveals more than one cointegrating equation, the VARM will be applied followed by the standard diagnostic tests.

Due to the large number of models that will be estimated in this chapter - 232 in total, if the diagnostic tests reveals any of the diagnostic problems such as serial correlation, heteroscedasticity, model misspecification or non-normality of residuals, this will be reported only, without undertaking any specific correction procedures. The only correction procedure which will be undertaken (if deemed necessary), is for the serial correlation. If any of the estimated models shows evidence of serial correlation problems, an independent variable AR(1) variable will be added to such model(s) and the model(s) will be re-estimated. This procedure is known as an iterative Cochrane-Orcutt procedure (Cochrane & Orcutt, 1949), and its intention is to correct for the

[109] If it is more than 2 „>I(2)', the coefficient(s) estimated can not be meaningfully interpreted.

serial correlation. Furthermore, the models which will be estimated using the ECM will contain an additional independent variable „Residual (-1)', which is a long-run residuals (error term) from the OLS (long-run model), lagged by one period.

6.4 EXPORT SUPPLY

According to Kreinin (2005), the country X supply to the RoW consists of excess supply in the domestic market at each specific price level, while the country X supply is determined by, and constituted of, the difference between domestic production and Consumption (C) levels. Under this proposition, the country cannot influence the world price levels in the observed category and as a result, it is considered a „small country' in the international trading environment in such category. Furthermore, if the QTY exported and domestic demand and supply price elasticities are known, according to Kreinin (2005), the X price elasticity is expressed in Equation 6.18

$$\eta_{XS} = \left(Q_S^{\ d} / Q_X\right)\ \eta_S^{\ d} + \left(Q_D^{\ d} / Q_X\right)\ \eta_D^{\ d} \tag{6.18}$$

where: 'η_{XS}' is price elasticity of the X supply, '$Q_S^{\ d}$' is the QTY supplied domestically, '$Q_D^{\ d}$' is the QTY demanded domestically, 'Q_X' is the QTY exported, '$\eta_S^{\ d}$' is price elasticity of domestic supply and '$\eta_D^{\ d}$' is the price elasticity of domestic demand.

6.4.1 THEORETICAL FRAMEWORK AND EMPIRICAL STUDIES

The econometric analysis of the X supply is relatively limited in the literature in contrast to the M demand analysis. This remark has been initially pointed-out almost 60 years ago by Orcutt (1950), while lack of the econometric studies in this area is also evident at present. According to Houthakker & Magee (1969), Taplin (1973), Khan & Ross (1977), Boylan *et al*. (1980), Boylan & Cuddy (1987) and Brakman & Elmer (1998), this is likely to be the outcome that price elasticity of the X supply is assumed to be infinite or very high and as a result, empirical studies are more focused on the X and M demand. Goldstein & Khan (1978) suggests that this assumption is applicable for the M supply by the RoW, however, it is unrelated for the X supply by an individual country. Furthermore, Goldstein & Khan suggests that other things being equal, an increasing international demand for the country X will generate raise in the price of the X, unless the exporting country experiencing an increasing return to scale.

Goldstein & Khan (1978) estimated that the simultaneous X supply and demand and finds that once the X supply is taken into account, the price elasticity of the X demand is different. Additional studies which have simultaneously estimated the X supply and demand includes Leamer & Stern (1970), Rhomberg (1973), Khan (1974), Arize (1987), Gafar (1988), Balassa *et al*. (1989) and Koshal *et al*. (1992).

While some studies utilized a simultaneous estimation of the X supply and demand, some researchers including Grimes (1993) recommends that the estimation of the X supply and demand as single equations for obtaining the structural estimates. The studies which have separately estimated the X supply and/or demand includes Aggarwala (1971), Bahmani-Oskooee (1984), Gunawardana *et al*. (1995), Prasit (1997) and Havrila (2004).

Ali (1978) pointed-out that the estimation of the X supply and demand model should be estimated by simultaneous equations if the X prices are determined endogenously; however, if the X prices are determined exogenously, the single equation model should be used. The model estimated by Ali (1978) contained the Exchange Rate (EXR) and value of subsidy, where the value of subsidy and the EXR determining the real effective EXR. There is some evidence that the approach suggested by Ali (1978) is adopted in a number of studies that estimated the X supply and demand models. Such studies includes Tambi (1998), which estimates the X supply for the agricultural products using price ratio, capacity variable and the EXR, whereas Athukorala & Reidel (1993) estimate the X supply for the manufactured products using real EXR and dummy variables. Moreover, the empirical studies such as Suss (1974) estimates the X supply and demand functions using a Relative Price (RP) ratio, while studies by Phaup (1981), Haynes & Stone (1983) uses domestic and the X prices separately in their models.

In the empirical studies by Goldstein & Khan (1978; 1985), Arize (1987), Koshal *et al*. (1992) and Warr & Wollmer (1996), the X supply is estimated as a function of the RP and the GDP levels. However, in addition to the RP variables, the studies by Koshal *et al*. (1992), Gunawardana *et al*. (1995), Prasit (1997) and Havrila (2004) have also used the capacity utilization. Furthermore, in addition to the RP and the capacity utilization, Prasit (1997) included a dummy variable for the factor (f) scheme, denoted as 0 before the year 1987 and 1 after year 1987[110]. Finally, the studies by Havrila (2004), Havrila & Gunawardana (2006) in estimation of the X supply models have used also the effective rate of government assistance.

Based on a comprehensive review of the empirical studies, all X supply models consists of the RP, while the rest of the explanatory variables are mixed. An additional explanatory variables that has been randomly used in the X supply models includes the GDP levels, capacity utilization, dummy variables and the effective rate of government assistance. The RP variable have been calculated by numerous methods which includes as a ratio of the X price to domestic price index (Goldstein & Khan, 1978); as a ratio of the X price index to the domestic price index (Prasit, 1997; Havrila, 2004; Havrila & Gunawardana, 2006) and as a ratio of the X price to the price of foreign goods multiplied by the EXR (Belessiotis & Giuseppe, 1997). The studies that have used GDP levels in the X supply model have converted the GDP levels from nominal to real values, while the capacity utilization was presented as a real value of domestic production (Havrila, 2004; Havrila & Gunawardana, 2006). However, since data for the capacity utilization are difficult to obtain, some studies that includes studies by Gunawardana *et al*. (1995), Prasit (1997) and Gunawardana & Prasit (1998) have used a proxy (time trend variable) for the capacity utilization.

Based on a review of empirical studies, the most basic X supply model is presented in Equation 6.19

$$XS_{ij}^{\,t} = f\left[\left(PX_i^{\,t} / P_i^{\,t}\right), DC_i^{\,t}\right] \tag{6.19}$$

where: 'XS' is the X supply, $(PX_i^t / P_i^t$ is the RP, while 'PX' is the X price index and 'P' is the domestic price index, 'DC' is the domestic capacity utilization, 'i' is the industry for the category i, 'j' is the country j or the RoW where the X is destined to and 't' is the time period.

According to the theoretical X supply in Equation 6.19, the RP expressed as a ratio of the X price index over the domestic price index, other things being equal, it is expected to be positive since increases in the RP will prove to be more profitable to X more. On the other hand, the domestic capacity utilization is also expected to be positive, since other things being equal, as the capacity utilization increases, it is expected that the X supply will rise.

[110] The factor (f) scheme was introduced in Australia in the year 1987.

The Australian X levels in the selected TD categories accounts for a small proportion of the world total X and this has been verified in chapters 4 and 5, thus the X prices are considered to be determined exogenously in the selected TD categories. Due to this evidence as suggested by Ali (1978) and further supported by Thursby & Thursby (1984), the single equation model will be estimated in this chapter. Furthermore, the adopted theoretical X supply model in this chapter will include both the RP and the capacity utilization. However the RP, unlike existing studies which use proxies (price indices for both the X and domestic output) for the calculation of the RP, this study will calculate the RP by dividing the Average Unit Value (AUV) of the X with AUV of the M. While the AUV for both the X and M are calculated by dividing the X and M values expressed in the AUD with the corresponding X and M QTY respectively. To my best knowledge, this approach has not been used in any previous studies, and the most likely reason for this is the lack of X and M trade data that contains both the X and M AUD values and their corresponding QTY. As a result, this approach is likely to provide more reliable relative X prices, thus reflecting on the model's strength. Finally, the capacity utilization in this study will be proxy by the time trend, which follows the methodology used in the studies by Gunawardana *et al*. (1995), Prasit (1997) and Gunawardana & Prasit (1998). The theoretical model for the X supply in this form is presented in Equation 6.20

$$XS_{ij}^{t} = f\left[\left(\left(X_{ij}^{t} / X*_{ij}^{t}\right) / \left(M_{ij}^{t} / M*_{ij}^{t}\right)\right), T_i^t\right] \tag{6.20}$$

where: $(X_{ij}^t / X^*{}_{ij}^t$ is the AUV for the X, $(M_{ij}^t / M^*{}_{ij}^t$ is the AUV for the M and $'T_i^t'$ is the time trend, $'X'$ and $'M'$ is based on monetary values (AUD), while $'X^*'$ and $'M^*'$ is the X and M corresponding QTY.

According to the theoretical X supply model in Equation 6.20, other things being equal, it is expected that the RP will be a positive because as the RP of the X increases, it will be more profitable to X more. Furthermore, other things being equal, a positive relationship is also expected for the domestic capacity utilization because as the capacity utilization increases, it is expected that the X supply will rise.

Despite the fact that a number of studies which includes studies by Prasit (1997), Gunawardana & Prasit (1998), Havrila (2004) and Havrila & Gunawardana (2006) do not include the GDP levels in the X supply model, other studies suggests that the GDP levels is a significant variable. The studies by Goldstein & Khan (1978; 1985), Arize

(1987), Koshal *et al*. (1992) and Warr & Wollmer (1996) all suggest that the country's real GDP levels are also significant variables in determining the X supply volumes. This is likely to be due to the fact that as the real GDP level increase, it is likely to increase an economic productive capacity (the ability to produce more goods and services) and as a result, the X sector in the observed industry will expand. Subsequently, the real GDP level will be included in the X supply model and the model in this form is presented in Equation 6.21

$$XS_{ij}^{t} = f\left[\left(\left(X_{ij}^{t} / X*_{ij}^{t}\right) / \left(M_{ij}^{t} / M*_{ij}^{t}\right)\right), RGDP^{t}, T_{i}^{t}\right] \tag{6.21}$$

where: $'RGDP'$ is a Real GDP levels.

By observing existing empirical studies which have estimated the X supply models, it is evident that the dummy variable(s) has been frequently used, while examples of such studies include studies by Prasit (1997), Gunawardana & Prasit (1998) and Havrila (2004). The X supply model in this chapter will also include a dummy variable to distinguish the Australian X supply before and after the Goods and Services Tax (GST)[111] introduction, while the final theoretical model in this form is presented in Equation 6.22

$$XS_{ij}^{t} = f\left[\left(\left(X_{ij}^{t} / X*_{ij}^{t}\right) / \left(M_{ij}^{t} / M*_{ij}^{t}\right)\right), RGDP^{t}, T_{i}^{t}, D\right] \tag{6.22}$$

where: $'D'$ is the dummy variable and takes value of 0 before July 2000 and 1 after July 2000.

The main reason why the dummy variable has been included in the X supply model is due to the strong evidence that the X of the goods (Wittwer & Anderson, 2002) and services (Ihalanayake & Divisekera, 2006) have been affected with the introduction of the GST in Australia. According to Wittwer & Anderson (2002) who have examined the wine industry in Australia, found evidence that the introduction of the GST has favourably affected the X sector in the wine industry, especially for the premium vine segments. On the other hand, the study by Ihalanayake & Divisekera (2006) which examined the tourism industry in Australia, found that the tax burden associated with the introduction of the GST has imposed a higher disproportional tax on the tourism industry compared to other industries in Australia. Furthermore, the exogenous factors

[111] The GST replaced the Wholesale Sales Tax (WST) which was applicable for the X, while the introduction of the GST was the major initiative by the previous Australian government to significantly reform the taxation system in Australia. One of the intentions of this tax reform in Australia was to promote the X competitiveness by Australian firms by exempting the X from the GST payment obligation. For more information visit: www.custom.gov.au and click on „import export'.

(in this case the GST) can at times inflict a bias on the estimates, while the inclusion of dummy variable will ensure that these exogenous factors are taken into account.

Based on this review, the X supply model which will be estimated is presented in Equation 6.23

$$XS_{ij}^{t} = \alpha_0 + \alpha_1 RP_{ij}^{t} + \alpha_2 RGDP^{t} + \alpha_3 T_i^{t} + \alpha_4 D + \varepsilon^{t} \tag{6.23}$$

where: 'α_0' is the intercept, '$\alpha_1, \alpha_2, \alpha_3$' are the slope coefficients, 'α_4' is the intercept shifter, 'ε' is a random error, 'RP' is the RP which is the ratio of the X *AUV* $(X_{ij}^{t} / X^{*}{}_{ij}^{t}$ over the AUV for the M $(M_{ij}^{t} / M^{*}{}_{ij}^{t}$, '$RGDP^{t}$' is the domestic real GDP levels, 'T_i^{t}' is the time trend which represents the domestic capacity utilization, 'D' is the dummy variable which takes value of 0 before July 2000 and 1 after July 2000, 'i' is the industry for the category i, 'j' is a country j or the RoW where the X is destined to and 't' is a time period.

The expected a priory signs for variables in Equation 6.23 are all positive; for 'α_1' other things being equal, as the AUV of the X relative to the AUV of the M increases, it is expected that the X supply will increase as it become more profitable to X more, hence a positive a priori sign. Furthermore, other things being equal 'α_2' a priory sign is expected to be positive, because as domestic real GDP increases, it is expected that the productive capacity will increase[112], which in turn is likely to increase the X supply. The 'α_3' is also expected a positive a priori sign as the capacity utilization increases, it is likely to increase the X supply volumes. Finally, other things being equal, it is expected that the 'α_4' a priory sign will shift the intercept higher in the period post July 2000, as it has been suggested that the introduction of the GST should favourably influence the X levels.

Now that the theoretical X supply model is determined, another important aspect to consider is to establish whether to use a linear or non-linear X supply model. According to Khan & Ross (1975; 1977) and Salas (1982), when the model estimated is used for the forecasting, the linear model is a more convenient form. However, when studies try to establish to what degree changes in the explanatory variables affects the dependant variable overtime, the preferred model is the log-log form. The

[112] This assumption does not hold in all situations. For example, the GDP level can increase due to increases in consumption levels only, however, an adopted approach is sensible since it has been established in Chapter 3 (Graph 3.8) that investment levels in Australia are positive.

use of the estimation in log-log form has been adopted in numerous studies, which include studies by Gunawardana & Prasit (1998) and Dutta & Ahmed (2006). As a result, the functional form for the X supply model, which will be estimated for the selected TD categories and countries, will be in the log-log form. This approach will not only produce elasticities but also according to Gujarati (2003, p.421), it is likely to reduce the problems with heteroscedasticity which is a common problem when the cross-sectional data are used, which is the case in this study. The adopted functional form for the X supply in the log-log form is presented in Equation 6.24

$$LnXS_{ij}^{t} = \alpha_0 + \alpha_1 LnRP_{ij}^{t} + \alpha_2 LnRGDP^{t} + \alpha_3 T_i^{t} + \alpha_4 D + \varepsilon^{t} \qquad (6.24)$$

where: '*Ln*' is the natural logarithm for the corresponding variables.

6.4.2 EXPORT SUPPLY ESTIMATION; HS-2, HS-4

This section consists of 116 estimated X supply models, using the X data presented in Appendix Tables 6.1-6.19 for HS-2 and Appendix Tables 6.20-6.46 for HS-4 level of aggregation. Furthermore, the Australian GDP data is presented in Appendix Table 6.46, while Table 6.1 and Table 6.2 shows the X supply models which will be estimated in this section based on HS-2 and HS-4 level of aggregation respectively.

Table: 6.1

EXPORT SUPPLY – ESTIMATED MODELS (AUD & QTY)					
HS-2 and ANZSIC-1					
AUSTRALIA -	30[1]	84[2]	85[3]	87[4]	1[5]
RoW	Yes (n=68)[a]	Yes (n=68)[a]	Yes (n=68)[a]	Yes (n=68)[a]	No
China	Yes (n=61)[b]	Yes (n=68)[a]	Yes (n=68)[a]	Yes (n=55)[c]	No
France	Yes (n=68)[a]	Yes (n=68)[a]	Yes (n=68)[a]	Yes (n=42)[f]	No
Germany	Yes (n=68)[a]	Yes (n=68)[a]	Yes (n=68)[a]	Yes (n=68)[a]	No
Malaysia	No	Yes (n=68)[a]	Yes (n=68)[a]	Yes (n=68)[a]	No
Singapore	No	Yes (n=68)[a]	Yes (n=68)[a]	Yes (n=68)[a]	No
Thailand	No	Yes (n=68)[a]	Yes (n=68)[a]	Yes (n=68)[a]	No
United Kingdom	Yes (n=68)[a]	Yes (n=68)[a]	Yes (n=68)[a]	Yes (n=68)[a]	No
United States of	Yes (n=68)[a]	Yes (n=68)[a]	Yes (n=68)[a]	Yes (n=68)[a]	No

[1] Pharmaceutical Products
[2] Nuclear Reactors, Boilers, Machinery and Mechanical Appliances; Parts Thereof
[3] Electrical Machinery and Equipment and Parts Thereof; Sound Recorders and Producers, Television Image and Sound Recorders and Reproducers, and Parts and Accessories of Such Articles
[4] Vehicles Other Than Railway or Tramway Rolling-Stock, and Parts and Accessories Thereof
[5] Transportation Services

- *[a] 1990:Q1 - 2006:Q4*
- *[b] 1991:Q4 - 2006:Q4*
- *[c] 1993:Q2 - 2006:Q4*
- *[f] 1996:Q3 - 2006:Q4*

Table: 6.2

EXPORT SUPPLY – ESTIMATED MODELS (AUD & QTY)						
HS-4 and ANZSIC-2						
AUSTRALIA -	3004[1]	8471[2]	8473[3]	8517[4]	8703[5]	1.2[6]
RoW	Yes (n=68)[a]	Yes (n=68)[a]	Yes (n=68)[a]	Yes (n=68)[a]	Yes (n=68)[a]	No
China	No	Yes (n=68)[a]	No	No	No	No
France	Yes (n=39)[g]	Yes (n=68)[a]	No	No	No	No
Germany	Yes (n=43)[e]	Yes (n=68)[a]	No	Yes (n=68)[a]	Yes (n=68)[a]	No
Malaysia	No	Yes (n=68)[a]	No	Yes (n=68)[a]	Yes (n=42)[f]	No
Singapore	No	Yes (n=68)[a]	No	Yes (n=68)[a]	Yes (n=48)[d]	No
Thailand	No	Yes (n=68)[a]	No	No	Yes (n=42)[f]	No
United Kingdom	Yes (n=35)[h]	Yes (n=68)[a]	No	Yes (n=68)[a]	Yes (n=68)[a]	No
United States of	No	No	No	No	Yes (n=68)[a]	No

[1] Medicaments (Excluding Goods of 3002, 3005 or 3006) Consisting of Mixed or Unmixed Products for Therapeutic or Prophylactic Uses, Put Up in Measured Doses or in Forms or Packagings for Retail Sale
[2] Automatic Data Processing Machines and Units Thereof; Magnetic or Optical Readers, Machines for Transcribing Data onto Data Media in Coded Form and Machines for Processing Such Data, Not Elsewhere Specified or Include
[3] Parts and Accessories (Other Than Covers, Carrying Cases and the Like) Suitable for Use Solely or Principally with Office Machines
[4] Electrical Apparatus for Line Telephony or Line Telegraphy, Including Line Telephone Sets with Cordless Handsets and Telecommunication Apparatus for Carrier-Current Line Systems or for Digital Line Systems; Videophones
[5] Motor Cars and Other Motor Vehicles Principally Designed for the Transport of Persons (Other Than Public Transport Type), Including Station Wagons and Racing Cars
[6] Freight Transports

- *[a] 1990:Q1 - 2006:Q4*
- *[d] 1995:Q1 - 2006:Q4*
- *[e] 1996:Q2 - 2006:Q4*
- *[f] 1996:Q3 - 2006:Q4*
- *[g] 1997:Q2 - 2006:Q4*
- *[h] 1998:Q2 - 2006:Q4*

Note: Due to data unavailability, the X supply and the M demand models for the TD categories 1 and 1.2 are not estimated.

Tables 6.1-6.2 consists of 58 X supply models only, however, as each of these models are estimated based on AUD and QTY values, the X supply models estimated are 116 in total. These 116 models are estimated for the selected TD goods categories only, as the X data (QTY) are not available for the selected TD service categories.

Due to the econometric procedures, the variables in the X supply models are tested for the unit root prior to models estimation. If the unit root test revealed that all tested variables in the model are non-stationary, further test for the cointegration is carried-out. The unit root results are presented in Appendix Tables 6.47-6.76, while Appendix Tables 6.47-6.61 shows the unit root results based on AUD and Appendix Tables 6.62-6.76 shows the unit root results based on QTY values. Finally, for those models which required a cointegration analysis, the cointegration test results are presented in Appendix Tables 6.107-6.124

Tables 6.3-6.11 in this section shows all 116 X supply models estimated, which includes the estimated coefficients, corresponding t-ratios and diagnostic tests results, while Tables 6.3-6.6 and Tables 6.7-6.11 shows the estimated X supply models based on HS-2 and HS-4 level of aggregation respectively.

Since the dependant variable (X) and independent variables (RP and RGDP) are in log values, the interpretation of these estimated coefficients are in terms of elasticities. However, if the values of these variables are expressed in a change of the log values, the interpretation of such variables will refer to the growth rates in the elasticities.

Now that the data used and the procedures followed are outlined, the following sections will individually comment on all X supply models estimated in this chapter.

6.4.2.1 EXPORT SUPPLY MODELS; CATEGORY: 30

Table: 6.3 (Part A)

EXPORT SUPPLY MODELS: CATEGORY 30*							
AUSTRALIA - RoW							
AUD	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.035	1.326	**R^2**	0.325	**LMT F(2,59)**	0.232	-Model is mis-specified.
Δ(LnRP)	0.007	0.729	**Adj. R^2**	0.270	**LMT F(Prob.)**	0.794	
Δ(LnRGDP)	0.643	3.127*	**F(5,61)**	5.887*	**BPGT F(5,61)**	0.830	
Trend	0.000	0.215	**F(Prob.)**	0.000	**BPGT**	0.533	
Dummy	-0.024	-0.581	**DW**	1.886	**RESET F(1,60)**	2.870***	
Residuals (-1)	-0.322	-3.951*	**AIC**	-1.945	**RESET**	0.096	
			SC	-1.747	**JBT χ^2 (2)**	1.393	
			LL	71.150	**JBT χ^2 (Prob.)**	0.498	
QTY	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.012	-0.208	**R^2**	0.333	**LMT F(2,58)**	1.832	-Residuals are Heteroscedastic. -Model is mis-specified. -Residuals are not normally distributed. -Incorrect sign for RP; RGDP.
Δ(LnRP)	-0.069	-2.426**	**Adj. R^2**	0.277	**LMT F(Prob.)**	0.169	
Δ(LnRGDP)	-0.282	-0.359	**F(5,60)**	5.978*	**BPGT F(4,61)**	5.032*	
Trend	0.002	0.886	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.001	
Dummy	-0.092	-1.035	**DW**	2.234	**RESET F(1,59)**	8.508*	
AR(1)	-0.472	-4.375*	**AIC**	0.310	**RESET F(Prob.)**	0.005	
			SC	0.509	**JBT χ^2 (2)**	128.54*	
			LL	-4.232	**JBT χ^2 (Prob.)**	0.000	
AUSTRALIA - CHINA							
AUD	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.191	1.791***	**R^2**	0.307	**LMT F(2,51)**	0.866	
LnRP	0.063	1.787***	**Adj. R^2**	0.242	**LMT F(Prob.)**	0.427	
Δ(LnRGDP)	2.302	1.640***	**F(5,53)**	4.706*	**BPGT F(4,54)**	0.948	
Trend	-0.010	-1.791***	**F(Prob.)**	0.001	**BPGT F(Prob.)**	0.443	
Dummy	0.304	1.559***	**DW**	1.8950	**RESET F(1,52)**	0.415	
AR(1)	-0.436	-3.649*	**AIC**	1.3435	**RESET F(Prob.)**	0.523	
			SC	1.5548	**JBT χ^2 (2)**	1.171	
			LL	-33.634	**JBT χ^2 (Prob.)**	0.557	
QTY	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.195	-0.535	**R^2**	0.401	**LMT F(2,51)**	0.300	-Residuals are Heteroscedastic. -Model is mis-specified. -Residuals are not normally distributed. -Incorrect sign for RP.
LnRP	-0.324	-2.693*	**Adj. R^2**	0.345	**LMT F(Prob.)**	0.742	
Δ(LnRGDP)	14.421	3.004*	**F(5,53)**	7.098*	**BPGT F(4,54)**	4.971*	
Trend	0.021	1.138	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.002	
Dummy	-0.975	-1.463***	**DW**	2.0936	**RESET F(1,52)**	6.197**	
AR(1)	-0.439	-3.573*	**AIC**	3.8028	**RESET F(Prob.)**	0.016	
			SC	4.0141	**JBT χ^2 (2)**	60.077*	
			LL	-106.18	**JBT χ^2 (Prob.)**	0.000	

**** Pharmaceutical Products***
DW – Durbin-Watson Statistics
AIS – Akaike Info Criterion
SC – Schwartz Criterion
LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

Table: 6.3 Continued (Part B)

EXPORT SUPPLY MODELS: CATEGORY 30*							
AUSTRALIA - FRANCE							
AUD	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
C	0.189	0.776	**R^2**	0.200	**LMT F(2,59)**	3.12***	-Residuals are serially correlated. -Residuals are not normally distributed.
LnRP	0.090	2.171**	**Adj. R^2**	0.134	**LMT F(Prob.)**	0.052	
Δ(LnRGDP)	2.099	1.026***	**F(5,61)**	3.05**	**BPGT F(5,61)**	1.750	
Trend	-0.005	-0.483	**F(Prob.)**	0.016	**BPGT F(Prob.)**	0.137	
Dummy	0.017	0.046	**DW**	1.692	**RESET F(1,60)**	0.132	
Residuals (-1)	-0.290	-3.471*	**AIC**	2.461	**RESET F(Prob.)**	0.718	
			SC	2.658	**JBT χ^2 (2)**	29.143*	
			LL	-76.44	**JBT χ^2 (Prob.)**	0.000	
QTY	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.007	0.034	**R^2**	0.480	**LMT F(1,59)**	3.28***	-Residuals are serially correlated. -Residuals are not normally distributed. -Incorrect sign for RP.
Δ(LnRP)	-0.207	-3.766*	**Adj. R^2**	0.436	**LMT F(Prob.)**	0.075	
Δ(LnRGDP)	2.797	0.834	**F(5,60)**	11.06*	**BPGT F(4,61)**	0.241	
Trend	0.000	0.035	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.914	
Dummy	0.008	0.023	**DW**	2.184	**RESET F(1,59)**	0.184	
AR(1)	-0.427	-3.591*	**AIC**	2.870	**RESET F(Prob.)**	0.670	
			SC	3.069	**JBT χ^2 (2)**	9.586*	
			LL	-88.697	**JBT χ^2 (Prob.)**	0.008	
AUSTRALIA - GERMANY							
AUD	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.301	1.501	**R^2**	0.218	**LMT F(2,58)**	2.69***	-Residuals are serially correlated. -Incorrect sign for RGDP.
LnRP	0.034	1.408***	**Adj. R^2**	0.153	**LMT F(Prob.)**	0.076	
Δ(LnRGDP)	-1.878	-1.184	**F(5,60)**	3.35**	**BPGT F(4,61)**	1.972	
Trend	-0.006	-0.953	**F(Prob.)**	0.010	**BPGT F(Prob.)**	0.110	
Dummy	0.236	1.084	**DW**	2.208	**RESET F(1,59)**	1.566	
AR(1)	-0.401	-3.328*	**AIC**	1.751	**RESET F(Prob.)**	0.216	
			SC	1.950	**JBT χ^2 (2)**	1.173	
			LL	-51.786	**JBT χ^2 (Prob.)**	0.556	
QTY	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.240	1.026	**R^2**	0.328	**LMT F(2,58)**	0.865	-Residuals are serially correlated.
LnRP	0.023	0.793***	**Adj. R^2**	0.273	**LMT F(Prob.)**	0.426	
Δ(LnRGDP)	0.265	0.128	**F(5,60)**	5.870*	**BPGT F(4,61)**	1.141	
Trend	-0.006	-0.874	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.346	
Dummy	0.286	1.127	**DW**	2.073	**RESET F(1,59)**	1.375	
AR(1)	-0.565	-5.314*	**AIC**	2.260	**RESET F(Prob.)**	0.246	
			SC	2.460	**JBT χ^2 (2)**	5.03***	
			LL	-68.595	**JBT χ^2 (Prob.)**	0.080	

**** Pharmaceutical Products***
DW – Durbin-Watson Statistics
AIS – Akaike Info Criterion
SC – Schwartz Criterion
LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

Table: 6.3 Continued (Part C)

EXPORT SUPPLY MODELS: CATEGORY 30*							
AUSTRALIA - UNITED KINGDOM							
AUD	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.096	1.093	**R^2**	0.112	**LMT F(2,60)**	3.527**	-Residuals are serially correlated. -Incorrect sign for RP.
LnRP	-0.002	-0.273	**Adj. R^2**	0.054	**LMT F(Prob.)**	0.036	
Δ(LnRGDP)	1.158	2.380**	**F(4,62)**	2.0***	**BPGT F(4,62)**	1.135	
Trend	-0.003	-1.169	**F(Prob.)**	0.094	**BPGT F(Prob.)**	0.348	
Dummy	0.068	0.708	**DW**	2.088	**RESET F(1,61)**	0.093	
			AIC	-0.254	**RESET F(Prob.)**	0.762	
			SC	-0.089	**JBT χ^2 (2)**	0.465	
			LL	13.496	**JBT χ^2 (Prob.)**	0.792	
QTY	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.068	0.404	**R^2**	0.032	**LMT F(1,61)**	0.175	-Residuals are Heteroscedastic. -Residuals are not normally distributed. -Model is not significant.
LnRP	0.012	0.718	**Adj. R^2**	0.031	**LMT F(Prob.)**	0.677	
Δ(LnRGDP)	1.174	1.250	**F(4,62)**	0.509	**BPGT F(4,62)**	2.43***	
Trend	0.001	0.175	**F(Prob.)**	0.729	**BPGT F(Prob.)**	0.057	
Dummy	-0.071	-0.382	**DW**	1.8847	**RESET F(1,61)**	1.476	
			AIC	1.0606	**RESET F(Prob.)**	0.229	
			SC	1.2251	**JBT χ^2 (2)**	18.671*	
			LL	-30.53	**JBT χ^2 (Prob.)**	0.000	
AUSTRALIA - UNITED STATES							
AUD	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.721	-3.086*	**R^2**	0.311	**LMT F(2,60)**	1.144	
LnRP	0.353	4.181*	**Adj. R^2**	0.267	**LMT F(Prob.)**	0.325	
Δ(LnRGDP)	3.190	3.325*	**F(4,62)**	7.001*	**BPGT F(4,62)**	0.575	
Trend	0.004	0.805	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.682	
Dummy	0.094	0.490	**DW**	2.323	**RESET F(1,61)**	0.165	
			AIC	1.125	**RESET F(Prob.)**	0.686	
			SC	1.290	**JBT χ^2 (2)**	0.924	
			LL	-32.69	**JBT χ^2 (Prob.)**	0.630	
QTY	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.640	2.244**	**R^2**	0.203	**LMT F(2,60)**	1.684	-Residuals are Heteroscedastic. -Incorrect sign for RP.
LnRP	-0.281	-2.729*	**Adj. R^2**	0.152	**LMT F(Prob.)**	0.194	
Δ(LnRGDP)	2.936	2.509**	**F(4,62)**	3.953*	**BPGT F(4,62)**	2.18***	
Trend	-0.004	-0.581	**F(Prob.)**	0.006	**BPGT F(Prob.)**	0.082	
Dummy	-0.250	-1.071	**DW**	2.236	**RESET F(1,61)**	2.199	
			AIC	1.522	**RESET F(Prob.)**	0.143	
			SC	1.687	**JBT χ^2 (2)**	0.511	
			LL	-45.99	**JBT χ^2 (Prob.)**	0.775	

**** Pharmaceutical Products***
DW – Durbin-Watson Statistics
AIS – Akaike Info Criterion
SC – Schwartz Criterion
LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

According to Table 6.3, all twelve X supply models in Category 30 are significant except for the model between Australia and The United Kingdom based on QTY, which is not significant. For most of the models, the variables RP and RGDP are significant, while the variables Trend and Dummy are mostly not significant.

The variable RP is significant in 9 out of the 12 models and the RGDP is significant in 7 out of the 12 models. However, an incorrect (negative) sign for the RP (5 out of the 12 models; 4 based on QTY and 1 on AUD) and for the RGDP (2 out of the 12 models; 1 based on QTY and 1 based on AUD) are likely to be due to serial correlation, heteroscedasticity, model mis-specification, non-normality of residuals and the presence of collinearity in these models. The correct coefficient signs for both RP and RGDP are found in 6 out of the 12 models (almost all based on AUD), while for these 6 models, the coefficients range for the RP and RGDP is between (0.007 and 0.353) and (0.265 and 3.19) respectively. Furthermore, the coefficients estimated for Trend in 6 out of the 12 models, and Dummy in 5 out of the 12 models are negative. These results highlight inconclusive evidence that capacity utilization increases the X supply and that an introduction of the GST in July 2000 has stimulated the X supply in this category. Finally, the Adj. R^2 in overall for all 12 models in this category ranges between 3.1 and 43.6 percent.

In overall, out of 12 estimated models in this category, only 2 models (the X supply to China and The United States of America, both based on AUD) have the correct signs and have satisfactory passed all diagnostic tests. The X supply model to China shows that a 1 percent increase in the RP will increase the X growth rate by 0.063 percent, while 1 percent RGDP growth rate will increase the X growth rate by 2.302 percent in average. The X supply model to The United States of America shows that a 1 percent increase in the RP will increase the X growth rate by 0.353 percent, while a 1 percent RGDP growth rate will increase the X growth rate by 3.19 percent in average. The variables RP and RGDP are significant for both countries, while the Trend and Dummy variables are significant for China; however, they are not significant for The United States of America. Furthermore, the Trend variable shows only a marginal affect of the capacity utilization on the X supply (negative for China and positive for The United States of America), while the Dummy variable shows that since the GST has been introduced, the X supply for this category has increased by 30.4 and 9.4

percent respectively for these 2 countries in average. Finally, the Adj. R^2 for China and The United States of America is 24.2 and 26.7 respectively.

6.4.2.2 EXPORT SUPPLY MODELS; CATEGORY: 84

Table: 6.4 (Part A)

EXPORT SUPPLY MODELS: CATEGORY 84*							
AUSTRALIA - RoW							
AUD	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.049	2.206**	**R^2**	0.705	**LMT F(1,61)**	1.607	-Residuals are Heteroscedastic. -Model is mis-specified.
Δ(LnRP)	0.021	0.842	**Adj. R^2**	0.686	**LMT F(Prob.)**	0.210	
Δ(LnRGDP)	2.035	11.880*	**F(4,62)**	37.12*	**BPGT F(4,62)**	3.456**	
Trend	-0.002	-2.537**	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.013	
Dummy	0.053	1.537***	**DW**	2.194	**RESET F(1,61)**	6.259**	
			AIC	-2.321	**RESET F(Prob.)**	0.015	
			SC	-2.156	**JBT χ^2 (2)**	0.885	
			LL	82.750	**JBT χ^2 (Prob.)**	0.642	
QTY	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	8.198	37.964*	**R^2**	0.685	**LMT F(2,58)**	0.379	-Residuals are Heteroscedastic. -Model is mis-specified. -Residuals are not normally distributed. -Incorrect sign for RP.
Δ(LnRP)	-0.361	-6.365*	**Adj. R^2**	0.659	**LMT F(Prob.)**	0.687	
Δ(LnRGDP)	1.046	3.075*	**F(5,60)**	26.15*	**BPGT F(4,61)**	5.837*	
Trend	0.003	0.439	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.001	
Dummy	0.305	1.449***	**DW**	1.942	**RESET F(1,59)**	16.240*	
AR(1)	0.682	6.938*	**AIC**	-0.128	**RESET F(Prob.)**	0.000	
			SC	0.071	**JBT χ^2 (2)**	6.927**	
			LL	10.220	**JBT χ^2 (Prob.)**	0.031	
AUSTRALIA - CHINA							
AUD	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.072	0.644	**R^2**	0.422	**LMT F(2,59)**	0.442	-Residuals are Heteroscedastic.
Δ(LnRP)	0.081	2.315**	**Adj. R^2**	0.375	**LMT F(Prob.)**	0.645	
Δ(LnRGDP)	3.270	3.780*	**F(5,61)**	8.917*	**BPGT F(5,61)**	3.272**	
Trend	-0.002	-0.536	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.011	
Dummy	0.050	0.291	**DW**	2.093	**RESET F(1,60)**	0.141	
Residuals (-1)	-0.597	-5.403*	**AIC**	0.915	**RESET F(Prob.)**	0.708	
			SC	1.112	**JBT χ^2 (2)**	1.274	
			LL	-24.653	**JBT χ^2 (Prob.)**	0.529	
QTY	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.099	0.817	**R^2**	0.920	**LMT F(2,59)**	1.455	-Residuals are Heteroscedastic. -Residuals are not normally distributed. -Incorrect sign for RP.
Δ(LnRP)	-0.885	-23.392*	**Adj. R^2**	0.913	**LMT F(Prob.)**	0.242	
Δ(LnRGDP)	3.261	3.450*	**F(5,61)**	139.8*	**BPGT F(5,61)**	2.884**	
Trend	-0.004	-0.752	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.021	
Dummy	0.069	0.370	**DW**	1.967	**RESET F(1,60)**	1.387	
Residuals (-1)	-0.766	-6.834*	**AIC**	1.081	**RESET F(Prob.)**	0.244	
			SC	1.279	**JBT χ^2 (2)**	8.529**	
			LL	-30.218	**JBT χ^2 (Prob.)**	0.014	

Nuclear Reactors, Boilers, Machinery and Mechanical Appliances; Parts Thereof
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AIS – Akaike Info Criterion
SC – Schwartz Criterion
LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

Table: 6.4 Continued (Part B)

EXPORT SUPPLY MODELS: CATEGORY 84*							
AUSTRALIA - FRANCE							
AUD	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	1.323	9.360*	**R^2**	0.577	**LMT F(2,60)**	0.567	-Residuals are not normally distributed.
LnRP	0.057	1.554***	**Adj. R^2**	0.550	**LMT F(Prob.)**	0.570	
Δ(LnRGDP)	3.017	3.393*	**F(4,62)**	21.16*	**BPGT F(4,62)**	1.761	
Trend	0.011	2.476**	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.148	
Dummy	0.402	2.158**	**DW**	1.867	**RESET F(1,61)**	0.001	
			AIC	0.959	**RESET F(Prob.)**	0.975	
			SC	1.124	**JBT χ^2 (2)**	45.423*	
			LL	-27.136	**JBT χ^2 (Prob.)**	0.000	
QTY	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	10.745	55.357*	**R^2**	0.861	**LMT F(2,60)**	1.333	-Model is mis-specified. -Incorrect sign for RP.
LnRP	-0.804	-16.004*	**Adj. R^2**	0.852	**LMT F(Prob.)**	0.272	
Δ(LnRGDP)	2.313	1.894***	**F(4,62)**	95.84*	**BPGT F(4,62)**	1.415	
Trend	-0.001	-0.178	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.239	
Dummy	0.669	2.615**	**DW**	1.560	**RESET F(1,61)**	6.734**	
			AIC	1.594	**RESET F(Prob.)**	0.012	
			SC	1.759	**JBT χ^2 (2)**	2.096	
			LL	-48.401	**JBT χ^2 (Prob.)**	0.350	
AUSTRALIA - GERMANY							
AUD	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	3.422	20.789*	**R^2**	0.287	**LMT F(1,59)**	0.120	-Residuals are not normally distributed.
LnRP	0.012	0.334	**Adj. R^2**	0.227	**LMT F(Prob.)**	0.730	
Δ(LnRGDP)	0.622	1.329	**F(5,60)**	4.819*	**BPGT F(4,61)**	2.026	
Trend	0.000	-0.017	**F(Prob.)**	0.001	**BPGT F(Prob.)**	0.102	
Dummy	-0.166	-0.891	**DW**	2.005	**RESET F(1,59)**	0.573	
AR(1)	0.410	3.257*	**AIC**	0.152	**RESET F(Prob.)**	0.452	
			SC	0.351	**JBT χ^2 (2)**	14.747*	
			LL	0.996	**JBT χ^2 (Prob.)**	0.000	
QTY	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	13.816	86.433*	**R^2**	0.915	**LMT F(2,58)**	1.213	-Residuals are Heteroscedastic. -Incorrect sign for RP.
LnRP	-0.885	-21.797*	**Adj. R^2**	0.908	**LMT F(Prob.)**	0.305	
Δ(LnRGDP)	0.825	1.365***	**F(5,60)**	129.7*	**BPGT F(4,61)**	2.12***	
Trend	-0.014	-2.990*	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.090	
Dummy	0.118	0.667	**DW**	1.905	**RESET F(1,59)**	1.255	
AR(1)	0.241	1.907***	**AIC**	0.462	**RESET F(Prob.)**	0.267	
			SC	0.661	**JBT χ^2 (2)**	3.424	
			LL	-9.256	**JBT χ^2 (Prob.)**	0.180	

**Nuclear Reactors, Boilers, Machinery and Mechanical Appliances; Parts Thereof*
DW – Durbin-Watson Statistics
AIS – Akaike Info Criterion
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LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

Table: 6.4 Continued (Part C)

EXPORT SUPPLY MODELS: CATEGORY 84*							
AUSTRALIA - MALAYSIA							
AUD	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	2.889	9.826*	R^2	0.706	**LMT F(2,58)**	1.241	-Residuals are Heteroscedastic. -Model is mis-specified.
LnRP	0.131	3.677*	**Adj.** R^2	0.681	**LMT F(Prob.)**	0.297	
Δ(LnRGDP)	1.649	5.340*	**F(5,60)**	28.76*	**BPGT F(4,61)**	2.07***	
Trend	0.004	0.591	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.096	
Dummy	0.184	0.884	**DW**	2.284	**RESET F(1,59)**	6.588**	
AR(1)	0.754	10.156*	**AIC**	-0.282	**RESET F(Prob.)**	0.013	
			SC	-0.083	**JBT** χ^2 **(2)**	0.133	
			LL	15.314	**JBT** χ^2 **(Prob.)**	0.936	
QTY	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	12.951	38.681*	R^2	0.789	**LMT F(2,58)**	3.190**	-Residuals are serially correlated. -Model is mis-specified. -Incorrect sign for RP.
LnRP	-0.642	-9.920*	**Adj.** R^2	0.772	**LMT F(Prob.)**	0.049	
Δ(LnRGDP)	1.252	2.167**	**F(5,60)**	44.91*	**BPGT F(4,61)**	1.709	
Trend	-0.021	-2.430**	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.160	
Dummy	0.427	1.413***	**DW**	2.308	**RESET F(1,59)**	6.186**	
AR(1)	0.570	5.265*	**AIC**	0.766	**RESET F(Prob.)**	0.016	
			SC	0.965	**JBT** χ^2 **(2)**	1.935	
			LL	-19.29	**JBT** χ^2 **(Prob.)**	0.379	
AUSTRALIA - SINGAPORE							
AUD	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	4.147	14.903*	R^2	0.636	**LMT F(2,58)**	2.56***	-Residuals are serially correlated. -Model is mis-specified. -Residuals are not normally distributed.
LnRP	0.025	0.869	**Adj.** R^2	0.606	**LMT F(Prob.)**	0.086	
Δ(LnRGDP)	1.493	3.806*	**F(5,60)**	20.97*	**BPGT F(4,61)**	1.242	
Trend	0.005	0.621	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.303	
Dummy	0.031	0.119	**DW**	2.322	**RESET F(1,59)**	4.089**	
AR(1)	0.713	7.651*	**AIC**	0.182	**RESET F(Prob.)**	0.048	
			SC	0.381	**JBT** χ^2 **(2)**	389.73*	
			LL	0.007	**JBT** χ^2 **(Prob.)**	0.000	
QTY	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.034	0.099	R^2	0.271	**LMT F(2,60)**	0.067	-Residuals are Heteroscedastic. -Residuals are not normally distributed. -Incorrect sign for RP.
LnRP	-0.487	-4.504*	**Adj.** R^2	0.224	**LMT F(Prob.)**	0.936	
Δ(LnRGDP)	3.032	1.146***	**F(4,62)**	5.752*	**BPGT F(4,62)**	5.475*	
Trend	0.022	1.548***	**F(Prob.)**	0.001	**BPGT F(Prob.)**	0.001	
Dummy	-0.349	-0.657	**DW**	2.039	**RESET F(1,61)**	1.576	
			AIC	3.144	**RESET F(Prob.)**	0.214	
			SC	3.308	**JBT** χ^2 **(2)**	17.510*	
			LL	-100.3	**JBT** χ^2 **(Prob.)**	0.000	

Nuclear Reactors, Boilers, Machinery and Mechanical Appliances; Parts Thereof
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BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

Table: 6.4 Continued (Part D)

EXPORT SUPPLY MODELS: CATEGORY 84*							
AUSTRALIA - THAILAND							
AUD	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.081	1.253	**R^2**	0.404	**LMT F(2,58)**	3.329**	-Residuals are serially correlated.
Δ(LnRP)	0.113	2.913*	**Adj. R^2**	0.354	**LMT F(Prob.)**	0.043	
Δ(LnRGDP)	2.134	2.369**	**F(5,60)**	8.126*	**BPGT F(4,61)**	1.215	
Trend	-0.004	-1.634***	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.314	
Dummy	0.160	1.613***	**DW**	2.312	**RESET F(1,59)**	0.028	
AR(1)	-0.495	-4.316*	**AIC**	0.556	**RESET F(Prob.)**	0.869	
			SC	0.756	**JBT χ^2 (2)**	1.102	
			LL	-12.364	**JBT χ^2 (Prob.)**	0.576	
QTY	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.039	0.419	**R^2**	0.853	**LMT F(2,57)**	4.155**	-Residuals are serially correlated. -Incorrect sign for RP.
Δ(LnRP)	-0.781	-15.647*	**Adj. R^2**	0.838	**LMT F(Prob.)**	0.021	
Δ(LnRGDP)	1.212	1.102***	**F(6,59)**	57.15*	**BPGT F(5,60)**	1.801	
Trend	-0.003	-0.776	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.126	
Dummy	0.130	0.915	**DW**	2.179	**RESET F(1,58)**	2.354	
Residuals (-1)	-0.245	-2.608**	**AIC**	1.061	**RESET F(Prob.)**	0.130	
AR(1)	-0.323	-2.223**	**SC**	1.294	**JBT χ^2 (2)**	1.858	
			LL	-28.023	**JBT χ^2 (Prob.)**	0.395	
AUSTRALIA - UNITED KINGDOM							
AUD	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	3.794	63.250*	**R^2**	0.429	**LMT F(2,58)**	0.606	
Δ(LnRP)	0.0002	-0.010	**Adj. R^2**	0.381	**LMT F(Prob.)**	0.549	
Δ(LnRGDP)	0.858	3.005*	**F(5,60)**	9.000*	**BPGT F(4,61)**	1.693	
Trend	0.009	3.990*	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.163	
Dummy	-0.253	-2.954*	**DW**	1.937	**RESET F(1,59)**	0.227	
AR(1)	0.276	2.293**	**AIC**	-1.047	**RESET F(Prob.)**	0.636	
			SC	-0.848	**JBT χ^2 (2)**	0.527	
			LL	40.560	**JBT χ^2 (Prob.)**	0.768	
QTY	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	12.650	27.051*	**R^2**	0.624	**LMT F(2,58)**	1.630	-Residuals are Heteroscedastic. -Model is mis-specified. -Residuals are not normally distributed. -Incorrect sign for RP.
Δ(LnRP)	-0.307	-4.631*	**Adj. R^2**	0.593	**LMT F(Prob.)**	0.205	
Δ(LnRGDP)	1.001	1.424***	**F(5,60)**	19.91*	**BPGT F(4,61)**	3.691*	
Trend	0.005	0.353	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.009	
Dummy	-0.517	-1.180	**DW**	1.712	**RESET F(1,59)**	10.620*	
AR(1)	0.719	7.705*	**AIC**	1.254	**RESET F(Prob.)**	0.002	
			SC	1.453	**JBT χ^2 (2)**	23.838*	
			LL	-35.375	**JBT χ^2 (Prob.)**	0.000	

Nuclear Reactors, Boilers, Machinery and Mechanical Appliances; Parts Thereof
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BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

Table: 6.4 Continued (Part E)

EXPORT SUPPLY MODELS: CATEGORY 84*							
AUSTRALIA - UNITED STATES							
AUD	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.038	1.153	**R^2**	0.331	**LMT F(2,59)**	0.854	-Model is mis-specified.
Δ(LnRP)	0.060	1.745***	**Adj. R^2**	0.277	**LMT F(Prob.)**	0.431	
Δ(LnRGDP)	0.961	3.423*	**F(5,61)**	6.045*	**BPGT F(5,61)**	1.906	
Trend	-0.001	-0.721	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.106	
Dummy	0.001	0.023	**DW**	2.164	**RESET F(1,60)**	3.76***	
Residuals (-1)	-0.352	-4.077*	**AIC**	-1.546	**RESET F(Prob.)**	0.057	
			SC	-1.349	**JBT χ^2 (2)**	1.067	
			LL	57.805	**JBT χ^2 (Prob.)**	0.587	
QTY	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	13.679	182.951*	**R^2**	0.612	**LMT F(2,60)**	4.396**	-Residuals are serially correlated. -Incorrect sign for RP.
LnRP	-0.386	-7.244*	**Adj. R^2**	0.587	**LMT F(Prob.)**	0.017	
Δ(LnRGDP)	2.080	4.216*	**F(4,62)**	24.40*	**BPGT F(4,62)**	0.161	
Trend	0.008	3.128*	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.957	
Dummy	-0.064	-0.670	**DW**	1.511	**RESET F(1,61)**	0.265	
			AIC	-0.298	**RESET F(Prob.)**	0.608	
			SC	-0.134	**JBT χ^2 (2)**	0.045	
			LL	14.991	**JBT χ^2 (Prob.)**	0.978	

Nuclear Reactors, Boilers, Machinery and Mechanical Appliances; Parts Thereof
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AIS – Akaike Info Criterion
SC – Schwartz Criterion
LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

According to Table 6.4, all eighteen X supply models in Category 84 are significant. For most of the models, the variables RP and RGDP are significant, while the variables Trend and Dummy are mostly not significant.

The variable RP is significant in 14 out of the 18 models and RGDP is significant in 17 out of the 18 models. However, an incorrect (negative) sign for RP (9 out of the 18 models; all based on QTY), while the signs in all 18 models for the RGDP variable are according to expectation. The correct coefficient signs for both the RP and the RGDP are found in 9 out of the 18 models (all based on AUD), while for these 9 models the coefficients range for the RP and RGDP is between (0.0002 and 0.131) and (0.622 and 3.270) respectively. Furthermore, the coefficients estimated for Trend in 9 out of the 18 models, and Dummy in 5 out of the 18 models are negative. These results highlight inconclusive evidence that the capacity utilization increases the X supply, while there is some evidence that an introduction of the GST in July 2000 has stimulated the X supply in this category. In overall, the Adj. R^2 for all 18 models in this category ranges between 22.4 and 91.3 percent.

In overall, out of the 18 estimated models in this category, none of the models have satisfactory passed all diagnostic tests. The X supply to France based on AUD is the only model that satisfies all diagnostic tests, except for normality of the residuals. All variables in this model are significant and the model shows that 1 percent increase in the RP will increase the X supply by 0.057 percent, while 1 percent RGDP growth rate will increase the X supply by 3.017 percent in average. Further, the Trend variable shows that an increase in production capacity and/or technological change will increase the X supply by 1.1 percent per quarter, while the Dummy variable shows that since the GST has been introduced, the X supply for this category has increased by 40.2 percent in average. Finally, the Adj. R^2 shows that 55 percent of variation in the X supply is explained by the variation in these 4 variables, while the remaining 45 percent of variation is are due to other factors which are not included in the model.

6.4.2.3 EXPORT SUPPLY MODELS; CATEGORY: 85

Table: 6.5 (Part A)

EXPORT SUPPLY MODELS: CATEGORY 85*							
AUSTRALIA - RoW							
AUD	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.016	0.465	**R^2**	0.625	**LMT F(2,58)**	9.373*	-Residuals are serially correlated. -Model is mis-specified. -Residuals are not normally distributed.
Δ(LnRP)	0.100	2.614**	**Adj. R^2**	0.593	**LMT F(Prob.)**	0.000	
Δ(LnRGDP)	2.643	6.275*	**F(5,60)**	19.98*	**BPGT F(4,61)**	1.278	
Trend	-0.001	-0.759	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.289	
Dummy	-0.016	-0.331	**DW**	2.278	**RESET F(1,59)**	9.059*	
AR(1)	-0.436	-3.692*	**AIC**	-0.932	**RESET F(Prob.)**	0.004	
			SC	-0.733	**JBT χ^2 (2)**	10.573*	
			LL	36.766	**JBT χ^2 (Prob.)**	0.005	
QTY	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	10.553	66.781*	**R^2**	0.815	**LMT F(2,58)**	11.628*	-Residuals are serially correlated. -Residuals are Heteroscedastic. -Model is mis-specified. -Incorrect sign for RP.
Δ(LnRP)	-0.274	-4.826*	**Adj. R^2**	0.800	**LMT F(Prob.)**	0.000	
Δ(LnRGDP)	1.230	3.000*	**F(5,60)**	52.98*	**BPGT F(4,61)**	2.925**	
Trend	-0.006	-1.129	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.028	
Dummy	1.028	5.331*	**DW**	1.122	**RESET F(1,59)**	15.668*	
AR(1)	0.490	6.139*	**AIC**	0.006	**RESET F(Prob.)**	0.000	
			SC	0.205	**JBT χ^2 (2)**	0.573	
			LL	5.800	**JBT χ^2 (Prob.)**	0.751	
AUSTRALIA - CHINA							
AUD	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	1.793	5.775*	**R^2**	0.382	**LMT F(2,58)**	0.623	-Residuals are Heteroscedastic. -Residuals are not normally distributed.
LnRP	0.020	0.326	**Adj. R^2**	0.330	**LMT F(Prob.)**	0.540	
Δ(LnRGDP)	1.790	1.403***	**F(5,60)**	7.407*	**BPGT F(4,61)**	2.878**	
Trend	0.024	2.725*	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.030	
Dummy	-0.073	-0.217	**DW**	2.052	**RESET F(1,59)**	0.170	
AR(1)	0.171	1.373***	**AIC**	1.905	**RESET F(Prob.)**	0.682	
			SC	2.104	**JBT χ^2 (2)**	19.863*	
			LL	-56.870	**JBT χ^2 (Prob.)**	0.000	
QTY	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	1.792	3.149*	**R^2**	0.169	**LMT F(2,60)**	1.936	-Residuals are Heteroscedastic. -Model is mis-specified. -Residuals are not normally distributed. -Incorrect sign for RP.
LnRP	-0.406	-3.447*	**Adj. R^2**	0.115	**LMT F(Prob.)**	0.153	
Δ(LnRGDP)	1.958	0.653	**F(4,62)**	3.154*	**BPGT F(4,62)**	5.913*	
Trend	-0.019	-1.261***	**F(Prob.)**	0.020	**BPGT F(Prob.)**	0.000	
Dummy	0.255	0.424	**DW**	2.019	**RESET F(1,61)**	8.064*	
			AIC	3.402	**RESET F(Prob.)**	0.006	
			SC	3.567	**JBT χ^2 (2)**	5.75***	
			LL	-108.99	**JBT χ^2 (Prob.)**	0.057	

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LL – Log Likelihood
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BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

Table: 6.5 Continued (Part B)

EXPORT SUPPLY MODELS: CATEGORY 85*							
AUSTRALIA - FRANCE							
AUD	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	1.022	3.771*	**R^2**	0.268	**LMT F(2,58)**	4.512**	-Residuals are serially correlated. -Residuals are Heteroscedastic. -Model is mis-specified.
LnRP	0.044	0.843	**Adj. R^2**	0.207	**LMT F(Prob.)**	0.015	
Δ(LnRGDP)	0.835	1.123***	**F(5,60)**	4.401*	**BPGT F(4,61)**	2.40***	
Trend	0.006	0.705	**F(Prob.)**	0.002	**BPGT F(Prob.)**	0.059	
Dummy	-0.162	-0.534	**DW**	2.288	**RESET F(1,59)**	13.056*	
AR(1)	0.430	3.647*	**AIC**	1.142	**RESET F(Prob.)**	0.001	
			SC	1.341	**JBT χ^2 (2)**	1.260	
			LL	-31.690	**JBT χ^2 (Prob.)**	0.532	
QTY	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	11.710	52.825*	**R^2**	0.760	**LMT F(2,60)**	0.685	-Incorrect sign for RP.
LnRP	-0.697	-12.163*	**Adj. R^2**	0.745	**LMT F(Prob.)**	0.508	
Δ(LnRGDP)	0.997	0.822	**F(4,62)**	49.19*	**BPGT F(4,62)**	1.854	
Trend	0.024	3.902*	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.130	
Dummy	-0.409	-1.652***	**DW**	1.690	**RESET F(1,61)**	1.462	
			AIC	1.595	**RESET F(Prob.)**	0.231	
			SC	1.759	**JBT χ^2 (2)**	3.976	
			LL	-48.421	**JBT χ^2 (Prob.)**	0.137	
AUSTRALIA - GERMANY							
AUD	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.044	0.570	**R^2**	0.265	**LMT F(2,60)**	0.723	-Residuals are not normally distributed.
Δ(LnRP)	0.139	3.740*	**Adj. R^2**	0.218	**LMT F(Prob.)**	0.489	
Δ(LnRGDP)	2.099	3.374*	**F(4,62)**	5.598*	**BPGT F(4,62)**	1.388	
Trend	0.000	0.084	**F(Prob.)**	0.001	**BPGT F(Prob.)**	0.248	
Dummy	-0.111	-0.928	**DW**	2.134	**RESET F(1,61)**	0.114	
			AIC	0.183	**RESET F(Prob.)**	0.737	
			SC	0.347	**JBT χ^2 (2)**	36.740*	
			LL	-1.114	**JBT χ^2 (Prob.)**	0.000	
QTY	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.629	1.947***	**R^2**	0.222	**LMT F(2,60)**	1.108	-Residuals are Heteroscedastic. -Model is mis-specified. -Residuals are not normally distributed. -Incorrect sign for RP.
LnRP	-0.231	-3.106*	**Adj. R^2**	0.172	**LMT F(Prob.)**	0.337	
Δ(LnRGDP)	3.708	2.183**	**F(4,62)**	4.424*	**BPGT F(4,62)**	3.106**	
Trend	-0.001	-0.109	**F(Prob.)**	0.003	**BPGT F(Prob.)**	0.022	
Dummy	-0.675	-1.902***	**DW**	2.201	**RESET F(1,61)**	11.477*	
			AIC	2.247	**RESET F(Prob.)**	0.001	
			SC	2.412	**JBT χ^2 (2)**	43.073*	
			LL	-70.275	**JBT χ^2 (Prob.)**	0.000	

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**** significant at 1%, ** significance at 5%, ***significance at 10%***

Table: 6.5 Continued (Part C)

EXPORT SUPPLY MODELS: CATEGORY 85*							
AUSTRALIA - MALAYSIA							
AUD	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.083	1.015	**R^2**	0.204	**LMT F(2,58)**	1.340	
LnRP	0.012	0.448	**Adj. R^2**	0.138	**LMT F(Prob.)**	0.270	
Δ(LnRGDP)	2.307	3.410*	**F(5,60)**	3.08**	**BPGT F(4,61)**	0.676	
Trend	-0.005	-1.193***	**F(Prob.)**	0.015	**BPGT F(Prob.)**	0.611	
Dummy	0.065	0.521	**DW**	2.052	**RESET F(1,59)**	0.015	
			AIC	0.275	**RESET F(Prob.)**	0.903	
			SC	0.474	**JBT χ^2 (2)**	1.139	
			LL	-3.070	**JBT χ^2 (Prob.)**	0.379	
QTY	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	15.472	37.687*	**R^2**	0.968	**LMT F(2,58)**	0.162	
LnRP	-0.967	-25.857*	**Adj. R^2**	0.965	**LMT F(Prob.)**	0.851	
Δ(LnRGDP)	-0.016	-0.035	**F(5,60)**	361.8*	**BPGT F(4,61)**	0.661	
Trend	-0.014	-1.174***	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.621	-Incorrect sign for RP.
Dummy	-0.019	-0.061	**DW**	2.016	**RESET F(1,59)**	0.773	
AR(1)	0.766	9.253*	**AIC**	0.617	**RESET F(Prob.)**	0.383	
			SC	0.816	**JBT χ^2 (2)**	0.622	
			LL	-14.350	**JBT χ^2 (Prob.)**	0.732	
AUSTRALIA - SINGAPORE							
AUD	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.050	0.732	**R^2**	0.224	**LMT F(2,60)**	1.036	
LnRP	0.024	1.088***	**Adj. R^2**	0.174	**LMT F(Prob.)**	0.361	
Δ(LnRGDP)	1.550	3.703*	**F(4,62)**	4.485*	**BPGT F(4,62)**	0.147	
Trend	-0.005	-2.242**	**F(Prob.)**	0.003	**BPGT F(Prob.)**	0.964	
Dummy	0.142	1.589	**DW**	2.128	**RESET F(1,61)**	0.628	
			AIC	-0.561	**RESET F(Prob.)**	0.431	
			SC	-0.396	**JBT χ^2 (2)**	1.526	
			LL	23.782	**JBT χ^2 (Prob.)**	0.466	
QTY	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	17.911	32.520*	**R^2**	0.921	**LMT F(2,58)**	1.408	
LnRP	-0.900	-20.146*	**Adj. R^2**	0.915	**LMT F(Prob.)**	0.253	
Δ(LnRGDP)	0.536	1.309***	**F(5,60)**	140.3*	**BPGT F(4,61)**	1.597	
Trend	-0.032	-2.469**	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.187	-Incorrect sign for RP.
Dummy	0.132	0.468	**DW**	2.245	**RESET F(3,57)**	1.924	
AR(1)	0.810	10.892*	**AIC**	0.331	**RESET F(Prob.)**	0.136	
			SC	0.530	**JBT χ^2 (2)**	1.742	
			LL	-4.910	**JBT χ^2 (Prob.)**	0.418	

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JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

Table: 6.5 Continued (Part D)

EXPORT SUPPLY MODELS: CATEGORY 85*							
AUSTRALIA - THAILAND							
AUD	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	2.434	8.243*	**R^2**	0.337	**LMT F(2,58)**	0.566	-Model is mis-specified. -Residuals are not normally distributed.
LnRP	0.102	1.434***	**Adj. R^2**	0.282	**LMT F(Prob.)**	0.571	
Δ(LnRGDP)	0.569	0.702	**F(5,60)**	6.094*	**BPGT F(4,61)**	1.252	
Trend	-0.008	-0.807	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.299	
Dummy	0.160	0.449	**DW**	2.120	**RESET F(2,58)**	2.71***	
AR(1)	0.471	4.129*	**AIC**	1.362	**RESET F(Prob.)**	0.075	
			SC	1.561	**JBT χ^2 (2)**	42.054*	
			LL	-38.932	**JBT χ^2 (Prob.)**	0.000	
QTY	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	14.586	57.128*	**R^2**	0.819	**LMT F(2,58)**	0.532	-Residuals are not normally distributed. -Incorrect sign for RP.
LnRP	-0.822	-12.205*	**Adj. R^2**	0.803	**LMT F(Prob.)**	0.590	
Δ(LnRGDP)	0.570	0.697	**F(5,60)**	54.15*	**BPGT F(4,61)**	1.739	
Trend	-0.003	-0.361	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.153	
Dummy	0.358	1.099***	**DW**	2.091	**RESET F(2,58)**	0.746	
AR(1)	0.408	3.455*	**AIC**	1.302	**RESET F(Prob.)**	0.479	
			SC	1.501	**JBT χ^2 (2)**	15.193*	
			LL	-36.973	**JBT χ^2 (Prob.)**	0.001	
AUSTRALIA - UNITED KINGDOM							
AUD	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.008	0.150	**R^2**	0.307	**LMT F(2,58)**	4.136**	-Residuals are serially correlated. -Residuals are Heteroscedastic.
LnRP	0.009	0.436	**Adj. R^2**	0.250	**LMT F(Prob.)**	0.021	
Δ(LnRGDP)	1.190	2.590**	**F(5,60)**	5.322*	**BPGT F(4,61)**	3.761*	
Trend	-0.001	-0.591	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.009	
Dummy	0.000	-0.005	**DW**	2.201	**RESET F(1,59)**	1.175	
AR(1)	-0.365	-3.085*	**AIC**	-0.685	**RESET F(Prob.)**	0.283	
			SC	-0.486	**JBT χ^2 (2)**	1.073	
			LL	28.609	**JBT χ^2 (Prob.)**	0.584	
QTY	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	13.881	44.032*	**R^2**	0.665	**LMT F(2,58)**	1.262	-Residuals are Heteroscedastic. -Residuals are not normally distributed. -Incorrect sign for RP.
LnRP	-0.417	-5.663*	**Adj. R^2**	0.637	**LMT F(Prob.)**	0.291	
Δ(LnRGDP)	2.060	3.248*	**F(5,60)**	23.86*	**BPGT F(4,61)**	4.064*	
Trend	0.009	0.939	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.006	
Dummy	0.075	0.228	**DW**	2.160	**RESET F(1,59)**	0.740	
AR(1)	0.572	5.290*	**AIC**	0.993	**RESET F(Prob.)**	0.393	
			SC	1.192	**JBT χ^2 (2)**	16.033*	
			LL	-26.774	**JBT χ^2 (Prob.)**	0.000	

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JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

Table: 6.5 Continued (Part E)

EXPORT SUPPLY MODELS: CATEGORY 85*							
AUSTRALIA - UNITED STATES							
AUD	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.033	0.437	R^2	0.423	**LMT F(1,59)**	0.017	
LnRP	0.001	0.052	**Adj.** R^2	0.375	**LMT F(Prob.)**	0.896	
Δ(LnRGDP)	2.177	4.509*	**F(5,60)**	8.815*	**BPGT F(4,61)**	1.096	
Trend	-0.001	-0.681	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.367	
Dummy	-0.022	-0.370	**DW**	2.008	**RESET F(1,59)**	0.164	
AR(1)	-0.412	-3.541*	**AIC**	-0.613	**RESET F(Prob.)**	0.687	
			SC	-0.414	**JBT** χ^2 **(2)**	1.178	
			LL	26.215	**JBT** χ^2 **(Prob.)**	0.555	
QTY	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	12.721	14.486*	R^2	0.870	**LMT F(2,58)**	3.328**	-Residuals are serially correlated. -Residuals are Heteroscedastic. -Model is mis-specified. -Incorrect sign for RP.
Δ(LnRP)	-0.448	-8.956*	**Adj.** R^2	0.859	**LMT F(Prob.)**	0.043	
Δ(LnRGDP)	0.593	0.862	**F(5,60)**	80.07*	**BPGT F(4,61)**	4.455*	
Trend	0.036	1.614***	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.003	
Dummy	0.505	1.024	**DW**	1.655	**RESET F(1,60)**	15.607*	
AR(1)	0.838	11.572*	**AIC**	1.416	**RESET F(Prob.)**	0.000	
			SC	1.615	**JBT** χ^2 **(2)**	4.274	
			LL	-40.730	**JBT** χ^2 **(Prob.)**	0.118	

Electrical Machinery and Equipment and Parts Thereof; Sound Recorders and Producers, Television Image and Sound Recorders and Reproducers, and Parts and Accessories of Such Articles
DW – Durbin-Watson Statistics
AIS – Akaike Info Criterion
SC – Schwartz Criterion
LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

According to Table 6.5, all eighteen X supply models in Category 85 are significant. For most of the models, the variables RP and RGDP are significant, while the variables Trend and Dummy are mostly not significant.

The variable RP is significant in 13 out of the 18 models and the RGDP is significant in 12 out of the 18 models. However, an incorrect (negative) sign for the RP (9 out of the 18 models; all based on QTY), while the signs in all 18 models for the RGDP variable is according to expectation. The correct coefficient signs for both the RP and RGDP are found in 9 out of the 18 models (all based on AUD), while for these 9 models, the coefficients range for the RP and RGDP is between (0.001 and 0.139) and (0.569 and 2.643) respectively. Furthermore, the coefficients estimated for Trend in 12 out of the 18 models, and Dummy in 8 out of the 18 models are negative. These results shows inconclusive evidence that the capacity utilization increases the X supply, while there is some evidence that an introduction of the GST in July 2000 has stimulated the X supply for this category. In overall, the Adj. R^2 for all 18 models in this category ranges between 11.5 and 96.5 percent.

In overall, out of the 18 estimated models in this category, 3 models (the X supply to Malaysia, Singapore and The United States of America; all based on AUD) have the correct signs and have satisfactory passed all diagnostic tests. The X supply model to Malaysia shows that a 1 percent increase in the RP will increase the X growth rate by 0.012 percent, while a 1 percent RGDP growth rate will increase the X growth rate by 2.307 percent in average. The X supply model to Singapore shows that a 1 percent increase in the RP will increase the X growth rate by 0.024 percent, while a 1 percent RGDP growth rate will increase the X growth rate by 1.55 percent in average. Finally, the X supply model to The United States of America shows that a 1 percent increase in the RP will increase the X growth rate by 0.001 percent, while a 1 percent RGDP growth rate will increase the X growth rate by 2.177 percent in average. The variable RP is significant only for Singapore, whereas the variable RGDP is significant for all 3 countries. The Trend variable is significant for Malaysia and Singapore only, while the variable Dummy is not significant for any of these 3 countries. Further, the Trend variable is negative for all 3 countries and shows only a marginal affect of the capacity utilization on the X supply. In addition, the Dummy variable shows that since the GST has been introduced, the X supply for this category has increased by 6.5 and 14.2 percent for Malaysia and Singapore respectively and decreased by 2.2 percent for The United States of America. Finally, the Adj. R^2 for Malaysia, Singapore and The United States of America is 13.8, 17.4 and 37.5 percent respectively.

6.4.2.4 EXPORT SUPPLY MODELS; CATEGORY: 87

Table: 6.6 (Part A)

EXPORT SUPPLY MODELS: CATEGORY 87*							
AUSTRALIA - RoW							
AUD	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.002	0.038	**R^2**	0.542	**LMT F(2,58)**	8.727*	-Residuals are serially correlated. -Residuals are Heteroscedastic. -Model is mis-specified.
LnRP	0.003	0.069	**Adj. R^2**	0.504	**LMT F(Prob.)**	0.001	
Δ(LnRGDP)	3.073	7.515*	**F(4,62)**	14.22*	**BPGT F(4,61)**	8.076*	
Trend	0.000	-0.253	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.000	
Dummy	-0.012	-0.176	**DW**	2.210	**RESET F(1,59)**	4.332**	
AR(1)	-0.130	-1.063***	**AIC**	-0.773	**RESET F(Prob.)**	0.042	
			SC	-0.574	**JBT χ^2 (2)**	0.402	
			LL	31.495	**JBT χ^2 (Prob.)**	0.818	
QTY	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.225	-2.314**	**R^2**	0.332	**LMT F(2,60)**	1.174	-Incorrect sign for RP.
LnRP	-0.457	-5.475*	**Adj. R^2**	0.289	**LMT F(Prob.)**	0.316	
Δ(LnRGDP)	0.845	1.203***	**F(4,62)**	7.708*	**BPGT F(4,62)**	1.737	
Trend	0.003	0.973	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.153	
Dummy	-0.388	-2.651**	**DW**	2.302	**RESET F(1,61)**	0.082	
			AIC	0.467	**RESET F(Prob.)**	0.776	
			SC	0.631	**JBT χ^2 (2)**	0.280	
			LL	-10.631	**JBT χ^2 (Prob.)**	0.869	
AUSTRALIA - CHINA							
AUD	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.346	-0.875	**R^2**	0.295	**LMT F(2,45)**	1.837	
LnRP	0.028	0.583	**Adj. R^2**	0.220	**LMT F(Prob.)**	0.171	
Δ(LnRGDP)	10.418	3.254*	**F(5,47)**	3.937*	**BPGT F(4,48)**	1.602	
Trend	0.002	0.132	**F(Prob.)**	0.005	**BPGT F(Prob.)**	0.189	
Dummy	0.020	0.043	**DW**	2.084	**RESET F(1,46)**	0.010	
AR(1)	-0.291	-2.101**	**AIC**	3.032	**RESET F(Prob.)**	0.922	
			SC	3.255	**JBT χ^2 (2)**	0.991	
			LL	-74.349	**JBT χ^2 (Prob.)**	0.609	
QTY	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	8.419	13.713*	**R^2**	0.932	**LMT F(2,45)**	0.722	-Incorrect sign for RP.
LnRP	-0.945	-20.245*	**Adj. R^2**	0.924	**LMT F(Prob.)**	0.491	
Δ(LnRGDP)	4.960	2.792*	**F(5,61)**	128.3*	**BPGT F(4,48)**	1.418	
Trend	0.072	2.778*	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.242	
Dummy	-0.418	-0.558	**DW**	2.035	**RESET F(2,45)**	1.681	
AR(1)	0.458	3.681*	**AIC**	2.709	**RESET F(Prob.)**	0.198	
			SC	2.932	**JBT χ^2 (2)**	0.058	
			LL	-65.782	**JBT χ^2 (Prob.)**	0.971	

Vehicles Other Than Railway or Tramway Rolling-Stock, and Parts and Accessories Thereof
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LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

Table: 6.6 Continued (Part B)

EXPORT SUPPLY MODELS: CATEGORY 87*							
AUSTRALIA - FRANCE							
AUD	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.154	0.327	**R^2**	0.523	**LMT F(2,32)**	1.156	-Residuals are Heteroscedastic.
LnRP	0.044	1.190***	**Adj. R^2**	0.453	**LMT F(Prob.)**	0.328	
Δ(LnRGDP)	2.976	2.533**	**F(5,34)**	7.468*	**BPGT F(4,35)**	4.706*	
Trend	0.001	0.028	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.004	
Dummy	-0.226	-0.393	**DW**	1.883	**RESET F(1,33)**	0.115	
AR(1)	0.571	3.809*	**AIC**	1.721	**RESET F(Prob.)**	0.737	
			SC	1.974	**JBT χ^2 (2)**	0.669	
			LL	-28.419	**JBT χ^2 (Prob.)**	0.716	
QTY	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	6.471	17.057*	**R^2**	0.934	**LMT F(1,33)**	0.096	-Residuals are Heteroscedastic. -Incorrect sign for RP.
LnRP	-0.987	-18.737*	**Adj. R^2**	0.925	**LMT F(Prob.)**	0.758	
Δ(LnRGDP)	4.667	2.629**	**F(5,34)**	96.60*	**BPGT F(4,35)**	5.123*	
Trend	-0.012	-0.549	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.002	
Dummy	-0.315	-0.566	**DW**	1.870	**RESET F(1,33)**	0.038	
AR(1)	0.307	1.878**	**AIC**	2.218	**RESET F(Prob.)**	0.847	
			SC	2.471	**JBT χ^2 (2)**	0.406	
			LL	-38.360	**JBT χ^2 (Prob.)**	0.816	
AUSTRALIA - GERMANY							
AUD	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	1.427	4.203*	**R^2**	0.442	**LMT F(1,59)**	0.094	-Residuals are not normally distributed.
LnRP	0.049	1.535***	**Adj. R^2**	0.395	**LMT F(Prob.)**	0.760	
Δ(LnRGDP)	1.685	2.200**	**F(5,60)**	9.488*	**BPGT F(4,61)**	1.213	
Trend	0.006	0.488	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.315	
Dummy	-0.278	-0.683	**DW**	1.936	**RESET F(1,59)**	0.064	
AR(1)	0.564	5.143*	**AIC**	1.361	**RESET F(Prob.)**	0.802	
			SC	1.560	**JBT χ^2 (2)**	47.363*	
			LL	-38.922	**JBT χ^2 (Prob.)**	0.000	
QTY	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	8.745	15.496*	**R^2**	0.937	**LMT F(1,59)**	1.074	-Incorrect sign for RP.
LnRP	-0.951	-20.795*	**Adj. R^2**	0.932	**LMT F(Prob.)**	0.304	
Δ(LnRGDP)	1.004	0.969	**F(5,60)**	179.9*	**BPGT F(4,61)**	1.984	
Trend	-0.025	-1.383	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.108	
Dummy	-0.101	-0.166	**DW**	1.793	**RESET F(1,59)**	0.070	
AR(1)	0.636	6.357*	**AIC**	2.047	**RESET F(Prob.)**	0.792	
			SC	2.247	**JBT χ^2 (2)**	4.042	
			LL	-61.567	**JBT χ^2 (Prob.)**	0.133	

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SC – Schwartz Criterion
LL – Log Likelihood
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BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

Table: 6.6 Continued (Part C)

EXPORT SUPPLY MODELS: CATEGORY 87*							
AUSTRALIA - MALAYSIA							
AUD	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.035	0.231	**R^2**	0.266	**LMT F(2,59)**	0.362	
LnRP	0.001	0.011	**Adj. R^2**	0.205	**LMT F(Prob.)**	0.698	
Δ(LnRGDP)	2.652	2.589**	**F(5,61)**	4.413*	**BPGT F(5,61)**	1.581	
Trend	-0.002	-0.325	**F(Prob.)**	0.002	**BPGT F(Prob.)**	0.179	
Dummy	-0.034	-0.173	**DW**	2.054	**RESET F(1,60)**	0.008	
Residuals (-1)	-0.249	-3.165*	**AIC**	1.215	**RESET F(Prob.)**	0.929	
			SC	1.413	**JBT χ^2 (2)**	3.499	
			LL	-34.705	**JBT χ^2 (Prob.)**	0.174	
QTY	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	11.721	18.354*	**R^2**	0.870	**LMT F(2,58)**	0.569	-Residuals are Heteroscedastic. -Incorrect sign for RP.
LnRP	-0.873	-17.070*	**Adj. R^2**	0.859	**LMT F(Prob.)**	0.569	
Δ(LnRGDP)	2.417	2.316**	**F(5,60)**	80.13*	**BPGT F(4,61)**	4.152*	
Trend	-0.034	-1.708***	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.005	
Dummy	0.530	0.834	**DW**	1.913	**RESET F(1,59)**	0.218	
AR(1)	0.683	6.586*	**AIC**	2.100	**RESET F(Prob.)**	0.642	
			SC	2.299	**JBT χ^2 (2)**	0.055	
			LL	-63.313	**JBT χ^2 (Prob.)**	0.973	
AUSTRALIA - SINGAPORE							
AUD	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	1.888	8.159*	**R^2**	0.380	**LMT F(2,58)**	0.616	
LnRP	0.074	2.399**	**Adj. R^2**	0.329	**LMT F(Prob.)**	0.543	
Δ(LnRGDP)	0.793	1.440***	**F(5,60)**	7.363*	**BPGT F(4,61)**	0.092	
Trend	0.004	0.509	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.985	
Dummy	-0.304	-1.106	**DW**	2.077	**RESET F(1,59)**	0.029	
AR(1)	0.553	5.052*	**AIC**	0.674	**RESET F(Prob.)**	0.864	
			SC	0.874	**JBT χ^2 (2)**	0.501	
			LL	-16.258	**JBT χ^2 (Prob.)**	0.779	
QTY	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	10.589	20.226*	**R^2**	0.407	**LMT F(2,58)**	1.009	-Residuals are Heteroscedastic. -Incorrect sign for RP.
Δ(LnRP)	-0.089	-2.135**	**Adj. R^2**	0.357	**LMT F(Prob.)**	0.371	
Δ(LnRGDP)	1.927	1.645***	**F(5,60)**	8.233*	**BPGT F(4,61)**	2.808**	
Trend	-0.006	-0.314	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.033	
Dummy	-0.460	-0.754	**DW**	1.987	**RESET F(1,59)**	1.146	
AR(1)	0.589	5.186*	**AIC**	2.206	**RESET F(Prob.)**	0.289	
			SC	2.405	**JBT χ^2 (2)**	1.592	
			LL	-66.809	**JBT χ^2 (Prob.)**	0.451	

Vehicles Other Than Railway or Tramway Rolling-Stock, and Parts and Accessories Thereof
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SC – Schwartz Criterion
LL – Log Likelihood
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BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

Table: 6.6 Continued (Part D)

EXPORT SUPPLY MODELS: CATEGORY 87*							
AUSTRALIA - THAILAND							
AUD	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.117	0.768	**R^2**	0.406	**LMT F(2,59)**	0.657	-Model is mis-specified.
Δ(LnRP)	0.199	4.408*	**Adj. R^2**	0.357	**LMT F(Prob.)**	0.522	
Δ(LnRGDP)	0.519	0.402	**F(5,61)**	8.343*	**BPGT F(5,61)**	1.417	
Trend	-0.002	-0.402	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.231	
Dummy	-0.014	-0.062	**DW**	2.182	**RESET F(1,60)**	5.693**	
Residuals (-1)	-0.342	-3.851*	**AIC**	1.544	**RESET F(Prob.)**	0.020	
			SC	1.742	**JBT χ^2 (2)**	2.167	
			LL	-45.733	**JBT χ^2 (Prob.)**	0.338	
QTY	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	10.589	13.325*	**R^2**	0.580	**LMT F(1,59)**	2.251	-Incorrect sign for RP.
LnRP	-0.445	-5.781*	**Adj. R^2**	0.545	**LMT F(Prob.)**	0.139	
Δ(LnRGDP)	1.477	1.168***	**F(5,60)**	16.56*	**BPGT F(4,61)**	0.182	
Trend	-0.021	-0.855	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.947	
Dummy	-0.151	-0.199	**DW**	2.229	**RESET F(1,59)**	2.625	
AR(1)	0.707	7.672*	**AIC**	2.406	**RESET F(Prob.)**	0.111	
			SC	2.605	**JBT χ^2 (2)**	0.756	
			LL	-73.402	**JBT χ^2 (Prob.)**	0.685	
AUSTRALIA - UNITED KINGDOM							
AUD	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.166	-1.139	**R^2**	0.207	**LMT F(2,58)**	4.046**	-Residuals are serially correlated.
LnRP	0.048	1.553***	**Adj. R^2**	0.141	**LMT F(Prob.)**	0.023	
Δ(LnRGDP)	1.850	1.627***	**F(5,60)**	3.135*	**BPGT F(4,61)**	0.782	
Trend	0.003	0.651	**F(Prob.)**	0.014	**BPGT F(Prob.)**	0.541	
Dummy	0.030	0.192	**DW**	2.197	**RESET F(1,59)**	1.130	
AR(1)	-0.305	-2.481**	**AIC**	1.158	**RESET F(Prob.)**	0.292	
			SC	1.357	**JBT χ^2 (2)**	0.142	
			LL	-32.221	**JBT χ^2 (Prob.)**	0.932	
QTY	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	7.873	19.058*	**R^2**	0.923	**LMT F(2,58)**	0.047	-Model is mis-specified. -Incorrect sign RP.
LnRP	-0.798	-15.300*	**Adj. R^2**	0.916	**LMT F(Prob.)**	0.954	
Δ(LnRGDP)	0.918	0.954	**F(5,60)**	143.1*	**BPGT F(4,61)**	1.072	
Trend	0.004	0.319	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.378	
Dummy	0.465	1.027	**DW**	2.014	**RESET F(1,59)**	6.343**	
AR(1)	0.518	4.664*	**AIC**	1.753	**RESET F(Prob.)**	0.015	
			SC	1.952	**JBT χ^2 (2)**	1.827	
			LL	-51.853	**JBT χ^2 (Prob.)**	0.401	

Vehicles Other Than Railway or Tramway Rolling-Stock, and Parts and Accessories Thereof
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LL – Log Likelihood
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BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

Table: 6.6 Continued (Part E)

EXPORT SUPPLY MODELS: CATEGORY 87*							
AUSTRALIA - UNITED STATES							
AUD	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	4.213	9.637*	**R^2**	0.751	**LMT F(2,58)**	1.020	
LnRP	0.229	4.308*	**Adj. R^2**	0.730	**LMT F(Prob.)**	0.367	
Δ(LnRGDP)	2.371	4.739*	**F(5,60)**	36.23*	**BPGT F(4,61)**	0.728	
Trend	0.006	0.507	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.576	
Dummy	0.674	2.002***	**DW**	1.834	**RESET F(2,58)**	0.918	
AR(1)	0.773	8.620*	**AIC**	0.719	**RESET F(Prob.)**	0.405	
			SC	0.918	**JBT χ^2 (2)**	0.451	
			LL	-17.720	**JBT χ^2 (Prob.)**	0.798	
QTY	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	12.476	47.511*	**R^2**	0.760	**LMT F(2,58)**	1.243	
LnRP	-0.553	-8.826*	**Adj. R^2**	0.740	**LMT F(Prob.)**	0.296	
Δ(LnRGDP)	2.620	4.236*	**F(5,60)**	37.92*	**BPGT F(4,61)**	1.832	
Trend	-0.012	-1.305***	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.134	-Incorrect sign for RP.
Dummy	0.553	1.766***	**DW**	1.949	**RESET F(1,59)**	1.294	
AR(1)	0.559	4.972*	**AIC**	0.908	**RESET F(Prob.)**	0.260	
			SC	1.107	**JBT χ^2 (2)**	2.705	
			LL	-23.963	**JBT χ^2 (Prob.)**	0.259	

Vehicles Other Than Railway or Tramway Rolling-Stock, and Parts and Accessories Thereof
DW – Durbin-Watson Statistics
AIS – Akaike Info Criterion
SC – Schwartz Criterion
LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

According to Table 6.6, all eighteen X supply models in the Category 87 are significant. For most of the models, the variables RP and RGDP are significant, while the variables Trend and Dummy are mostly not significant.

The variables RP and RGDP are significant in 15 out of the 18 models, however, an incorrect (negative) sign for the RP (9 out of the 18 models; all based on QTY) is evident, while the signs in all 18 models for the RGDP variable are according to expectation. The correct coefficient signs for both the RP and RGDP are found in 9 out of the 18 models (all based on AUD), while for these 9 models, the coefficients range for the RP and RGDP is between (0.001 and 0.229) and (0.519 and 10.418) respectively. Furthermore, the coefficients estimated for Trend in 8 out of the 18 models, and Dummy in 12 out of the 18 models are negative. These results in overall show some evidence that that capacity utilization increases the X supply, while there is inconclusive evidence that an introduction of the GST in July 2000 has stimulated the X supply for this category. In overall, the Adj. R^2 for all 18 models in this category ranges between 14.1 and 93.2 percent.

In overall, out of the 18 estimated models in this category, 5 models (the X supply to China, Germany, Malaysia, Singapore and The United States of America; all based on AUD) have the correct signs and have satisfactory passed all diagnostic tests, however, for Germany the residuals are not normally distributed. The X supply model to China shows that a 1 percent increase in the RP will increase the X growth rate by 0.028 percent, while a 1 percent RGDP growth rate will increase the X growth rate by an astonishing 10.418 percent in average. The X supply model to Germany shows that a 1 percent increase in the RP will increase the X supply by 0.049 percent, while a 1 percent RGDP growth rate will increase the X supply by 1.685 percent in average. The X supply model to Malaysia shows that a 1 percent increase in the RP will increase the X supply growth rate by 0.001 percent, while a 1 percent RGDP growth rate will increase the X supply growth rate by 2.652 percent in average. The X supply model to Singapore shows that a 1 percent increase in the RP will increase the X supply by 0.074 percent, while a 1 percent RGDP growth rate will increase the X supply by 0.793 percent in average. Finally, the X supply model to The United States of America shows that a 1 percent increase in the RP will increase the X supply by 0.229 percent, while a 1 percent RGDP growth rate will increase the X supply by 2.371 percent in average. The variable RP is significant for Germany, Singapore, and The United States of America whereas the variable RGDP is significant for all 5 countries. The Trend variable is not significant for any of these 5 countries, while the variable Dummy is only significant for The United States of America. Furthermore, the Trend variable is positive for all 5 countries except for Malaysia and shows only a marginal affect of the capacity utilization on the X supply in this category. In addition, the Dummy variable shows that since the GST has been introduced, the X supply for this category has decreased for Germany, Malaysia and Singapore by 27.8, 3.4 and 30.4 percent respectively; while for China and The United States of America, the X supply has increased by 2 and 67.4 percent respectively. Finally, the Adj. R^2 for China, Germany, Malaysia, Singapore and The United States of America is 22, 39.5, 20.5, 32.9 and 73 percent respectively.

6.4.2.5 EXPORT SUPPLY MODELS; CATEGORY: 3004

Table: 6.7 (Part A)

EXPORT SUPPLY MODELS: CATEGORY 3004*							
AUSTRALIA - RoW							
AUD	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.047	1.607	**R^2**	0.121	**LMT F(2,58)**	1.858	
Δ(LnRP)	0.008	0.786	**Adj. R^2**	0.048	**LMT F(Prob.)**	0.165	
Δ(LnRGDP)	0.463	1.443***	**F(5,60)**	1.7***	**BPGT F(4,61)**	0.961	
Trend	0.001	0.156	**F(Prob.)**	0.099	**BPGT F(Prob.)**	0.436	
Dummy	-0.031	-0.687	**DW**	2.056	**RESET F(1,59)**	0.285	
AR(1)	-0.214	-1.559***	**AIC**	-1.460	**RESET F(Prob.)**	0.595	
			SC	-1.261	**JBT χ^2 (2)**	0.833	
			LL	54.171	**JBT χ^2 (Prob.)**	0.659	
QTY	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.058	0.678	**R^2**	0.461	**LMT F(2,59)**	1.214	-Residuals are Heteroscedastic. -Residuals are not normally distributed. -Incorrect sign for RP; RGDP.
Δ(LnRP)	-0.087	-3.472*	**Adj. R^2**	0.417	**LMT F(Prob.)**	0.304	
Δ(LnRGDP)	-0.074	-0.112	**F(5,61)**	10.44*	**BPGT F(5,61)**	2.788**	
Trend	-0.001	-0.242	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.025	
Dummy	-0.001	-0.006	**DW**	1.809	**RESET F(1,60)**	1.529	
Residuals (-1)	-0.718	-6.047*	**AIC**	0.373	**RESET F(Prob.)**	0.221	
			SC	0.571	**JBT χ^2 (2)**	83.499*	
			LL	-6.511	**JBT χ^2 (Prob.)**	0.000	
AUSTRALIA - FRANCE							
AUD	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.137	0.240	**R^2**	0.206	**LMT F(2,30)**	2.423	-Residuals are not normally distributed. -Incorrect sign for RP; RGDP. -Model is not significant.
Δ(LnRP)	-0.014	-0.087	**Adj. R^2**	0.081	**LMT F(Prob.)**	0.106	
Δ(LnRGDP)	-1.613	-0.265	**F(5,32)**	1.656	**BPGT F(5,32)**	0.465	
Trend	0.012	0.288	**F(Prob.)**	0.174	**BPGT F(Prob.)**	0.799	
Dummy	-0.369	-0.382	**DW**	1.562	**RESET F(1,31)**	0.022	
Residuals (-1)	-0.387	-2.749**	**AIC**	3.967	**RESET F(Prob.)**	0.884	
			SC	4.225	**JBT χ^2 (2)**	534.19*	
			LL	-69.369	**JBT χ^2 (Prob.)**	0.000	
QTY	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	1.430	1.730***	**R^2**	0.298	**LMT F(2,31)**	1.640	-Incorrect sign for RP.
LnRP	-0.413	-1.895***	**Adj. R^2**	0.213	**LMT F(Prob.)**	0.211	
Δ(LnRGDP)	17.073	2.767*	**F(4,33)**	3.49**	**BPGT F(4,33)**	1.062	
Trend	-0.057	-1.089***	**F(Prob.)**	0.017	**BPGT F(Prob.)**	0.391	
Dummy	-0.055	-0.050	**DW**	1.717	**RESET F(1,32)**	1.249	
			AIC	4.155	**RESET F(Prob.)**	0.272	
			SC	4.371	**JBT χ^2 (2)**	0.610	
			LL	-73.949	**JBT χ^2 (Prob.)**	0.737	

Medicaments (Excluding Goods of 3002, 3005 or 3006) Consisting of Mixed or Unmixed Products for Therapeutic or Prophylactic Uses, Put Up in Measured Doses or in Forms or Packagings for Retail Sale
DW – Durbin-Watson Statistics
AIS – Akaike Info Criterion
SC – Schwartz Criterion
LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

Table: 6.7 Continued (Part B)

EXPORT SUPPLY MODELS: CATEGORY 3004*							
AUSTRALIA - GERMANY							
AUD	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.544	2.401**	**R^2**	0.279	**LMT F(2,33)**	2.338	-Residuals are Heteroscedastic. -Model is mis-specified. -Incorrect sign for RGDP.
LnRP	0.062	0.689	**Adj. R^2**	0.176	**LMT F(Prob.)**	0.112	
Δ(LnRGDP)	-5.955	-1.811**	**F(5,35)**	2.71**	**BPGT F(4,36)**	4.476*	
Trend	-0.018	-1.074***	**F(Prob.)**	0.036	**BPGT F(Prob.)**	0.005	
Dummy	0.385	0.930	**DW**	2.170	**RESET F(1,34)**	7.006**	
AR(1)	-0.353	-2.134**	**AIC**	2.670	**RESET F(Prob.)**	0.012	
			SC	2.920	**JBT χ^2 (2)**	1.357	
			LL	-48.729	**JBT χ^2 (Prob.)**	0.507	
QTY	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.337	1.367	**R^2**	0.359	**LMT F(2,33)**	3.481**	-Residuals are serially correlated. -Model is mis-specified. -Residuals are not normally distributed. -Incorrect sign for RP; RGDP.
LnRP	-0.016	-0.144	**Adj. R^2**	0.267	**LMT F(Prob.)**	0.043	
Δ(LnRGDP)	-6.943	-1.609	**F(5,35)**	3.919*	**BPGT F(5,36)**	1.644	
Trend	-0.015	-0.853	**F(Prob.)**	0.006	**BPGT F(Prob.)**	0.185	
Dummy	0.356	0.783	**DW**	2.295	**RESET F(1,34)**	3.63***	
AR(1)	-0.594	-4.246*	**AIC**	3.142	**RESET F(Prob.)**	0.065	
			SC	3.393	**JBT χ^2 (2)**	48.775*	
			LL	-58.420	**JBT χ^2 (Prob.)**	0.000	
AUSTRALIA - UNITED KINGDOM							
AUD	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.041	0.445	**R^2**	0.043	**LMT F(1,28)**	1.681	-Model is mis-specified. -Model is not significant.
LnRP	0.004	0.221	**Adj. R^2**	0.089	**LMT F(Prob.)**	0.205	
Δ(LnRGDP)	0.722	1.010***	**F(4,29)**	0.329	**BPGT F(4,29)**	0.713	
Trend	-0.002	-0.456	**F(Prob.)**	0.856	**BPGT F(Prob.)**	0.590	
Dummy	0.042	0.344	**DW**	2.406	**RESET F(1,28)**	3.390**	
			AIC	-0.326	**RESET F(Prob.)**	0.076	
			SC	-0.102	**JBT χ^2 (2)**	1.273	
			LL	10.547	**JBT χ^2 (Prob.)**	0.529	
QTY	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.053	0.314	**R^2**	0.136	**LMT F(2,27)**	1.946	-Residuals are Heteroscedastic. -Incorrect sign for RP. -Model is not significant.
LnRP	-0.023	-0.707	**Adj. R^2**	0.016	**LMT F(Prob.)**	0.162	
Δ(LnRGDP)	2.143	1.642	**F(4,29)**	1.137	**BPGT F(4,29)**	3.275**	
Trend	0.001	0.155	**F(Prob.)**	0.359	**BPGT F(Prob.)**	0.025	
Dummy	-0.267	-1.209	**DW**	1.796	**RESET F(1,28)**	1.925	
			AIC	0.878	**RESET F(Prob.)**	0.176	
			SC	1.102	**JBT χ^2 (2)**	0.824	
			LL	-9.920	**JBT χ^2 (Prob.)**	0.662	

***Medicaments (Excluding Goods of 3002, 3005 or 3006) Consisting of Mixed or Unmixed Products for Therapeutic or Prophylactic Uses, Put Up in Measured Doses or in Forms or Packagings for Retail Sale**

DW – Durbin-Watson Statistics
AIS – Akaike Info Criterion
SC – Schwartz Criterion
LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

According to Table 6.7, out of the eight X supply models in Category 3004, 5 models are significant, while the remaining 3 models (France; based on AUD and United Kingdom; based on both AUD and QTY) are not significant. Furthermore, for most of the models, the variables RP, RGDP, Trend and Dummy are not significant.

The variable RP is significant in 2 out of the 8 models and the RGDP is significant in 4 out of the 8 models. However, an incorrect (negative) sign for the RP (5 out of 8 the models; 4 based on QTY and 1 based on AUD) and for the RGDP (4 out of 8 models; 2 based on QTY and 2 based on AUD) is evident. The correct coefficients signs for both the RP and RGDP are found in only 2 out of the 8 models (both based on AUD), while for these 2 models, the coefficients range for the RP and RGDP is between (0.004 and 0.008) and (0.463 and 0.722) respectively. Furthermore, the coefficients estimated for both the Trend and Dummy are negative in 5 out of the 8 models. These results show inconclusive evidence, that capacity utilization increases the X supply and that an introduction of the GST in July 2000 has stimulated the X supply for this category. In overall, the Adj. R^2 for all 18 models in this category ranges between 1.6 and 41.7 percent.

In overall, out of the 8 estimated models in this category, only 1 model (the X supply to RoW; based on AUD) has the correct signs and has satisfactory passed all diagnostic tests. The X supply model to the RoW shows that a 1 percent growth rate in the RP will increase the X growth rate by 0.008 percent, while 1 percent RGDP growth rate will increase the X growth rate by 0.463 percent in average. However, the variables RP, Trend and Dummy are not significant, whereas the variable RGDP is significant. Further, the Trend variable is positive and shows only a marginal affect of the capacity utilization on the X supply, while the Dummy variable shows that since the GST has been introduced, the X supply for this category has decreased by 3.1 percent in average. Finally, the Adj. R^2 for this model is only 4.8 percent, which suggests a very poor fit of the model.

6.4.2.6 EXPORT SUPPLY MODELS; CATEGORY: 8471

Table: 6.8 (Part A)

EXPORT SUPPLY MODELS: CATEGORY 8471*							
AUSTRALIA - RoW							
AUD	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.055	1.383	**R^2**	0.495	**LMT F(2,58)**	4.800**	-Residuals are serially correlated. -Residuals are Heteroscedastic.
Δ(LnRP)	0.013	0.277	**Adj. R^2**	0.453	**LMT F(Prob.)**	0.012	
Δ(LnRGDP)	2.519	5.173*	**F(5,60)**	11.75*	**BPGT F(4,61)**	3.312**	
Trend	-0.004	-2.318**	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.016	
Dummy	0.146	2.397**	**DW**	2.223	**RESET F(1,59)**	0.007	
AR(1)	-0.401	-3.385*	**AIC**	-0.588	**RESET F(Prob.)**	0.935	
			SC	-0.389	**JBT χ^2 (2)**	0.105	
			LL	25.413	**JBT χ^2 (Prob.)**	0.949	
QTY	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.070	1.242	**R^2**	0.902	**LMT F(2,59)**	0.234	-Residuals are Heteroscedastic. -Incorrect sign for RP.
Δ(LnRP)	-0.934	-21.457*	**Adj. R^2**	0.893	**LMT F(Prob.)**	0.793	
Δ(LnRGDP)	1.419	3.283*	**F(5,61)**	111.7*	**BPGT F(5,61)**	2.05***	
Trend	-0.002	-1.047***	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.084	
Dummy	0.077	0.893	**DW**	1.955	**RESET F(1,60)**	0.143	
Residuals (-1)	-0.396	-3.858*	**AIC**	-0.463	**RESET F(Prob.)**	0.707	
			SC	-0.265	**JBT χ^2 (2)**	0.048	
			LL	21.500	**JBT χ^2 (Prob.)**	0.976	
AUSTRALIA - CHINA							
AUD	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.919	-1.895***	**R^2**	0.306	**LMT F(2,58)**	6.400*	-Residuals are serially correlated. -Residuals are not normally distributed.
LnRP	0.240	2.298*	**Adj. R^2**	0.248	**LMT F(Prob.)**	0.003	
Δ(LnRGDP)	2.501	0.728	**F(5,60)**	5.291*	**BPGT F(4,61)**	1.446	
Trend	0.013	1.097	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.230	
Dummy	-0.073	-0.186	**DW**	2.3892	**RESET F(1,59)**	1.075	
AR(1)	-0.466	-4.084*	**AIC**	3.2244	**RESET F(Prob.)**	0.304	
			SC	3.4234	**JBT χ^2 (2)**	8.833**	
			LL	-	**JBT χ^2 (Prob.)**	0.012	
QTY	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	1.040	1.810***	**R^2**	0.299	**LMT F(2,58)**	1.886	-Incorrect sign for RP.
LnRP	-0.276	-2.226**	**Adj. R^2**	0.241	**LMT F(Prob.)**	0.161	
Δ(LnRGDP)	0.922	0.230	**F(5,60)**	5.123*	**BPGT F(4,61)**	1.368	
Trend	-0.010	-0.755	**F(Prob.)**	0.001	**BPGT F(Prob.)**	0.256	
Dummy	0.076	0.163	**DW**	2.195	**RESET F(1,59)**	1.520	
AR(1)	-0.456	-3.797*	**AIC**	3.546	**RESET F(Prob.)**	0.222	
			SC	3.745	**JBT χ^2 (2)**	0.975	
			LL	-111.03	**JBT χ^2 (Prob.)**	0.614	

Automatic Data Processing Machines and Units Thereof; Magnetic or Optical Readers, Machines for Transcribing Data onto Data Media in Coded Form and Machines for Processing Such Data, Not Elsewhere Specified or Included

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SC – Schwartz Criterion

LL – Log Likelihood

LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation

BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity

RESET – Ramsey RESET Test for Model Specification

JBT – Jarques-Bera Test for normality of the residuals

**** significant at 1%, ** significance at 5%, ***significance at 10%***

Table: 6.8 Continued (Part B)

EXPORT SUPPLY MODELS: CATEGORY 8471*							
AUSTRALIA - FRANCE							
AUD	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-2.513	-3.406*	**R^2**	0.343	**LMT F(2,58)**	0.529	
LnRP	0.151	1.362***	**Adj. R^2**	0.288	**LMT F(Prob.)**	0.592	
Δ(LnRGDP)	3.130	1.096	**F(5,60)**	6.262*	**BPGT F(4,61)**	1.001	
Trend	0.007	0.277	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.414	
Dummy	1.344	1.328***	**DW**	2.0401	**RESET F(1,59)**	0.016	
AR(1)	0.360	2.937*	**AIC**	3.6824	**RESET F(Prob.)**	0.899	
			SC	3.8814	**JBT χ^2 (2)**	1.514	
			LL	-115.52	**JBT χ^2 (Prob.)**	0.469	
QTY	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	4.112	8.568*	**R^2**	0.490	**LMT F(2,60)**	0.050	-Model is mis-specified. -Incorrect sign for RP.
LnRP	-0.626	-5.558*	**Adj. R^2**	0.457	**LMT F(Prob.)**	0.952	
Δ(LnRGDP)	5.309	1.457	**F(4,62)**	14.86*	**BPGT F(4,62)**	0.558	
Trend	0.017	0.915	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.694	
Dummy	1.264	1.744***	**DW**	1.920	**RESET F(1,61)**	9.112*	
			AIC	3.763	**RESET F(Prob.)**	0.004	
			SC	3.928	**JBT χ^2 (2)**	3.175	
			LL	-121.06	**JBT χ^2 (Prob.)**	0.204	
AUSTRALIA - GERMANY							
AUD	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-1.519	-4.752*	**R^2**	0.427	**LMT F(2,58)**	0.758	-Incorrect sign for RP; RGDP.
LnRP	-0.031	-0.419	**Adj. R^2**	0.380	**LMT F(Prob.)**	0.473	
Δ(LnRGDP)	-0.248	-0.160	**F(5,60)**	8.955*	**BPGT F(4,61)**	0.124	
Trend	0.022	1.872***	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.973	
Dummy	0.451	0.971	**DW**	2.132	**RESET F(1,59)**	0.001	
AR(1)	0.228	1.998***	**AIC**	2.359	**RESET F(Prob.)**	0.976	
			SC	2.558	**JBT χ^2 (2)**	0.023	
			LL	-71.843	**JBT χ^2 (Prob.)**	0.988	
QTY	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	5.048	13.329*	**R^2**	0.624	**LMT F(2,58)**	0.536	-Model is mis-specified. -Residuals are not normally distributed. -Incorrect sign for RP.
LnRP	-0.735	-8.377*	**Adj. R^2**	0.592	**LMT F(Prob.)**	0.588	
Δ(LnRGDP)	1.073	0.575	**F(5,60)**	19.88*	**BPGT F(4,61)**	1.808	
Trend	0.039	2.766*	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.139	
Dummy	0.368	0.663	**DW**	2.114	**RESET F(1,59)**	17.266*	
AR(1)	0.224	1.931***	**AIC**	2.713	**RESET F(Prob.)**	0.000	
			SC	2.912	**JBT χ^2 (2)**	14.667*	
			LL	-83.539	**JBT χ^2 (Prob.)**	0.000	

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DW – Durbin-Watson Statistics
AIS – Akaike Info Criterion
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LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

Table: 6.8 Continued (Part C)

EXPORT SUPPLY MODELS: CATEGORY 8471*							
AUSTRALIA - MALAYSIA							
AUD	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.761	3.214*	**R^2**	0.361	**LMT F(2,60)**	0.489	-Residuals are Heteroscedastic. -Model is mis-specified.
LnRP	0.019	0.295	**Adj. R^2**	0.319	**LMT F(Prob.)**	0.616	
Δ(LnRGDP)	1.621	1.702***	**F(4,62)**	8.746*	**BPGT F(4,62)**	3.137**	
Trend	-0.012	-2.143**	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.021	
Dummy	0.867	4.162*	**DW**	1.737	**RESET F(1,61)**	4.620**	
			AIC	1.111	**RESET F(Prob.)**	0.036	
			SC	1.275	**JBT χ^2 (2)**	2.561	
			LL	-32.207	**JBT χ^2 (Prob.)**	0.278	
QTY	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	1.705	3.544*	**R^2**	0.320	**LMT F(2,58)**	2.365	-Residuals are not normally distributed. -Incorrect sign for RP.
LnRP	-0.550	-4.188*	**Adj. R^2**	0.264	**LMT F(Prob.)**	0.103	
Δ(LnRGDP)	0.005	0.002	**F(5,60)**	5.654*	**BPGT F(4,61)**	0.712	
Trend	-0.022	-1.978***	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.587	
Dummy	-0.845	-2.150**	**DW**	2.097	**RESET F(1,59)**	0.023	
AR(1)	-0.275	-2.134**	**AIC**	2.789	**RESET F(Prob.)**	0.881	
			SC	2.988	**JBT χ^2 (2)**	10.650*	
			LL	-86.027	**JBT χ^2 (Prob.)**	0.004	
AUSTRALIA - SINGAPORE							
AUD	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	2.766E-03	310.764*	**R^2**	0.980	**LMT F(1,61)**	0.223	-Residuals are Heteroscedastic. -Model is mis-specified. -Residuals are not normally distributed.
LnRP	4.870E-06	0.935	**Adj. R^2**	0.979	**LMT F(Prob.)**	0.639	
Δ(LnRGDP)	2.430E-04	5.601*	**F(4,62)**	778.8*	**BPGT F(4,62)**	2.12***	
Trend	-6.710E-06	-30.251*	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.089	
Dummy	1.200E-05	1.349	**DW**	1.890	**RESET F(1,61)**	6.352**	
			AIC	-18.884	**RESET F(Prob.)**	0.014	
			SC	-18.719	**JBT χ^2 (2)**	6.635**	
			LL	637.59	**JBT χ^2 (Prob.)**	0.036	
QTY	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.417	2.104**	**R^2**	0.423	**LMT F(2,58)**	0.119	-Residuals are Heteroscedastic. -Incorrect sign for RP.
LnRP	-0.311	-2.506**	**Adj. R^2**	0.375	**LMT F(Prob.)**	0.888	
Δ(LnRGDP)	3.048	1.917***	**F(5,60)**	8.811*	**BPGT F(4,61)**	2.994**	
Trend	-0.002	-0.517	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.025	
Dummy	-0.167	-0.902	**DW**	1.919	**RESET F(1,59)**	2.044	
AR(1)	-0.499	-4.450*	**AIC**	1.701	**RESET F(Prob.)**	0.158	
			SC	1.900	**JBT χ^2 (2)**	3.606	
			LL	-50.136	**JBT χ^2 (Prob.)**	0.165	

Automatic Data Processing Machines and Units Thereof; Magnetic or Optical Readers, Machines for Transcribing Data onto Data Media in Coded Form and Machines for Processing Such Data, Not Elsewhere Specified or Included

DW – Durbin-Watson Statistics
AIS – Akaike Info Criterion
SC – Schwartz Criterion
LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

Table: 6.8 Continued (Part D)

EXPORT SUPPLY MODELS: CATEGORY 8471*							
AUSTRALIA - THAILAND							
AUD	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.191	0.928	**R^2**	0.230	**LMT F(2,58)**	6.882*	-Incorrect sign for RP and RGDP.
LnRP	-0.063	-1.201	**Adj. R^2**	0.166	**LMT F(Prob.)**	0.002	
Δ(LnRGDP)	-0.611	-0.330	**F(5,60)**	3.581*	**BPGT F(4,61)**	0.854	
Trend	-0.001	-0.196	**F(Prob.)**	0.007	**BPGT F(Prob.)**	0.497	
Dummy	-0.057	-0.252	**DW**	2.413	**RESET F(1,59)**	1.301	
AR(1)	-0.492	-4.335*	**AIC**	2.028	**RESET F(Prob.)**	0.259	
			SC	2.227	**JBT χ^2 (2)**	2.004	
			LL	-60.926	**JBT χ^2 (Prob.)**	0.367	
QTY	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	10.196	23.730*	**R^2**	0.824	**LMT F(2,58)**	1.960	-Incorrect sign for RP and RGDP.
LnRP	-0.904	-12.879*	**Adj. R^2**	0.810	**LMT F(Prob.)**	0.150	
Δ(LnRGDP)	-0.562	-0.449	**F(5,60)**	56.25*	**BPGT F(4,61)**	1.763	
Trend	-0.029	-2.115**	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.148	
Dummy	0.557	1.073	**DW**	2.178	**RESET F(1,59)**	0.204	
AR(1)	0.442	3.760*	**AIC**	2.129	**RESET F(Prob.)**	0.654	
			SC	2.328	**JBT χ^2 (2)**	2.300	
			LL	-64.256	**JBT χ^2 (Prob.)**	0.317	
AUSTRALIA - UNITED KINGDOM							
AUD	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.255	-0.730	**R^2**	0.366	**LMT F(2,58)**	1.204	-Residuals are Heteroscedastic. -Residuals are not normally distributed.
LnRP	0.099	1.221***	**Adj. R^2**	0.313	**LMT F(Prob.)**	0.308	
Δ(LnRGDP)	1.324	0.776	**F(5,60)**	6.928*	**BPGT F(4,61)**	3.436**	
Trend	0.024	1.794***	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.013	
Dummy	0.336	0.685	**DW**	2.051	**RESET F(1,59)**	0.163	
AR(1)	0.229	1.795***	**AIC**	2.542	**RESET F(Prob.)**	0.688	
			SC	2.741	**JBT χ^2 (2)**	5.56***	
			LL	-77.89	**JBT χ^2 (Prob.)**	0.062	
QTY	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	6.509	25.315*	**R^2**	0.811	**LMT F(2,60)**	0.697	-Residuals are Heteroscedastic. -Model is mis-specified. -Incorrect sign for RP.
LnRP	-0.799	-10.432*	**Adj. R^2**	0.798	**LMT F(Prob.)**	0.502	
Δ(LnRGDP)	1.103	0.577	**F(4,62)**	66.33*	**BPGT F(4,62)**	2.36***	
Trend	0.030	2.961*	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.063	
Dummy	0.456	1.191	**DW**	1.847	**RESET F(1,61)**	4.432**	
			AIC	2.506	**RESET F(Prob.)**	0.039	
			SC	2.670	**JBT χ^2 (2)**	1.140	
			LL	-78.947	**JBT χ^2 (Prob.)**	0.565	

Automatic Data Processing Machines and Units Thereof; Magnetic or Optical Readers, Machines for Transcribing Data onto Data Media in Coded Form and Machines for Processing Such Data, Not Elsewhere Specified or Included

DW – Durbin-Watson Statistics
AIS – Akaike Info Criterion
SC – Schwartz Criterion
LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

According to Table 6.8, all sixteen X supply models in Category 8471 are significant. For most of the models, the variables RP and Trend are significant, while the variables RGDP and Dummy are mostly not significant.

The variable RP is significant in 11 out of the 16 models and the RGDP is significant in 5 out of the 16 models. However, an incorrect (negative) sign for the RP (10 out of 16 models; 8 based on QTY and 2 based on AUD) and for the RGDP (3 out of 16 models; 1 based on QTY and 2 based on AUD) is evident. The correct coefficients signs for both the RP and RGDP are found in 6 out of the 16 models (all based on AUD), while for these 2 models, the coefficients range for the RP and RGDP is between (4.87E-06 and 0.240) and (2.43E-04 and 3.130) respectively. Furthermore, the coefficients estimated for Trend in 9 out of the 16 models, and Dummy in 4 out of the 16 models are negative. These results shows inconclusive evidence that capacity utilization increases the X supply, while there is some evidence that an introduction of the GST in July 2000 has stimulated the X supply for this category. In overall, the Adj. R^2 for all 18 models in this category ranges between 16.6 and 97.9 percent.

In overall, out of the 16 estimated models in this category, only 1 model (the X supply to France; based on AUD) has the correct signs and has satisfactory passed all diagnostic tests. The X supply model to France shows that a 1 percent increase in the RP will increase the X supply by 0.151 percent, while a 1 percent RGDP growth rate will increase the X supply by 3.130 percent in average. However, the variables RGDP and Trend are not significant, whereas the variables RP and Dummy are significant. Furthermore, the Trend variable shows that an increase in production capacity and/or technological change will increase the X supply by 0.7 percent per quarter, while the Dummy variable shows that since the GST has been introduced, the X supply for this category has increased by 134.4 percent in average. Finally, the Adj. R^2 for this model is 28.8 percent.

6.4.2.7 EXPORT SUPPLY MODELS; CATEGORY: 8473

Table: 6.9

EXPORT SUPPLY MODELS: CATEGORY 8473*							
AUSTRALIA - RoW							
AUD	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.127	2.974*	**R^2**	0.503	**LMT F(2,60)**	1.070	
LnRP	0.025	1.551***	**Adj. R^2**	0.471	**LMT F(Prob.)**	0.350	
Δ(LnRGDP)	1.544	7.125*	**F(4,62)**	15.67*	**BPGT F(4,62)**	1.390	
Trend	-0.003	-2.709*	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.248	
Dummy	0.045	1.022	**DW**	2.112	**RESET F(1,61)**	1.523	
			AIC	-1.849	**RESET F(Prob.)**	0.222	
			SC	-1.685	**JBT χ^2 (2)**	0.302	
			LL	66.956	**JBT χ^2 (Prob.)**	0.860	
QTY	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	4.453	19.715*	**R^2**	0.946	**LMT F(2,58)**	0.706	-Residuals are not normally distributed. -Incorrect sign for RP.
LnRP	-0.588	-8.104*	**Adj. R^2**	0.941	**LMT F(Prob.)**	0.498	
Δ(LnRGDP)	0.928	1.630***	**F(5,60)**	209.2*	**BPGT F(4,61)**	0.298	
Trend	0.049	8.793*	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.878	
Dummy	0.349	1.677***	**DW**	2.063	**RESET F(1,59)**	1.146	
AR(1)	0.368	2.786*	**AIC**	0.524	**RESET F(Prob.)**	0.289	
			SC	0.723	**JBT χ^2 (2)**	18.872*	
			LL	-11.291	**JBT χ^2 (Prob.)**	0.000	

Parts and Accessories (Other Than Covers, Carrying Cases and the Like) Suitable for Use Solely or Principally with Office Machines
DW – Durbin-Watson Statistics
AIS – Akaike Info Criterion
SC – Schwartz Criterion
LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

According to Table 6.9, due to data availability, only two X supply models in Category 8473 are estimated. In both models, all variables are significant except the Dummy variable in the X supply model based on AUD, which is not significant. Furthermore, the variable RP in the X supply model based on QTY has an incorrect (negative) sign.

The X supply model to the RoW (based on AUD), has the correct signs, has satisfactory passed all diagnostic tests and all the variables, except the Dummy are significant. This X supply model shows that a 1 percent increase in the RP will increase the X growth rate by 0.025 percent, while a 1 percent RGDP growth rate will increase the X growth rate by 1.544 percent in average. The Trend variable shows that an increase in production capacity and/or technological change will decrease the X supply by 0.3 percent per quarter in average. Finally, the Dummy variable shows that since the GST was introduced, the X supply has increased by 4.5 percent in average, while the Adj. R^2 for this model shows that 47.1 percent of variations in the X supply in this category are explained by these 4 independent variables.

6.4.2.8 EXPORT SUPPLY MODELS; CATEGORY: 8517

Table: 6.10 (Part A)

EXPORT SUPPLY MODELS: CATEGORY 8517*							
AUSTRALIA - RoW							
AUD	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	3.968	13.956*	**R^2**	0.599	**LMT F(2,58)**	2.97***	-Residuals are serially correlated. -Model is mis-specified.
LnRP	0.509	6.801*	**Adj. R^2**	0.565	**LMT F(Prob.)**	0.059	
Δ(LnRGDP)	2.380	3.412*	**F(5,60)**	17.91*	**BPGT F(4,61)**	0.535	
Trend	-0.006	-0.679	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.710	
Dummy	0.188	0.535	**DW**	2.330	**RESET F(1,59)**	9.671*	
AR(1)	0.543	4.975*	**AIC**	1.140	**RESET F(Prob.)**	0.003	
			SC	1.339	**JBT χ^2 (2)**	0.573	
			LL	-31.607	**JBT χ^2 (Prob.)**	0.751	
QTY	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	4.955	28.081*	**R^2**	0.647	**LMT F(2,58)**	2.348	-Model is mis-specified. -Incorrect sign for RP.
LnRP	-0.496	-7.118*	**Adj. R^2**	0.618	**LMT F(Prob.)**	0.105	
Δ(LnRGDP)	3.238	4.212*	**F(5,60)**	22.02*	**BPGT F(4,61)**	0.300	
Trend	-0.004	-0.671	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.877	
Dummy	0.135	0.526	**DW**	2.175	**RESET F(1,59)**	9.637*	
AR(1)		2.325**	**AIC**	1.023	**RESET F(Prob.)**	0.003	
			SC	1.222	**JBT χ^2 (2)**	1.428	
			LL	-27.756	**JBT χ^2 (Prob.)**	0.490	
AUSTRALIA - GERMANY							
AUD	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.020	0.034	**R^2**	0.256	**LMT F(2,58)**	1.567	
LnRP	0.029	0.607	**Adj. R^2**	0.194	**LMT F(Prob.)**	0.218	
Δ(LnRGDP)	1.732	0.927***	**F(5,60)**	4.119*	**BPGT F(4,61)**	0.188	
Trend	0.005	0.212	**F(Prob.)**	0.003	**BPGT F(Prob.)**	0.944	
Dummy	0.118	0.141	**DW**	2.066	**RESET F(1,59)**	0.277	
AR(1)	0.455	3.895*	**AIC**	3.010	**RESET F(Prob.)**	0.601	
			SC	3.209	**JBT χ^2 (2)**	1.204	
			LL	-93.317	**JBT χ^2 (Prob.)**	0.548	
QTY	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	6.548	9.255*	**R^2**	0.723	**LMT F(2,58)**	0.034	-Incorrect sign for RP.
LnRP	-0.779	-12.460*	**Adj. R^2**	0.700	**LMT F(Prob.)**	0.967	
Δ(LnRGDP)	1.526	0.609	**F(5,60)**	31.28*	**BPGT F(4,61)**	1.162	
Trend	-0.032	-1.223***	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.336	
Dummy	1.843	1.803***	**DW**	2.020	**RESET F(1,59)**	0.715	
AR(1)	0.400	3.608*	**AIC**	3.531	**RESET F(Prob.)**	0.401	
			SC	3.730	**JBT χ^2 (2)**	2.504	
			LL	-110.53	**JBT χ^2 (Prob.)**	0.286	

Electrical Apparatus for Line Telephony or Line Telegraphy, Including Line Telephone Sets with Cordless Handsets and Telecommunication Apparatus for Carrier-Current Line Systems or for Digital Line Systems; Videophones

DW – Durbin-Watson Statistics
AIS – Akaike Info Criterion
SC – Schwartz Criterion
LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

Table: 6.10 Continued (Part B)

EXPORT SUPPLY MODELS: CATEGORY 8517*							
AUSTRALIA - MALAYSIA							
AUD	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.036	-0.133	**R^2**	0.250	**LMT F(2,58)**	0.888	-Residuals are not normally distributed. -Incorrect sign for RP.
LnRP	-0.003	-0.099	**Adj. R^2**	0.187	**LMT F(Prob.)**	0.417	
Δ(LnRGDP)	5.162	2.488**	**F(5,60)**	3.995*	**BPGT F(4,61)**	1.160	
Trend	0.002	0.252	**F(Prob.)**	0.003	**BPGT F(Prob.)**	0.337	
Dummy	-0.261	-1.076	**DW**	2.061	**RESET F(1,59)**	0.284	
AR(1)	-0.449	-3.938*	**AIC**	2.287	**RESET F(Prob.)**	0.596	
			SC	2.486	**JBT χ^2 (2)**	84.785*	
			LL	-69.482	**JBT χ^2 (Prob.)**	0.000	
QTY	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	9.331	9.960*	**R^2**	0.763	**LMT F(2,58)**	2.333	-Model is mis-specified. -Residuals are not normally distributed. -Incorrect sign for RP.
LnRP	-0.958	-15.100*	**Adj. R^2**	0.743	**LMT F(Prob.)**	0.106	
Δ(LnRGDP)	1.371	0.743	**F(5,60)**	38.63*	**BPGT F(4,61)**	0.642	
Trend	0.003	0.092	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.635	
Dummy	-2.082	-2.148**	**DW**	2.306	**RESET F(1,59)**	6.203**	
AR(1)	0.586	5.372*	**AIC**	3.123	**RESET F(Prob.)**	0.016	
			SC	3.322	**JBT χ^2 (2)**	122.75*	
			LL	-97.064	**JBT χ^2 (Prob.)**	0.000	
AUSTRALIA - SINGAPORE							
AUD	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.103	-0.248	**R^2**	0.401	**LMT F(2,58)**	3.908**	-Residuals are serially correlated.
LnRP	0.011	0.195	**Adj. R^2**	0.352	**LMT F(Prob.)**	0.026	
Δ(LnRGDP)	0.578	0.436	**F(5,60)**	8.047*	**BPGT F(4,61)**	1.194	
Trend	0.031	2.157**	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.323	
Dummy	-0.530	-0.970	**DW**	2.156	**RESET F(1,59)**	1.677	
AR(1)	0.430	3.669*	**AIC**	2.297	**RESET F(Prob.)**	0.200	
			SC	2.496	**JBT χ^2 (2)**	1.081	
			LL	-69.801	**JBT χ^2 (Prob.)**	0.582	
QTY	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	7.590	21.740*	**R^2**	0.518	**LMT F(2,60)**	1.255	-Model is mis-specified. -Incorrect sign for RP.
LnRP	-0.543	-7.104*	**Adj. R^2**	0.487	**LMT F(Prob.)**	0.293	
Δ(LnRGDP)	1.510	0.583	**F(4,62)**	16.67*	**BPGT F(4,62)**	0.373	
Trend	0.027	2.095**	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.827	
Dummy	-1.022	-1.863***	**DW**	1.647	**RESET F(1,61)**	10.376*	
			AIC	3.111	**RESET F(Prob.)**	0.002	
			SC	3.276	**JBT χ^2 (2)**	1.034	
			LL	-99.234	**JBT χ^2 (Prob.)**	0.596	

Electrical Apparatus for Line Telephony or Line Telegraphy, Including Line Telephone Sets with Cordless Handsets and Telecommunication Apparatus for Carrier-Current Line Systems or for Digital Line Systems; Videophones

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RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

Table: 6.10 Continued (Part C)

EXPORT SUPPLY MODELS: CATEGORY 8517*							
AUSTRALIA - UNITED KINGDOM							
AUD	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.791	2.097**	**R^2**	0.318	**LMT F(2,58)**	0.746	-Residuals are Heteroscedastic.
LnRP	0.050	1.327***	**Adj. R^2**	0.262	**LMT F(Prob.)**	0.479	
Δ(LnRGDP)	1.301	1.290	**F(5,60)**	5.607*	**BPGT F(4,61)**	2.564**	
Trend	0.004	0.289	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.047	
Dummy	-0.355	-0.754	**DW**	1.877	**RESET F(1,59)**	0.588	
AR(1)	0.513	4.475*	**AIC**	1.845	**RESET F(Prob.)**	0.446	
			SC	2.044	**JBT χ^2 (2)**	2.221	
			LL	-54.897	**JBT χ^2 (Prob.)**	0.394	
QTY	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	7.603	13.186*	**R^2**	0.841	**LMT F(2,58)**	0.745	-Incorrect sign for RP.
LnRP	-0.970	-15.986*	**Adj. R^2**	0.827	**LMT F(Prob.)**	0.479	
Δ(LnRGDP)	1.573	0.955	**F(5,60)**	63.26*	**BPGT F(4,61)**	0.973	
Trend	-0.046	-2.231**	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.429	
Dummy	1.223	1.633***	**DW**	1.883	**RESET F(1,59)**	0.003	
AR(1)	0.482	4.155*	**AIC**	2.798	**RESET F(Prob.)**	0.955	
			SC	2.997	**JBT χ^2 (2)**	1.518	
			LL	-86.320	**JBT χ^2 (Prob.)**	0.468	

Electrical Apparatus for Line Telephony or Line Telegraphy, Including Line Telephone Sets with Cordless Handsets and Telecommunication Apparatus for Carrier-Current Line Systems or for Digital Line Systems; Videophones
DW – Durbin-Watson Statistics
AIS – Akaike Info Criterion
SC – Schwartz Criterion
LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

According to Table 6.10, all ten X supply models in Category 8517 are significant. For most of the models, the variable RP is significant, while the variables RGDP, Trend and Dummy are mostly not significant.

The variable RP is significant in 7 out of the 10 models and the RGDP is significant in 4 out of the 10 models. However, an incorrect (negative) sign for the RP (6 out of the 10 models; 5 based on QTY and 1 based on AUD), while the signs in all 10 models for the RGDP is according to expectation. The correct coefficients signs for both the RP and RGDP are found in only 4 out of the 10 models (all based on AUD), while for these 4 models, the coefficients range for the RP and RGDP is between (0.011 and 0.509) and (0.578 and 2.38) respectively. Furthermore, the coefficients estimated for the Trend and Dummy are negative in 4 out of 10 and in 5 out of the 10 models respectively. These results shows some evidence, that capacity utilization increases the X supply, while inconclusive evidence exits that an introduction of the

GST in July 2000 has stimulated the X supply for this category. In overall, the Adj. R^2 for all 10 models in this category ranges between 18.7 and 82.7 percent.

In overall, out of the 10 estimated models in this category, only 1 model (the X supply to Germany; based on AUD) has the correct signs and has satisfactory passed all diagnostic tests. The X supply model to Germany shows that a 1 percent increase in the RP will increase the X supply by 0.029 percent, while a 1 percent RGDP growth rate will increase the X supply by 1.732 percent in average. However, the variables RP, Trend and Dummy are not significant, whereas the variable RGDP is significant. Further, the Trend variable shows that an increase in production capacity and/or technological change will increase the X supply by 0.5 percent per quarter in average. Finally, the Dummy variable shows that since the GST was introduced, the X supply for this category has increased by 11.8 percent in average, while the Adj. R^2 for this model is 19.4 percent.

6.4.2.9 EXPORT SUPPLY MODELS; CATEGORY: 8703

Table: 6.11 (Part A)

EXPORT SUPPLY MODELS: CATEGORY 8703*							
AUSTRALIA - RoW							
AUD	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.038	0.481	**R^2**	0.427	**LMT F(2,60)**	9.802*	-Residuals are serially correlated. -Residuals are Heteroscedastic. -Incorrect sign for RP.
Δ(LnRP)	-0.109	-0.698	**Adj. R^2**	0.390	**LMT F(Prob.)**	0.000	
Δ(LnRGDP)	3.986	6.045*	**F(4,62)**	11.56*	**BPGT F(4,62)**	6.523*	
Trend	-0.002	-0.625	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.000	
Dummy	0.020	0.164	**DW**	2.187	**RESET F(1,61)**	0.784	
			AIC	0.239	**RESET F(Prob.)**	0.380	
			SC	0.404	**JBT χ^2 (2)**	0.218	
			LL	-3.023	**JBT χ^2 (Prob.)**	0.897	
QTY	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.057	0.769	**R^2**	0.679	**LMT F(2,59)**	0.873	-Residuals are Heteroscedastic. -Incorrect sign for RP.
Δ(LnRP)	-0.904	-6.234*	**Adj. R^2**	0.653	**LMT F(Prob.)**	0.423	
Δ(LnRGDP)	2.662	4.325*	**F(5,61)**	25.82*	**BPGT F(5,61)**	2.25***	
Trend	-0.002	-0.731	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.060	
Dummy	0.030	0.259	**DW**	1.894	**RESET F(1,60)**	0.968	
Residuals (-1)	-0.420	-4.400*	**AIC**	0.094	**RESET F(Prob.)**	0.329	
			SC	0.292	**JBT χ^2 (2)**	0.864	
			LL	2.846	**JBT χ^2 (Prob.)**	0.649	
AUSTRALIA - GERMANY							
AUD	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-1.391	-1.804***	**R^2**	0.143	**LMT F(2,58)**	1.101	-Residuals are Heteroscedastic. -Model is mis-specified. -Incorrect sign for RGDP.
LnRP	0.346	2.175**	**Adj. R^2**	0.072	**LMT F(Prob.)**	0.339	
Δ(LnRGDP)	-2.832	-0.854	**F(5,60)**	2.0***	**BPGT F(4,61)**	4.084*	
Trend	-0.011	-0.380	**F(Prob.)**	0.090	**BPGT F(Prob.)**	0.005	
Dummy	0.382	0.357	**DW**	2.017	**RESET F(1,59)**	5.332**	
AR(1)	0.308	2.474**	**AIC**	3.941	**RESET F(Prob.)**	0.025	
			SC	4.141	**JBT χ^2 (2)**	0.470	
			LL	-124.07	**JBT χ^2 (Prob.)**	0.791	
QTY	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	3.228	4.196*	**R^2**	0.316	**LMT F(2,58)**	0.437	-Residuals are Heteroscedastic. -Model is mis-specified. -Incorrect sign for RP; RGDP.
LnRP	-0.628	-4.216*	**Adj. R^2**	0.259	**LMT F(Prob.)**	0.648	
Δ(LnRGDP)	-2.528	-0.825	**F(5,60)**	5.533*	**BPGT F(4,61)**	5.597*	
Trend	-0.021	-0.745	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.001	
Dummy	0.625	0.591	**DW**	1.994	**RESET F(1,59)**	8.526*	
AR(1)	0.347	2.839*	**AIC**	3.828	**RESET F(Prob.)**	0.005	
			SC	4.027	**JBT χ^2 (2)**	0.711	
			LL	-	**JBT χ^2 (Prob.)**	0.709	

Motor Cars and Other Motor Vehicles Principally Designed for the Transport of Persons (Other Than Public Transport Type), Including Station Wagons and Racing Cars
DW – Durbin-Watson Statistics
AIS – Akaike Info Criterion
SC – Schwartz Criterion
LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

Table: 6.11 Continued (Part B)

EXPORT SUPPLY MODELS: CATEGORY 8703*							
AUSTRALIA - MALAYSIA							
AUD	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-1.532	-1.425	**R^2**	0.115	**LMT F(1,35)**	2.003	-Residuals are not normally distributed. -Model is not significant.
LnRP	0.219	1.356	**Adj. R^2**	0.017	**LMT F(Prob.)**	0.166	
Δ(LnRGDP)	8.506	1.694	**F(4,36)**	1.168	**BPGT F(4,36)**	0.615	
Trend	0.024	0.590	**F(Prob.)**	0.341	**BPGT F(Prob.)**	0.655	
Dummy	0.039	0.038	**DW**	2.425	**RESET F(1,35)**	0.043	
			AIC	3.950	**RESET F(Prob.)**	0.837	
			SC	4.159	**JBT χ^2 (2)**	57.383*	
			LL	-75.966	**JBT χ^2 (Prob.)**	0.000	
QTY	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	4.404	6.672*	**R^2**	0.545	**LMT F(1,35)**	0.533	-Incorrect sign for RP.
LnRP	-0.372	-3.753*	**Adj. R^2**	0.495	**LMT F(Prob.)**	0.470	
Δ(LnRGDP)	3.115	1.010***	**F(4,36)**	10.79*	**BPGT F(4,36)**	0.423	
Trend	-0.088	-3.577*	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.791	
Dummy	2.149	3.414*	**DW**	1.762	**RESET F(1,35)**	1.953	
			AIC	2.974	**RESET F(Prob.)**	0.171	
			SC	3.183	**JBT χ^2 (2)**	0.898	
			LL	-55.971	**JBT χ^2 (Prob.)**	0.638	
AUSTRALIA - SINGAPORE							
AUD	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.155	0.299	**R^2**	0.339	**LMT F(2,38)**	0.112	
Δ(LnRP)	0.099	1.343***	**Adj. R^2**	0.244	**LMT F(Prob.)**	0.894	
Δ(LnRGDP)	4.419	1.911***	**F(5,40)**	2.52**	**BPGT F(4,41)**	1.402	
Trend	-0.044	-1.483***	**F(Prob.)**	0.045	**BPGT F(Prob.)**	0.250	
Dummy	0.779	0.997	**DW**	1.896	**RESET F(1,39)**	0.555	
AR(1)	0.341	2.139**	**AIC**	2.909	**RESET F(Prob.)**	0.461	
			SC	3.147	**JBT χ^2 (2)**	0.102	
			LL	-60.897	**JBT χ^2 (Prob.)**	0.950	
QTY	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	3.829	8.184*	**R^2**	0.193	**LMT F(2,40)**	1.995	-Model is mis-specified. -Residuals are not normally distributed. -Incorrect sign for RP.
Δ(LnRP)	-0.188	-1.576	**Adj. R^2**	0.116	**LMT F(Prob.)**	0.149	
Δ(LnRGDP)	4.380	1.101	**F(4,42)**	2.5***	**BPGT F(4,42)**	0.985	
Trend	-0.068	-2.336**	**F(Prob.)**	0.056	**BPGT F(Prob.)**	0.426	
Dummy	1.910	2.393**	**DW**	1.481	**RESET F(1,41)**	34.053*	
			AIC	3.585	**RESET F(Prob.)**	0.000	
			SC	3.782	**JBT χ^2 (2)**	26.564*	
			LL	-79.256	**JBT χ^2 (Prob.)**	0.000	

Motor Cars and Other Motor Vehicles Principally Designed for the Transport of Persons (Other Than Public Transport Type), Including Station Wagons and Racing Cars
DW – Durbin-Watson Statistics
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LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

Table: 6.11 Continued (Part C)

EXPORT SUPPLY MODELS: CATEGORY 8703*							
AUSTRALIA - THAILAND							
AUD	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.489	-0.993	R^2	0.198	**LMT F(2,34)**	1.413	
Δ(LnRP)	0.182	0.940	**Adj.** R^2	0.153	**LMT F(Prob.)**	0.258	
Δ(LnRGDP)	8.906	2.027***	**F(4,36)**	1.6***	**BPGT F(4,36)**	0.952	
Trend	0.037	1.059***	**F(Prob.)**	0.06	**BPGT F(Prob.)**	0.445	
Dummy	-0.787	-0.920	**DW**	2.372	**RESET F(1,35)**	0.075	
			AIC	3.685	**RESET F(Prob.)**	0.785	
			SC	3.894	**JBT** χ^2 **(2)**	0.244	
			LL	-70.542	**JBT** χ^2 **(Prob.)**	0.885	
QTY	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.430	-0.954	R^2	0.311	**LMT F(2,34)**	1.526	
Δ(LnRP)	-0.580	-3.270*	**Adj.** R^2	0.234	**LMT F(Prob.)**	0.232	
Δ(LnRGDP)	7.060	1.756***	**F(4,36)**	4.061*	**BPGT F(4,36)**	0.909	
Trend	0.035	1.098***	**F(Prob.)**	0.008	**BPGT F(Prob.)**	0.469	-Incorrect sign for RP.
Dummy	-0.748	-0.955	**DW**	2.339	**RESET F(1,35)**	1.142	
			AIC	3.508	**RESET F(Prob.)**	0.293	
			SC	3.717	**JBT** χ^2 **(2)**	0.166	
			LL	-66.914	**JBT** χ^2 **(Prob.)**	0.921	
AUSTRALIA - UNITED KINGDOM							
AUD	**DEPENDENT VARIABLE: Δ(LnX)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.109	-0.366	R^2	0.168	**LMT F(2,58)**	1.971	
LnRP	0.029	0.289	**Adj.** R^2	0.099	**LMT F(Prob.)**	0.149	
Δ(LnRGDP)	1.010	0.375	**F(5,60)**	2.43**	**BPGT F(4,61)**	1.414	
Trend	0.005	0.506	**F(Prob.)**	0.045	**BPGT F(Prob.)**	0.240	
Dummy	-0.122	-0.368	**DW**	2.120	**RESET F(1,59)**	0.201	
AR(1)	-0.419	-3.544*	**AIC**	2.814	**RESET F(Prob.)**	0.656	
			SC	3.013	**JBT** χ^2 **(2)**	1.791	
			LL	-86.856	**JBT** χ^2 **(Prob.)**	0.408	
QTY	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	3.835	7.077*	R^2	0.756	**LMT F(2,58)**	0.380	
LnRP	-0.833	-8.730*	**Adj.** R^2	0.736	**LMT F(Prob.)**	0.685	
Δ(LnRGDP)	2.220	1.377***	**F(5,60)**	37.24*	**BPGT F(4,61)**	1.901	-Model is mis-specified.
Trend	0.008	0.443	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.122	-Incorrect sign for RP.
Dummy	1.068	1.563***	**DW**	2.090	**RESET F(1,59)**	18.124*	
AR(1)	0.411	3.406*	**AIC**	2.668	**RESET F(Prob.)**	0.000	
			SC	2.867	**JBT** χ^2 **(2)**	3.670	
			LL	-82.047	**JBT** χ^2 **(Prob.)**	0.160	

Motor Cars and Other Motor Vehicles Principally Designed for the Transport of Persons (Other Than Public Transport Type), Including Station Wagons and Racing Cars
DW – Durbin-Watson Statistics
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SC – Schwartz Criterion
LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

Table: 6.11 Continued (Part D)

EXPORT SUPPLY MODELS: CATEGORY 8703*							
AUSTRALIA - UNITED STATES							
AUD	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	3.975	3.051*	**R^2**	0.589	**LMT F(2,58)**	3.785**	-Residuals are serially correlated. -Residuals are not normally distributed.
LnRP	0.011	0.047	**Adj. R^2**	0.555	**LMT F(Prob.)**	0.029	
Δ(LnRGDP)	4.308	3.014*	**F(5,60)**	17.22*	**BPGT F(4,61)**	1.072	
Trend	-0.031	-0.881	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.378	
Dummy	1.403	1.461***	**DW**	1.501	**RESET F(1,59)**	1.817	
AR(1)	0.765	8.319*	**AIC**	2.821	**RESET F(Prob.)**	0.183	
			SC	3.020	**JBT χ^2 (2)**	25.185*	
			LL	-87.094	**JBT χ^2 (Prob.)**	0.000	
QTY	**DEPENDENT VARIABLE: LnX**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	8.214	6.599*	**R^2**	0.578	**LMT F(2,58)**	1.709	-Residuals are not normally distributed. -Incorrect sign for RP.
LnRP	-0.149	-0.599	**Adj. R^2**	0.542	**LMT F(Prob.)**	0.190	
Δ(LnRGDP)	3.991	2.570**	**F(5,60)**	16.41*	**BPGT F(4,61)**	0.963	
Trend	-0.042	-1.220***	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.434	
Dummy	1.682	1.670***	**DW**	1.660	**RESET F(1,59)**	1.603	
AR(1)	0.733	7.941*	**AIC**	2.953	**RESET F(Prob.)**	0.210	
			SC	3.152	**JBT χ^2 (2)**	27.727*	
			LL	-91.438	**JBT χ^2 (Prob.)**	0.000	

***Motor Cars and Other Motor Vehicles Principally Designed for the Transport of Persons (Other Than Public Transport Type), Including Station Wagons and Racing Cars**
DW – Durbin-Watson Statistics
AIS – Akaike Info Criterion
SC – Schwartz Criterion
LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

According to Table 6.11, out of the fourteen X supply models in Category 8703, 13 models are significant, while 1 model (Malaysia; based on AUD) is not significant. Furthermore, for most of the models, the variable RGDP is significant and the variables RP and Trend half being significant and other half not, while the variable Dummy is mostly not significant.

The variable RP is significant in 7 out of the 14 models and the RGDP is significant in 9 out of the 14 models. However, an incorrect (negative) sign for the RP (8 out of the 14 models; 7 based on QTY and 1 based on AUD) and for the RGDP (2 out of the 14 models; 1 based on QTY and 1 based on AUD) is evident. The correct coefficients signs for both the RP and RGDP are found in only 5 out of the 14 models (all based on AUD), while for these 5 models, the coefficients range for the RP and RGDP is between (0.011 and 0.219) and (1.01 and 8.906) respectively. Furthermore, the coefficients estimated for the Trend and Dummy are negative in 8 out of 14 and in 3 out of the 14 models respectively. These results shows inconclusive evidence, that the capacity utilization increases the X supply, while some evidence exits that the introduction of the GST in July 2000 has stimulated the X supply for this category. In overall, the Adj. R^2 for all 14 models in this category ranges between 1.7 and 73.6 percent.

In overall, out of 14 estimated models in this category, 3 models (the X supply to Singapore, Thailand and The United Kingdom; all based on AUD) have the correct signs and have satisfactory passed all diagnostic tests. The X supply model to Singapore shows that a 1 percent growth rate in the RP will increase the X supply by 0.099 percent, while a 1 percent RGDP growth rate will increase the X supply by 4.419 percent in average. The X supply model to Thailand shows that a 1 percent growth rate in the RP will increase the X growth rate by 0.182 percent, while a 1 percent RGDP growth rate will increase the X growth rate by 8.906 percent in average. The X supply model to The United Kingdom shows that a 1 percent increase in the RP will increase the X growth rate by 0.029 percent, while a 1 percent RGDP growth rate will increase the X growth rate by 1.01 percent in average. The variables RP is significant only for Singapore, the RGDP and Trend is significant for Singapore and Thailand, while the variable Dummy is not significant for any of these 3 countries. Furthermore, the Trend variable only shows a marginal affect of the capacity utilization on the X supply (negative for Singapore; positive for Thailand and The United Kingdom). Additionally, the Dummy variable shows that since the GST was introduced, the X supply for this category to Thailand and The United Kingdom has decreased by 78.7 and 12.2 percent respectively and increased in average by 77.9 percent for Singapore. Finally, the Adj. R^2 for Singapore, Thailand and The United Kingdom is 24.4, 15.3 and 9.9 respectively, which shows a relatively poor fit for these 3 models.

6.4.2.10 SUMMARY - EXPORT SUPPLY MODELS; HS-2, HS-4

In this section, one hundred and sixteen X supply models are estimated and the results are interpreted, and these 116 models consist of 66 models (33 based on AUD and 33 based on QTY) based on HS-2 and 50 models (25 based on AUD and 25 based on QTY) based on HS-4 level of aggregation. Accordingly, the initial summaries and the specific findings are made individually for HS-2 and HS-4 level of aggregation, followed by the overall combined summaries for both levels of aggregation.

Summary: HS-2

Based on HS-2 level of aggregation, 65 out of 66 models are significant and 1 model (The United Kingdom; for the Category 30 - based on QTY) is not significant. However, an incorrect (negative) sign for the RP (32 out of 66 models; 1 based on AUD and 31 based on QTY) and for RGDP (negative) (2 out of 66 models; 1 based on AUD and 1 based on QTY) is evident. The correct coefficients signs for both the RP and RGDP are found in 33 out of the 66 models (all based on AUD), while for these 33 models, the coefficients range for the RP and RGDP is between (0.0002 and 0.353) and (0.265 and 10.418) respectively. Furthermore, the coefficients estimated for Trend in 35 out of the 66 models, and Dummy in 30 out of the 66 models are negative. These results show inconclusive evidence that that capacity utilization does increase the X supply, while some evidence exists that the introduction of the GST in July 2000 has stimulated the X supply.

In overall, out of the 66 estimated models based on HS-2, 11 models (the X supply to China and The United States of America for the Category 30; France for the Category 84; Malaysia, Singapore and The United States of America for the Category 85; China, Germany Malaysia, Singapore and The United States of America for the Category 87; - all based on AUD) have the correct signs and have satisfactory passed all diagnostic tests. However, for France in the Category 84 and for Germany in the Category 87, the residuals are not normally distributed. Furthermore, for these 11 models, the coefficients range for the RP and RGDP is between (0.001 and 0.353) and (0.793 and 10.418) respectively. The variables RP is significant in 7 out of these 11 models and the variable RGDP is significant in all 11 models, while the Trend and Dummy variables are significant in 4 out of 11 and 3 out of 11 models respectively. The Trend coefficients signs are mixed; which shows only marginal and inconclusive evidence that capacity utilization increases the X supply. However, the Dummy coefficients are mostly positive and show some evidence that since the GST was introduced, the overall X supply has considerably increased in most of the categories. Finally, the Adj. R^2 for these 11 models ranges between 13.8 and 55 percent.

Summary: HS-4

Based on HS-4 level of aggregation, 46 out of the 50 models are significant and 4 models (France and The United Kingdom for the Category 3004; - based on AUD, The United Kingdom for the Category 3004; - based on QTY and Malaysia for the Category 8703; - based on AUD) are not significant. However, an incorrect (negative) sign for RP (30 out of 50 models; 5 based on AUD and 25 based on QTY) and for RGDP (negative) (9 out of 50 models; 5 based on AUD and 4 based on QTY) is evident. The correct coefficients signs for both the RP and RGDP are found in 18 out of 50 models (all based on AUD), while for these 18 models, the coefficients range for the RP and RGDP is between (4.87E-06 and 0.509) and (2.43E-04 and 8.906) respectively. Furthermore, the coefficients estimated for Trend in 27 out of the 50 models, and Dummy in 17 out of 50 models are negative. These results shows inconclusive evidence that that capacity utilization increase the X supply, while some evidence exists that since introduction of the GST in July 2000 it has stimulated the X supply.

In overall, out of the 50 estimated models based on HS-4, 7 models (the X supply to the RoW for the Category 3004; France for the Category 8471; the RoW for the Category 8473; Germany for the Category 8517; Singapore, Thailand and The United Kingdom for the Category 8703; - all based on AUD) have the correct signs and have satisfactory passed all diagnostic tests. Furthermore, for these 7 models, the coefficients range for the RP and RGDP is between (0.008 and 0.182) and (0.463 and 8.906) respectively. The variables RP is significant in 3 out of the 7 models and the variable RGDP is significant in 5 out of the 7 models, while the Trend and Dummy variables are significant in 3 out of 7 and 1 out of the 7 models respectively. Both the Trend and Dummy coefficients signs are mostly positive, while the Trend coefficients values are very small in comparisons with the Dummy coefficients. These results shows only marginal evidence that the capacity utilization increases the X supply and shows evidence that since the GST was introduced, the overall X supply has considerably increased in most of the categories. Finally, the Adj. R^2 for these 7 models ranges between 4.8 and 47.1 percent.

Overall Summary

Based on both HS-2 and HS-4 level of aggregation, out of the one hundred and sixteen X supply models, 111 models are significant and 5 models are not significant. However, an incorrect (negative) sign for the RP (62 out of 116 models; 6 based on AUD and 56 based on QTY) and for the RGDP (negative) (11 out of the 116 models; 6 based on AUD and 5 based on QTY) is evident. The correct coefficients signs for both the RP and the RGDP are found in 51 out of the 116 models (all based on AUD), while for these 51 models, the coefficients range for the RP and RGDP is between (4.87E-06 and 0.509) and (2.43E-04 and 10.418) respectively. Furthermore, the coefficients estimated for Trend in 62 out of the 116 models, and Dummy in 47 out of the 116 models are negative. In overall, these results show inconclusive evidence that that capacity utilization does increase the X supply, while some evidence exists that the introduction of the GST in July 2000 has stimulated the X supply.

Out of the 116 estimated models based on both HS-2 and HS-4, 18 models have the correct signs and have satisfactory passed all diagnostic tests, while all these 18 models are based on AUD values. The coefficients range for the RP and RGDP in these 18 models is between (0.001 and 0.353) and (0.463 and 10.418) respectively. The variable RP is significant in 10 out of the 18 models and the variable RGDP is significant in 16 out of the 18 models, while the Trend and Dummy variables are significant in 7 out of the 18 and 4 out of the 18 models respectively. The Trend coefficients signs are mixed with relatively very small values, which shows only marginal and inconclusive evidence that the capacity utilization increases the X supply. On the other hand, the Dummy coefficients values are higher and mostly positive, which show some evidence that since the GST was introduced, the overall X supply has considerably increased in most of the categories. Finally, the Adj. R^2 for these 18 models ranges between 4.8 and 55 percent.

Although some valuable information is obtained from these one hundred and sixteen X supply models, the overall results indicate several problems. One of the major problems is that the majority of the models did not pass some or all diagnostic tests which include; serial correlation, heteroscedasticity, model specification, non-normality of residuals and collinearity. These problems suggest that the coefficients estimated in such models must be viewed with caution. Furthermore, the models estimated based on AUD values, compared to the models estimated based on QTY values has produced better results in overall. This is evident by observing the coefficients signs estimated and the results of the diagnostic tests. The models estimated based on QTY compared to the models based on AUD values are more likely to experience an incorrect coefficients signs and less satisfactory diagnostic results, while none of the models based on QTY values did pass all the diagnostic tests. Furthermore, most of the X supply models estimated show that the X supply is price inelastic and income elastic, while most of the X supply models have a relatively low Adj. R^2. Finally, the overall findings suggest that most of the X supply models estimated require further improvements. These improvements include further corrections, adjustments and/or even considerable modification of most of the models in order to obtain more reliable models. This in turn will make it possible to get a clearer understanding of the determinants of the X supply from Australia to the RoW and the selected TD countries in the selected TD categories.

6.5 IMPORT DEMAND

According to Kreinin (2005), the most likely scenario is that M demand from the RoW for any individual country accounts for a relatively small M demand share, compared to the world total M demand share in any product category. Due to this, the individual country M demand is unlikely to have a significant effect on the total world demand volumes, hence on the price levels. The M demand for an individual country is determined by the differences between domestic demand and supply at a specific world price level, while under this proposition, the country is considered a „small country' and cannot influence the world price levels in the observed category. Furthermore, if QTY imported and domestic demand and supply price elasticities are known, according to Kreinin (2005), the M price elasticity is expressed in Equation 6.25

$$\eta_{MD} = \left(Q_D{}^d / Q_M\right)\ \eta_D{}^d + \left(Q_S{}^d / Q_M\right)\ \eta_S{}^d \tag{6.25}$$

where: 'η_{MD}' is price elasticity of the M demand, '$Q_D{}^d$' is the QTY demanded domestically, '$Q_S{}^d$' is the QTY supplied domestically, 'Q_M' is the QTY imported, '$\eta_D{}^d$' is price elasticity of domestic demand and '$\eta_S{}^d$'is the price elasticity of domestic supply.

6.5.1 THEORETICAL FRAMEWORK AND EMPIRICAL STUDIES

The econometric analysis of the M demand are extensively covered in the current literature, and one of the earliest and most influential theoretical survey in this area is by Orcutt (1950) who examined the price elasticities of demand for the M, and X and their affects on the trade balances. Following this influential work by Orcutt (1950), the M demand was examined in numerous empirical studies which includes Balassa (1967), Houthakker & Magee (1969), Leamer & Stern (1970), Murray & Ginman (1976), George *et al*. (1977), Goldstein & Khan (1985), Silvapulle & Phillips (1985), Wilkinson (1992), Deyak *et al*. (1993), Athukorala & Menon (1995), Carone (1996), Belessiotis & Giuseppe (1997), Prasit (1997), Havrila (2004), Shiferaw & Kilmer (2007) and Muhammad (2008).

Balassa (1967) examined the trade flows in the European Common Market by using only income, as an explanatory variable in an attempt to explain how income elasticities of the X supply and M demand are likely to affect internal and external trade creation, while the external trade creation refers to an increased M from a third countries. The major findings were inconclusive since a rise in income elasticities did not provide the expected support for gross trade creation. Subsequent contribution in this area is a study by Houthakker & Magee (1969) which expanded the Balassa (1967) M demand model by the inclusion of additional explanatory variable the price level (the ratio of the M price index over the country's wholesale price index) in the analysis of 15 industrialized countries. The major findings by Houthakker & Magee (1969) established that all M demand models generated relatively good results for most of the countries. Exception to these findings was only 2 models; one for Australia and second for South Africa where model fit was lower than for rest of the countries. The R^2 for Australia and South Africa in this study was 62 and 79.6 percent respectively, while for rest of the 13 countries, the R^2 was equal to or in excess of 95.6 percent. However, as pointed-out by Houthakker & Magee (1969), these results should be viewed with caution as the sample size was relatively small and some evidence of the serial correlation was also present. In addition, it has been suggested that a bilateral trade analysis amongst all of the industrial countries should be further carried-out by using a log-log model structure.

According to Leamer & Stern (1970, p.40), the theoretical M demand model should give a clear emphasis of whether the producer or consumer M demand is estimated. Furthermore, consideration must be made whether the category falls into durable or non-durable product range, since demand according to these factors is likely to be influenced by unique explanatory variables. Finally, Leamer & Stern (1970) shows that there is a strong theoretical support that the M demand model should include the RP of the M and real income levels.

Further contribution to the M demand model specification is a study by Murray & Ginman (1976) which suggest that the M demand model consists of income, the M price index and the price index of domestically produced substitutes for that import. The M demand model proposed by Murray & Ginman (1976) includes an explanatory variables income, M price index, domestic price index for tradable products and domestic price index for non-tradable products separately. According to this study, there is an argument that traditional M demand model that uses the RP ratio is more appropriate for a disaggregated M demand estimation, however, when the parameter estimation is based on aggregated M demand, the explanatory variable RP is inappropriate. However, these suggestions should be further validated with empirical evidence since they are based on methodological rather than empirical grounds. Nevertheless, these findings prove to be consistent with theoretical expectations.

According to Goldstein & Khan (1985), the majority of the M demand empirical studies are focusing on the manufacturing industries where the products from industries are viewed as imperfect substitutes, while the most common explanatory variables are price of the imported product and the price of domestically produced substitutes and domestic income. Furthermore, Goldstein & Khan suggests that care must be taken when single equation models are used for estimation, as the price elasticity estimated can be biased due to simultaneity between the price and QTY. Finally, most of the empirical studies which have estimated the M demand model for manufacturing industries suggest that income and price are a significant explanatory variable, while income elasticity is higher compared to price elasticity.

A study by Silvapulle & Phillips (1985) examined Australia's M demand elasticity of substitution in manufacturing industries from the Association of South-East Asian Nations (ASEAN) countries. However, the foreign reserves and capacity utilization variables did not conform to the theoretical expectations, while the income elasticity of M demand was high in all industries. Another study which investigated the M demand for Australia is a study by Wilkinson (1992) and the major findings suggests that income and the RP are significant in explaining growth in the Australian M demand. A further study that estimated the M demand model in the Australian manufacturing industry is a study by Athukorala & Menon (1995) which used the RP, GDP and ratio of stock to average sales volumes as explanatory variables. In the study by Athukorala & Menon, the RP is defined as the ratio of tariff augmented M price over the price of domestic competing products; the GDP measure relates to domestic activity, while the ratio of stock measures the overall scarcity in the domestic supply. The major findings in this study suggests that the Australian M demand price elasticity for manufacturers is inelastic, while the upwards bias exists in the price elasticity of the M demand due to quantitative restrictions.

Deyak *et al*. (1993) estimated the M demand model for Canada using explanatory variables, real Gross National Product (GNP), foreign currency price of the M, domestic price of the M, EXR and quarterly dummy variables (Q2, Q3 and Q4). The major findings of this study are that the M demand is relatively income elastic, price inelastic, and dummy variables suggest that the M volumes differ over different time frames, while the M demand changes in respect to changes in the EXR is slow.

Carone (1996) investigated the M demand model for The United States of America for the total M and non-oil merchandise M, using real GDP and RP as explanatory variables. Furthermore, Belessiotis & Giuseppe (1997) investigated the M demand for France for merchandise imports, using real GDP and RP for the M and price of the M competing products. The major findings in both studies suggest that the GDP and the RP are significant in explaining M volumes in both countries. Shiferaw & Kilmer (2007) investigated the M demand model for Switzerland for imported meat using the total expenditure of imported meat minus nominal M price of meat and the price index. An overall result in this study suggests that the M demand has a long-run relationship with prices and real expenditure. Furthermore, Muhammad (2008) used a differential production model to estimate the M demand model for European Union countries that import roses from African countries. According to this study, the price fluctuation is a significant variable in the M demand for roses, while the price fluctuation is subject to overall fluctuation in the tariff rates.

Finally, studies by Prasit (1997) and Havrila (2004) estimated the Australian M demand for pharmaceutical and textile and clothing respectively for Australia. Prasit (1997) used the following explanatory variables; M price index, RGDP and dummy variable for the trade liberalization, while dummy variable takes value 0 for the period 1975-1988 and 1 for the period 1989-1992. On the other hand, Havrila (2004) used explanatory variables of the RP, RGDP, effective rate of assistance, stock to sales ratio and dummy variable for the Asian crisis, while the dummy variable had a value of 0 before the year 1997 and 1, post 1997. The overall findings relating to the significance of the explanatory variables chosen for these 2 studies are mixed; however, the RP and GDP appear to be the most significant variables in both studies.

Based on a review of empirical studies, the most basic M demand model is presented in Equation 6.26

$$MD_{ij}^{t} = f\left[\left(PM_{i}^{t} / P_{i}^{t}\right), RGDP_{i}^{t}\right] \tag{6.26}$$

where: $'MD'$ is the M demand, $(PM_i^t / P_i^t$ is the RP of M, while $'PM'$ is the M price index and $'P'$ is the domestic price index, $'RGDP'$ is real domestic GDP levels, $'i'$ is the industry for the category i, $'j'$ is a country j or the RoW from where the M is originating from and $'t'$ is a time period.

According to the theoretical M demand model in Equation 6.26, the RP is expressed as a ratio of the M price index over the domestic price index. Other things being equal, the RP is expected to be negative, since increase in the RP will make imports more expensive, hence, the M demand will decrease. On the other hand, other things being equal and assuming that the imports are „normal products[113]', as the domestic real GDP increases, it is expected to initiate an increase in the M demand level, hence, a positive relationship between real GDP levels and the M demand.

The Australian M levels in the selected TD categories accounts for a small proportion of the world's total imports, which is similar to the X levels in these categories. Thus, the assumption that the M prices are determined exogenously in these TD categories is sensible and consequently, the M demand estimation will be in the form of a single equation model. Numerous researchers, which includes Murray & Ginman (1976), Deyak *et al*. (1993), and Carone (1996), suggested that price specification for the M demand should be separately specified; as the price of M and the price of domestically produced substitutes. In addition, the study by Sawyer & Sprinkle (1999) suggested the inclusion of the EXR, in addition to these two prices in the M demand models. However, according to Murray & Ginman (1976), the RP ratio is more appropriate for the disaggregated M demand estimation. This comment raises an important point, as this is the case in this study, as the selected TD categories are disaggregated based on HS-2 and HS-4 level of aggregation. Furthermore, whether the M demand model should include the RP or the prices should be individually specified, a consensus amongst researchers does not currently exist. In order to preserve consistency with the X supply estimation and follow-up suggestions made by Murray & Ginman (1976), the adopted approach in this study is to use the RP and consequently the theoretical M demand model in this chapter will include both the RP and the RGDP.

[113] „Normal Products' here are referring to „Normal Goods', since the analysis is conducted for both goods and services, hence the adopted expression is products and not goods. In addition, „Normal Goods' are those goods for which consumption levels are rising as income level increases, while „Inferior Goods' are those goods for which consumption levels decline as income level increases (Engel, 1895).

The RP calculation for the M demand will follow the reverse approach adopted in the X supply model. Accordingly, the AUV of the M will be divided with AUV of the X, while AUV for both the M and X is calculated by dividing the M and X values expressed in AUD with the corresponding M and X QTY. The theoretical model for the M demand in this form is presented in Equation 6.27

$$MD_{ij}^{\,t} = f\left[\left(\left(M_{ij}^{\,t} / M*_{ij}^{\,t}\right) / \left(X_{ij}^{\,t} / X*_{ij}^{\,t}\right)\right), RGDP_i^t\right] \tag{6.27}$$

where: $(M_{ij}^t / M^*{}_{ij}^t$ is the AUV for the M, $(X_{ij}^t / X^*{}_{ij}^t$ is the AUV for the X, $'M'$ and $'X'$ is based on monetary values (AUD), while $'M^*'$ and $'X^*'$ is the M and X corresponding QTY.

According to the theoretical M demand model in Equation 6.27, other things being equal, it is expected for the RP to be negative because as the RP of the M increases, the M demand will decrease and vice-versa. In addition, a positive relationship is expected for the real GDP, because as domestic income levels rises, it is expected that the M demand will increase.

Furthermore, the dummy variables in the M demand models are frequently used (Boylan & Cuddy 1987; Prasit, 1997; Havrila, 2004 and Dutta & Ahmed, 2006), while Marquez & McNeilly (1988) have recommended the inclusion of dummy variables since dummy variable(s) explain(s) the M demand caused by exogenous factors. The M demand model estimated in this study will include 3 quarterly dummy variables - Q2, Q3 and Q4 which follows the methodology used by Deyak *et al.* (1993)[114]. The difference between this study and the study by Deyak *et al.* (1993) is that this study only uses the RP and does not separate the price of the M, the price of domestic substitutes and the EXR. Furthermore, unlike the studies which have estimated the M demand model from an Australian perspective for pharmaceuticals (Prasit, 1997) and textile and clothing (Havrila, 2004), that are based on annual time-series and inability to employ quarterly dummy variables, this study can facilitate this approach due to the quarterly time series data used. Haan *et al.* (2008) pointed-out that by avoiding annual time-series data in favour of the quarterly time-series data, it will capture high frequency fluctuations know as „Shock Accounting' and reveal additional information, which are completely hidden when annual time series data is used. Consequently, this model is likely to capture and reveal additional information

[114] Deyak *et al.* (1993) found that significant fluctuations in the Canadian M demand exists in these 3 different periods.

compared to the previous studies, while the final theoretical M demand model in this form is presented in Equation 6.28

$$MD_{ij}^{\ t} = f\left[\left(\left(M_{ij}^{\ t} / M*_{ij}^{\ t}\right) / \left(X_{ij}^{\ t} / X*_{ij}^{\ t}\right)\right), RGDP^{t}, DQ_2, DQ_3, DQ_4\right] \tag{6.28}$$

where: 'DQ_2', 'DQ_3' and 'DQ_4' are the dummy variables for quarter two (June quarter), quarter three (September quarter) and quarter four (December quarter), while quarter one (March quarter) is a reference period.

Based on this review, the M demand model which will be estimated is presented in Equation 6.29

$$MD_{ij}^{\ t} = \beta_0 + \beta_1 RP_{ij}^{\ t} + \beta_2 RGDP^{t} + \beta_3 DQ_2 + \beta_4 DQ_3 + \beta_5 DQ_4 + \nu^{t} \tag{6.29}$$

where: 'β_0' is the intercept, 'β_1, β_2' are the slope coefficients, '$\beta_3, \beta_4, \beta_5$' are the intercept shifters, 'ν' is a random error, 'RP' is the ratio of the M AUV $(M_{ij}^{\ t} / M^{*}{}_{ij}^{\ t}$ over the AUV for the X $(X_{ij}^{\ t} / X^{*}{}_{ij}^{\ t}$, '$RGDP^{t}$' is domestic real GDP levels, 'DQ_2, DQ_3, DQ_4' are quarterly dummy variables for June, September and December respectively, 'i' is the industry for the category i, 'j' is a country j or the RoW from where the M is originating from and 't' is a time period.

The expected a priory signs for variable in Equation 6.29 is negative for 'β_1', positive for 'β_2', while for '$\beta_3, \beta_4, \beta_5$' is uncertain. According to Deyak *et al.* (1993), who used such quarterly variables for the Canadian M demand model, found that the coefficients for quarter two and four were positive, while for quarter three, the coefficient was negative. These empirical results for Canada does not necessary hold for Australia, as seasons and categories analyzed for Canada does not correspond to those analyzed in this study.

Now that the theoretical M demand model is determined, another important aspect to consider is to establish whether to use a linear or non-linear M demand model. According to Khan & Ross (1975; 1977) and Salas (1982), when the M demand model tries to establish to what degree changes in the explanatory variables affect the dependant variable overtime, the preferred model form is in log-log form. As a result, the M demand model in this chapter will be estimated in log-log form[115]. This approach has been adopted in a vast number of existing studies and such studies

[115] According to Gujarati (2003, p.421), this approach is likely to reduce the problems with heteroscedasticity which is a common problem when cross-sectional data are used, which is the case in this study.

includes Houthakker & Magee (1969), Prasit (1997), Deyak *et al*. (1993), Dutta & Ahmed (2006) and Shiferaw & Kilmer (2007). The adopted M demand model in log-log form is presented in Equation 6.30

$$LnMD_{ij}^{t} = \beta_0 + \beta_1 LnRP_{ij}^{t} + \beta_2 LnRGDP^{t} + \beta_3 DQ_2 + \beta_4 DQ_3 + \beta_5 DQ_4 + \nu^{t} \tag{6.30}$$

where: 'Ln' is the natural logarithm for the corresponding variables.

6.5.2 IMPORT DEMAND ESTIMATION

This section consists of 116 estimated M demand models, using M data presented in Appendix Tables 6.1-6.19 for HS-2 and Appendix Tables 6.20-6.46 for HS-4 level of aggregation. Furthermore, the Australian GDP data is presented in Appendix Table 6.46, while Table 6.12 and Table 6.13 shows the M demand models which will be estimated in this section based on HS-2 and HS-4 level of aggregation respectively.

Table: 6.12

IMPORT DEMAND – ESTIMATED MODELS (AUD & QTY)					
HS-2 and ANZSIC-1					
AUSTRALIA -	30[1]	84[2]	85[3]	87[4]	1[5]
RoW	Yes (n=68)[a]	Yes (n=68)[a]	Yes (n=68)[a]	Yes (n=68)[a]	No
China	Yes (n=61)[b]	Yes (n=68)[a]	Yes (n=68)[a]	Yes (n=55)[c]	No
France	Yes (n=68)[a]	Yes (n=68)[a]	Yes (n=68)[a]	Yes (n=42)[f]	No
Germany	Yes (n=68)[a]	Yes (n=68)[a]	Yes (n=68)[a]	Yes (n=68)[a]	No
Malaysia	No	Yes (n=68)[a]	Yes (n=68)[a]	Yes (n=68)[a]	No
Singapore	No	Yes (n=68)[a]	Yes (n=68)[a]	Yes (n=68)[a]	No
Thailand	No	Yes (n=68)[a]	Yes (n=68)[a]	Yes (n=68)[a]	No
United Kingdom	Yes (n=68)[a]	Yes (n=68)[a]	Yes (n=68)[a]	Yes (n=68)[a]	No
United States of	Yes (n=68)[a]	Yes (n=68)[a]	Yes (n=68)[a]	Yes (n=68)[a]	No

[1] Pharmaceutical Products
[2] Nuclear Reactors, Boilers, Machinery and Mechanical Appliances; Parts Thereof
[3] Electrical Machinery and Equipment and Parts Thereof; Sound Recorders and Producers, Television Image and Sound Recorders and Reproducers, and Parts and Accessories of Such Articles
[4] Vehicles Other Than Railway or Tramway Rolling-Stock, and Parts and Accessories Thereof
[5] Transportation Services

- *[a] 1990:Q1 - 2006:Q4*
- *[b] 1991:Q4 - 2006:Q4*
- *[c] 1993:Q2 - 2006:Q4*
- *[f] 1996:Q3 - 2006:Q4*

Table: 6.13

IMPORT DEMAND – ESTIMATED MODELS (AUD & QTY)						
HS-4 and ANZSIC-2						
AUSTRALIA -	3004[1]	8471[2]	8473[3]	8517[4]	8703[5]	1.2[6]
RoW	Yes (n=68)[a]	Yes (n=68)[a]	Yes (n=68)[a]	Yes (n=68)[a]	Yes (n=68)[a]	No
China	No	Yes (n=68)[a]	No	No	No	No
France	Yes (n=39)[g]	Yes (n=68)[a]	No	No	No	No
Germany	Yes (n=43)[e]	Yes (n=68)[a]	No	Yes (n=68)[a]	Yes (n=68)[a]	No
Malaysia	No	Yes (n=68)[a]	No	Yes (n=68)[a]	Yes (n=42)[f]	No
Singapore	No	Yes (n=68)[a]	No	Yes (n=68)[a]	Yes (n=48)[d]	No
Thailand	No	Yes (n=68)[a]	No	No	Yes (n=42)[f]	No
United Kingdom	Yes (n=35)[h]	Yes (n=68)[a]	No	Yes (n=68)[a]	Yes (n=68)[a]	No
United States of	No	No	No	No	Yes (n=68)[a]	No

[1] Medicaments (Excluding Goods of 3002, 3005 or 3006) Consisting of Mixed or Unmixed Products for Therapeutic or Prophylactic Uses, Put Up in Measured Doses or in Forms or Packagings for Retail Sale
[2] Automatic Data Processing Machines and Units Thereof; Magnetic or Optical Readers, Machines for Transcribing Data onto Data Media in Coded Form and Machines for Processing Such Data, Not Elsewhere Specified or Include
[3] Parts and Accessories (Other Than Covers, Carrying Cases and the Like) Suitable for Use Solely or Principally with Office Machines
[4] Electrical Apparatus for Line Telephony or Line Telegraphy, Including Line Telephone Sets with Cordless Handsets and Telecommunication Apparatus for Carrier-Current Line Systems or for Digital Line Systems; Videophones
[5] Motor Cars and Other Motor Vehicles Principally Designed for the Transport of Persons (Other Than Public Transport Type), Including Station Wagons and Racing Cars
[6] Freight Transports

- *[a] 1990:Q1 - 2006:Q4*
- *[d] 1995:Q1 - 2006:Q4*
- *[e] 1996:Q2 - 2006:Q4*
- *[f] 1996:Q3 - 2006:Q4*
- *[g] 1997:Q2 - 2006:Q4*
- *[h] 1998:Q2 - 2006:Q4*

Tables 6.12-6.13 consists of only 58 M demand models, however, as each of these models are estimated based on AUD and QTY values, the M demand models estimated are 116 in total. These 116 models are estimated for the selected TD goods categories only, as the M data (QTY) is not available for the selected TD service categories.

Due to econometric procedures, the variables in the M demand models are tested for the unit root prior to models estimation. If the unit root test revealed that all of the tested variables in the model are non-stationary, further tests for cointegration is carried-out. The unit root results are presented in Appendix Tables 6.77-6.106, while Appendix Tables 6.77-6.91 shows the unit root results based on AUD, and Appendix Tables 6.92-6.106 shows the unit root results based on QTY values. Finally, the cointegration tests are presented in Appendix Tables 6.107-6.124.

Tables 6.14-6.22 in this section shows all of the estimated one hundred and sixteen M demand models. These include the estimated coefficients, the corresponding t-ratios and diagnostic tests results, while Tables 6.14-6.17 and Tables 6.18-6.22 show the estimated M demand models based on HS-2 and HS-4 level of aggregation respectively.

Since the dependant variable (M) and independent variables (RP and RGDP) are in log values, the interpretation of the estimated coefficients are in terms of elasticities. However, if the values of these variables are expressed in the change of the log values, the interpretation of such variables will refer to the growth rates in elasticities.

Now that the data used and the procedures followed are outlined, the following sections will individually comment on all M demand models estimated in this chapter.

6.5.2.1 IMPORT DEMAND MODELS; CATEGORY: 30

Table: 6.14 (Part A)

IMPORT DEMAND MODELS: CATEGORY 30*							
AUSTRALIA - RoW							
AUD	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.278	5.292*	**R^2**	0.486	**LMT F(2,58)**	1.254	
Δ(LnRP)	-0.001	-0.007	**Adj. R^2**	0.434	**LMT F(Prob.)**	0.293	
Δ(LnRGDP)	3.024	4.253*	**F(5,61)**	9.442*	**BPGT F(5,60)**	1.270	
Q2	-0.357	-4.323*	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.285	
Q3	-0.268	-3.991*	**DW**	2.166	**RESET F(1,59)**	2.101	
Q4	-0.518	-5.162*	**AIC**	-2.677	**RESET F(Prob.)**	0.153	
Residuals (-1)	-0.211	-2.389**	**SC**	-2.446	**JBT χ^2 (2)**	1.776	
			LL	96.666	**JBT χ^2 (Prob.)**	0.412	
QTY	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.115	0.434	**R^2**	0.931	**LMT F(2,57)**	1.153	-Residuals are Heteroscedastic. -Residuals are not normally distributed.
Δ(LnRP)	-0.918	-29.346*	**Adj. R^2**	0.923	**LMT F(Prob.)**	0.323	
Δ(LnRGDP)	0.382	0.107	**F(6,59)**	131.7*	**BPGT F(5,60)**	3.146**	
Q2	-0.126	-0.300	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.014	
Q3	-0.184	-0.548	**DW**	2.069	**RESET F(1,58)**	2.352	
Q4	-0.130	-0.257	**AIC**	0.430	**RESET F(Prob.)**	0.131	
AR(1)	-0.331	-2.710*	**SC**	0.662	**JBT χ^2 (2)**	38.400*	
			LL	-7.179	**JBT χ^2 (Prob.)**	0.000	
AUSTRALIA - CHINA							
AUD	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.169	-0.609	**R^2**	0.084	**LMT F(2,52)**	0.157	-Incorrect sign for RP; RGDP. -Model is not significant.
LnRP	0.012	0.534	**Adj. R^2**	0.001	**LMT F(Prob.)**	0.855	
Δ(LnRGDP)	-1.383	-0.359	**F(5,54)**	0.991	**BPGT F(5,54)**	0.332	
Q2	0.394	0.890	**F(Prob.)**	0.432	**BPGT F(Prob.)**	0.892	
Q3	0.268	0.744	**DW**	2.132	**RESET F(1,53)**	2.511	
Q4	0.294	0.547	**AIC**	0.541	**RESET F(Prob.)**	0.119	
			SC	0.750	**JBT χ^2 (2)**	2.750	
			LL	-10.219	**JBT χ^2 (Prob.)**	0.253	
QTY	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	2.324	1.661	**R^2**	0.379	**LMT F(2,50)**	2.325	
LnRP	-0.276	-2.853*	**Adj. R^2**	0.308	**LMT F(Prob.)**	0.108	
Δ(LnRGDP)	44.319	2.275**	**F(6,52)**	5.297*	**BPGT F(5,53)**	0.446	
Q2	-4.008	-1.779***	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.814	
Q3	-2.988	-1.671	**DW**	2.178	**RESET F(1,51)**	1.107	
Q4	-5.433	-1.990***	**AIC**	3.603	**RESET F(Prob.)**	0.298	
AR(1)	-0.332	-2.520**	**SC**	3.849	**JBT χ^2 (2)**	3.061	
			LL	-99.281	**JBT χ^2 (Prob.)**	0.216	

**** Pharmaceutical Products***
DW – Durbin-Watson Statistics
AIS – Akaike Info Criterion
SC – Schwartz Criterion
LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

Table: 6.14 Continued (Part B)

IMPORT DEMAND MODELS: CATEGORY 30*							
AUSTRALIA - FRANCE							
AUD	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.302	1.454	**R^2**	0.436	**LMT F(2,57)**	0.299	
LnRP	-0.013	-1.524***	**Adj. R^2**	0.379	**LMT F(Prob.)**	0.743	
Δ(LnRGDP)	1.883	0.706	**F(6,59)**	7.611*	**BPGT F(5,60)**	0.715	
Q2	-0.456	-1.351***	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.615	
Q3	-0.238	-0.947	**DW**	2.027	**RESET F(1,58)**	0.429	
Q4	-0.462	-1.149	**AIC**	-0.034	**RESET F(Prob.)**	0.515	
AR(1)	-0.614	-5.938*	**SC**	0.198	**JBT χ^2 (2)**	0.404	
			LL	8.124	**JBT χ^2 (Prob.)**	0.817	
QTY	**DEPENDENT VARIABLE: LnM**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	10.982	12.752*	**R^2**	0.823	**LMT F(2,57)**	3.670**	-Residuals are serially correlated. -Model is mis-specified. -Incorrect sign for RGDP.
LnRP	-0.715	-12.031*	**Adj. R^2**	0.806	**LMT F(Prob.)**	0.032	
Δ(LnRGDP)	-11.299	-1.325***	**F(6,59)**	45.88*	**BPGT F(5,60)**	1.555	
Q2	0.637	0.638	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.187	
Q3	0.094	0.114	**DW**	2.450	**RESET F(2,57)**	13.876*	
Q4	1.272	1.035***	**AIC**	2.997	**RESET F(Prob.)**	0.000	
AR(1)	0.778	9.370*	**SC**	3.230	**JBT χ^2 (2)**	0.615	
			LL	-91.911	**JBT χ^2 (Prob.)**	0.735	
AUSTRALIA - GERMANY							
AUD	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.303	1.790***	**R^2**	0.332	**LMT F(2,57)**	1.939	-Model is mis-specified. -Residuals are not normally distributed.
LnRP	-0.002	-0.331	**Adj. R^2**	0.264	**LMT F(Prob.)**	0.153	
Δ(LnRGDP)	3.541	1.513***	**F(6,59)**	4.881*	**BPGT F(5,60)**	0.543	
Q2	-0.479	-1.720***	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.743	
Q3	-0.206	-0.935	**DW**	2.185	**RESET F(1,58)**	3.01***	
Q4	-0.601	-1.794***	**AIC**	-0.456	**RESET F(Prob.)**	0.088	
AR(1)	-0.394	-3.282*	**SC**	-0.224	**JBT χ^2 (2)**	10.311*	
			LL	22.054	**JBT χ^2 (Prob.)**	0.006	
QTY	**DEPENDENT VARIABLE: LnM**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	13.946	20.029*	**R^2**	0.922	**LMT F(2,57)**	5.558*	-Residuals are serially correlated. -Residuals are not normally distributed.
LnRP	-0.936	-23.467*	**Adj. R^2**	0.914	**LMT F(Prob.)**	0.006	
Δ(LnRGDP)	22.584	3.045*	**F(6,59)**	116.8*	**BPGT F(5,60)**	1.169	
Q2	-2.259	-2.629**	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.335	
Q3	-1.771	-2.495**	**DW**	2.409	**RESET F(1,58)**	0.897	
Q4	-2.865	-2.740*	**AIC**	2.679	**RESET F(Prob.)**	0.348	
AR(1)	0.739	8.173*	**SC**	2.912	**JBT χ^2 (2)**	6.644**	
			LL	-81.417	**JBT χ^2 (Prob.)**	0.036	

**** Pharmaceutical Products***
DW – Durbin-Watson Statistics
AIS – Akaike Info Criterion
SC – Schwartz Criterion
LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

Table: 6.14 Continued (Part C)

IMPORT DEMAND MODELS: CATEGORY 30*							
AUSTRALIA - UNITED KINGDOM							
AUD	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.278	1.821***	**R^2**	0.299	**LMT F(2,57)**	6.293*	-Residuals are serially correlated. -Residuals are Heteroscedastic.
LnRP	-0.011	-1.882***	**Adj. R^2**	0.228	**LMT F(Prob.)**	0.003	
Δ(LnRGDP)	3.830	1.836***	**F(6,59)**	4.191*	**BPGT F(5,60)**	2.507**	
Q2	-0.386	-1.569***	**F(Prob.)**	0.001	**BPGT F(Prob.)**	0.040	
Q3	-0.399	-2.024**	**DW**	2.276	**RESET F(1,58)**	2.523	
Q4	-0.636	-2.141**	**AIC**	-0.626	**RESET F(Prob.)**	0.118	
AR(1)	-0.352	-2.798*	**SC**	-0.394	**JBT χ^2 (2)**	0.937	
			LL	27.653	**JBT χ^2 (Prob.)**	0.626	
QTY	**DEPENDENT VARIABLE: LnM**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	13.716	38.406*	**R^2**	0.990	**LMT F(2,57)**	2.705**	-Residuals are serially correlated.
LnRP	-1.012	-69.064*	**Adj. R^2**	0.989	**LMT F(Prob.)**	0.076	
Δ(LnRGDP)	3.309	1.160***	**F(6,59)**	975.2*	**BPGT F(5,60)**	1.279	
Q2	-0.056	-0.172	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.285	
Q3	-0.149	-0.552	**DW**	2.235	**RESET F(1,58)**	2.513	
Q4	-0.462	-1.153***	**AIC**	0.843	**RESET F(Prob.)**	0.118	
AR(1)	0.843	11.877*	**SC**	1.075	**JBT χ^2 (2)**	0.321	
			LL	-20.826	**JBT χ^2 (Prob.)**	0.852	
AUSTRALIA - UNITED STATES							
AUD	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.148	1.167***	**R^2**	0.246	**LMT F(2,57)**	0.534	
LnRP	-0.007	-0.349	**Adj. R^2**	0.169	**LMT F(Prob.)**	0.589	
Δ(LnRGDP)	0.846	0.461	**F(6,59)**	3.200*	**BPGT F(5,60)**	0.136	
Q2	-0.118	-0.547	**F(Prob.)**	0.009	**BPGT F(Prob.)**	0.984	
Q3	-0.100	-0.582	**DW**	2.041	**RESET F(1,58)**	0.825	
Q4	-0.227	-0.872	**AIC**	-1.027	**RESET F(Prob.)**	0.367	
AR(1)	-0.382	-3.209*	**SC**	-0.795	**JBT χ^2 (2)**	0.765	
			LL	40.897	**JBT χ^2 (Prob.)**	0.682	
QTY	**DEPENDENT VARIABLE: LnM**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	14.120	65.297*	**R^2**	0.484	**LMT F(2,57)**	0.698	
LnRP	-0.202	-3.693*	**Adj. R^2**	0.431	**LMT F(Prob.)**	0.502	
Δ(LnRGDP)	0.482	0.190	**F(6,59)**	9.223*	**BPGT F(5,60)**	0.933	
Q2	-0.077	-0.262	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.466	
Q3	-0.032	-0.133	**DW**	2.166	**RESET F(1,58)**	2.262	
Q4	-0.173	-0.485	**AIC**	0.396	**RESET F(Prob.)**	0.138	
AR(1)	0.623	6.590*	**SC**	0.628	**JBT χ^2 (2)**	0.865	
			LL	-6.074	**JBT χ^2 (Prob.)**	0.649	

**** Pharmaceutical Products***
DW – Durbin-Watson Statistics
AIS – Akaike Info Criterion
SC – Schwartz Criterion
LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

According to Table 6.14, all twelve M demand models in Category 30 are significant except for the model between Australia and China based on AUD, which is not significant. For most of the models, the variables RP, RGDP and Q4 are significant, while the variables Q2 in half of the models is significant and in the other half, it is not, while the variable Q3 is mostly not significant.

The variable RP is significant in 8 out of the 12 models and RGDP is significant in 7 out of the 12 models. However, an incorrect (positive) sign for RP (1 out of the 12 models; based on AUD) and an incorrect (negative) sign for RGDP (2 out of the 12 models; 1 based on AUD and 1 based on QTY) are likely to be due to serial correlation, heteroscedasticity, model specification, non-normality of residuals and the presence of collinearity in such models. The correct coefficients signs for both the RP and RGDP are found in 10 out of the 12 models, while for these 10 models, the coefficients range for the RP and RGDP is between (-0.001 and -1.012) and (0.382 and 44.319) respectively. Furthermore, the coefficients estimated for Q2, Q3 and Q4 in 9 out of the 12 models are negative. In overall, these results show that the M demand in the June, September and December quarters are lower than in the March quarter in this category. Finally, the Adj. R^2 in overall for all the 12 models in this category ranges between 0.1 and 98.9 percent.

In overall, out of the 12 estimated models in this category, 5 models (the M demand from the RoW, France and The United States of America based on AUD; China and The United States of America based on QTY) have the correct signs and have satisfactory passed all diagnostic tests. The M demand model from the RoW (based on AUD values) shows that a 1 percent growth rate in the RP will decrease the M growth rate by 0.001 percent, while a 1 percent RGDP growth rate will increase the M growth rate by 3.024 percent in average. The M demand model from France (based on AUD values) shows that a 1 percent increase in the RP will decrease the M growth rate by 0.013 percent, while a 1 percent RGDP growth rate will increase the M growth rate by 1.883 percent in average. The M demand model from The United States of America (based on AUD values) shows that a 1 percent increase in the RP will decrease the M growth rate by 0.007 percent, while a 1 percent RGDP growth rate will increase the M growth rate by 0.846 percent in average. The M demand model from China (based on QTY values) shows that a 1 percent increase in the RP will decrease the M growth rate by 0.276 percent, while a 1 percent RGDP growth rate will increase the M growth rate by staggering 44.319 percent in average. The M demand model from The United States of America (based on QTY values) shows that a 1 percent increase in the RP will decrease the M demand by 0.202 percent, while a 1 percent RGDP growth rate will increase the M demand by 0.482 percent in average. For these 5 models, the variable RP is mostly significant and the variables RGDP, Q2, Q3 and Q4 are mostly not significant. The coefficients for quarterly dummy variables Q2, Q3 and Q4 in these 5 models are all negative, while the coefficients range for the Q2, Q3 and Q4 is between (-0.077 and -5.008), (-0.032 and -2.988) and (-0.173 and -5.433) respectively. These figures show that in overall, the M demand for all these 3 quarters is less than the M demand in the March quarter in average. Furthermore, for these 5 models, the M demand in the June quarter is less than in the March quarter between 7.7 and 500.8 percent in average. The M demand in the September quarter is less than in the March quarter between 3.2 and 298.8 percent in average and the M demand in the December quarter is less than in the March quarter between 17.3 and 543.3 percent in average. Finally, the Adj. R^2 for the RoW, France and The United States of America based on AUD values is 43.4, 37.9 and 16.9 percent respectively and for China and The United States of America based on QTY values is 30.8 and 43.1 percent respectively.

6.5.2.2 IMPORT DEMAND MODELS; CATEGORY: 84

Table: 6.15 (Part A)

IMPORT DEMAND MODELS: CATEGORY 84*							
AUSTRALIA - RoW							
AUD	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.056	-1.115***	**R^2**	0.545	**LMT F(2,59)**	0.191	
LnRP	-0.007	-0.592	**Adj. R^2**	0.508	**LMT F(Prob.)**	0.826	
Δ(LnRGDP)	0.487	0.798	**F(5,61)**	14.62*	**BPGT F(5,61)**	1.768	
Q2	0.091	1.288***	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.133	
Q3	0.073	1.267***	**DW**	1.668	**RESET F(1,60)**	0.102	
Q4	0.027	0.308	**AIC**	-2.994	**RESET F(Prob.)**	0.751	
			SC	-2.796	**JBT χ^2 (2)**	2.247	
			LL	106.28	**JBT χ^2 (Prob.)**	0.325	
QTY	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.039	-0.321	**R^2**	0.457	**LMT F(2,57)**	2.82***	-Residuals are serially correlated. -Model is mis-specified. -Residuals are not normally distributed.
LnRP	-0.020	-0.858	**Adj. R^2**	0.402	**LMT F(Prob.)**	0.068	
Δ(LnRGDP)	1.599	1.054***	**F(6,59)**	8.278*	**BPGT F(5,60)**	1.229	
Q2	-0.020	-0.112	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.307	
Q3	0.103	0.726	**DW**	2.234	**RESET F(1,58)**	7.982*	
Q4	-0.130	-0.603	**AIC**	-1.306	**RESET F(Prob.)**	0.007	
AR(1)	-0.364	-3.125*	**SC**	-1.074	**JBT χ^2 (2)**	50.644*	
			LL	50.096	**JBT χ^2 (Prob.)**	0.000	
AUSTRALIA - CHINA							
AUD	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.042	0.243	**R^2**	0.560	**LMT F(2,59)**	23.904*	-Residuals are serially correlated. -Model is mis-specified.
Δ(LnRP)	-0.037	-1.970***	**Adj. R^2**	0.523	**LMT F(Prob.)**	0.000	
Δ(LnRGDP)	4.286	1.816***	**F(5,61)**	15.50*	**BPGT F(5,61)**	1.799	
Q2	-0.157	-0.575	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.126	
Q3	0.109	0.491	**DW**	2.151	**RESET F(1,60)**	3.19***	
Q4	-0.110	-0.333	**AIC**	-0.310	**RESET F(Prob.)**	0.079	
			SC	-0.113	**JBT χ^2 (2)**	1.069	
			LL	16.400	**JBT χ^2 (Prob.)**	0.586	
QTY	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.166	-1.035	**R^2**	0.659	**LMT F(2,57)**	10.084*	-Residuals are serially correlated. -Residuals are Heteroscedastic. -Incorrect sign for RP.
Δ(LnRP)	0.008	0.428	**Adj. R^2**	0.624	**LMT F(Prob.)**	0.000	
Δ(LnRGDP)	2.315	1.059***	**F(6,59)**	19.00*	**BPGT F(5,60)**	2.815**	
Q2	0.176	0.692	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.024	
Q3	0.329	1.610***	**DW**	2.217	**RESET F(1,58)**	0.584	
Q4	0.238	0.772	**AIC**	-0.528	**RESET F(Prob.)**	0.448	
AR(1)	-0.270	-2.149**	**SC**	-0.295	**JBT χ^2 (2)**	0.272	
			LL	24.414	**JBT χ^2 (Prob.)**	0.873	

Nuclear Reactors, Boilers, Machinery and Mechanical Appliances; Parts Thereof
DW – Durbin-Watson Statistics
AIS – Akaike Info Criterion
SC – Schwartz Criterion
LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

Table: 6.15 Continued (Part B)

IMPORT DEMAND MODELS: CATEGORY 84*							
AUSTRALIA - FRANCE							
AUD	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.058	0.314	**R^2**	0.210	**LMT F(2,57)**	2.756**	-Residuals are serially correlated.
LnRP	-0.005	-0.310	**Adj. R^2**	0.130	**LMT F(Prob.)**	0.072	
Δ(LnRGDP)	1.316	0.521	**F(6,59)**	2.61**	**BPGT F(5,60)**	0.894	
Q2	-0.189	-0.631	**F(Prob.)**	0.026	**BPGT F(Prob.)**	0.491	
Q3	0.009	0.039	**DW**	2.196	**RESET F(1,58)**	0.081	
Q4	-0.111	-0.307	**AIC**	-0.264	**RESET F(Prob.)**	0.777	
AR(1)	-0.347	-2.854*	**SC**	-0.032	**JBT χ^2 (2)**	1.205	
			LL	15.719	**JBT χ^2 (Prob.)**	0.547	
QTY	**DEPENDENT VARIABLE: LnM**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	13.588	50.659*	**R^2**	0.342	**LMT F(2,57)**	0.961	-Residuals are not normally distributed.
LnRP	-0.153	-4.079*	**Adj. R^2**	0.275	**LMT F(Prob.)**	0.389	
Δ(LnRGDP)	4.986	1.409***	**F(6,59)**	5.115*	**BPGT F(5,60)**	0.672	
Q2	-0.684	-1.650***	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.646	
Q3	-0.495	-1.449***	**DW**	1.949	**RESET F(1,58)**	1.006	
Q4	-0.838	-1.672***	**AIC**	0.799	**RESET F(Prob.)**	0.320	
AR(1)	0.371	3.148*	**SC**	1.031	**JBT χ^2 (2)**	48.351*	
			LL	-19.361	**JBT χ^2 (Prob.)**	0.000	
AUSTRALIA - GERMANY							
AUD	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.030	0.234	**R^2**	0.048	**LMT F(2,59)**	2.121	-Incorrect sign for RP. -Model is not significant.
Δ(LnRP)	0.006	0.306	**Adj. R^2**	0.030	**LMT F(Prob.)**	0.129	
Δ(LnRGDP)	1.013	0.590	**F(5,61)**	0.609	**BPGT F(5,61)**	0.558	
Q2	-0.048	-0.241	**F(Prob.)**	0.693	**BPGT F(Prob.)**	0.731	
Q3	-0.019	-0.119	**DW**	2.234	**RESET F(1,60)**	0.001	
Q4	-0.078	-0.322	**AIC**	-0.923	**RESET F(Prob.)**	0.979	
			SC	-0.725	**JBT χ^2 (2)**	1.180	
			LL	36.914	**JBT χ^2 (Prob.)**	0.554	
QTY	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.146	0.925	**R^2**	0.368	**LMT F(2,57)**	1.783	
Δ(LnRP)	-0.017	-0.629	**Adj. R^2**	0.304	**LMT F(Prob.)**	0.177	
Δ(LnRGDP)	3.095	1.456**	**F(6,59)**	5.738*	**BPGT F(5,60)**	1.285	
Q2	-0.234	-0.929	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.283	
Q3	-0.099	-0.496	**DW**	1.979	**RESET F(1,58)**	0.569	
Q4	-0.459	-1.508***	**AIC**	-0.552	**RESET F(Prob.)**	0.454	
AR(1)	-0.461	-3.989*	**SC**	-0.320	**JBT χ^2 (2)**	1.586	
			LL	25.230	**JBT χ^2 (Prob.)**	0.453	

Nuclear Reactors, Boilers, Machinery and Mechanical Appliances; Parts Thereof
DW – Durbin-Watson Statistics
AIS – Akaike Info Criterion
SC – Schwartz Criterion
LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

Table: 6.15 Continued (Part C)

IMPORT DEMAND MODELS: CATEGORY 84*							
AUSTRALIA - MALAYSIA							
AUD	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.132	0.912	R^2	0.489	**LMT F(2,59)**	12.023*	-Residuals are serially correlated. -Residuals are Heteroscedastic.
LnRP	-0.020	-1.158***	**Adj.** R^2	0.447	**LMT F(Prob.)**	0.000	
Δ(LnRGDP)	5.085	2.487**	**F(5,61)**	11.69*	**BPGT F(5,61)**	3.981*	
Q2	-0.188	-0.797	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.003	
Q3	-0.177	-0.925	**DW**	2.117	**RESET F(1,60)**	0.800	
Q4	-0.350	-1.221***	**AIC**	-0.656	**RESET F(Prob.)**	0.375	
			SC	-0.458	**JBT** χ^2 **(2)**	0.362	
			LL	27.962	**JBT** χ^2 **(Prob.)**	0.834	
QTY	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.013	0.044	R^2	0.344	**LMT F(2,57)**	3.197**	-Residuals are serially correlated. -Residuals are not normally distributed.
Δ(LnRP)	-0.104	-1.829***	**Adj.** R^2	0.278	**LMT F(Prob.)**	0.048	
Δ(LnRGDP)	1.179	0.302	**F(6,59)**	5.165*	**BPGT F(5,60)**	0.572	
Q2	0.036	0.077	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.721	
Q3	-0.096	-0.263	**DW**	2.279	**RESET F(1,58)**	0.213	
Q4	0.100	0.177	**AIC**	0.677	**RESET F(Prob.)**	0.647	
AR(1)	-0.476	-4.150*	**SC**	0.909	**JBT** χ^2 **(2)**	35.703*	
			LL	-15.346	**JBT** χ^2 **(Prob.)**	0.000	
AUSTRALIA - SINGAPORE							
AUD	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.187	1.356	R^2	0.476	**LMT F(2,58)**	0.785	-Residuals are not normally distributed.
Δ(LnRP)	-0.010	-0.621	**Adj.** R^2	0.424	**LMT F(Prob.)**	0.461	
Δ(LnRGDP)	3.155	1.693***	**F(6,60)**	9.082*	**BPGT F(5,60)**	1.427	
Q2	-0.082	-0.377	**F(Prob.**	0.000	**BPGT F(Prob.)**	0.220	
Q3	-0.350	-1.979***	**DW**	2.286	**RESET F(1,59)**	1.360	
Q4	-0.415	-1.580***	**AIC**	-0.764	**RESET F(Prob.)**	0.248	
Residuals (-1)	-0.110	-2.352**	**SC**	-0.533	**JBT** χ^2 **(2)**	5.06***	
			LL	32.583	**JBT** χ^2 **(Prob.)**	0.080	
QTY	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.548	1.990***	R^2	0.308	**LMT F(2,57)**	0.679	-Model is mis-specified. -Residuals are not normally distributed.
Δ(LnRP)	-0.030	-0.936	**Adj.** R^2	0.238	**LMT F(Prob.)**	0.511	
Δ(LnRGDP)	8.325	2.277**	**F(6,59)**	4.384*	**BPGT F(5,60)**	0.511	
Q2	-0.852	-1.927***	**F(Prob.)**	0.001	**BPGT F(Prob.)**	0.767	
Q3	-0.690	-2.007**	**DW**	2.137	**RESET F(1,58)**	5.178**	
Q4	-1.132	-2.139**	**AIC**	0.544	**RESET F(Prob.)**	0.027	
AR(1)	-0.497	-4.248*	**SC**	0.777	**JBT** χ^2 **(2)**	23.312*	
			LL	-10.966	**JBT** χ^2 **(Prob.)**	0.000	

Nuclear Reactors, Boilers, Machinery and Mechanical Appliances; Parts Thereof
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SC – Schwartz Criterion
LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

Table: 6.15 Continued (Part D)

IMPORT DEMAND MODELS: CATEGORY 84*							
AUSTRALIA - THAILAND							
AUD	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.243	-1.412***	**R^2**	0.449	**LMT F(2,59)**	2.74***	-Residuals are serially correlated. -Model is mis-specified. -Incorrect sign for RGDP.
LnRP	-0.013	-0.633	**Adj. R^2**	0.404	**LMT F(Prob.)**	0.073	
Δ(LnRGDP)	-0.894	-0.367	**F(5,61)**	9.947*	**BPGT F(5,61)**	1.419	
Q2	0.171	0.600	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.230	
Q3	0.467	2.004***	**DW**	2.409	**RESET F(1,60)**	8.076*	
Q4	0.471	1.366***	**AIC**	-0.312	**RESET F(Prob.)**	0.006	
			SC	-0.115	**JBT χ^2 (2)**	1.512	
			LL	16.454	**JBT χ^2 (Prob.)**	0.470	
QTY	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.171	-0.744	**R^2**	0.240	**LMT F(2,57)**	4.085**	-Residuals are serially correlated. -Residuals are not normally distributed.
LnRP	-0.029	-1.304***	**Adj. R^2**	0.163	**LMT F(Prob.)**	0.022	
Δ(LnRGDP)	0.056	0.017	**F(6,59)**	3.113*	**BPGT F(5,60)**	1.594	
Q2	0.127	0.324	**F(Prob.)**	0.010	**BPGT F(Prob.)**	0.176	
Q3	0.218	0.692	**DW**	2.116	**RESET F(1,58)**	0.019	
Q4	0.178	0.376	**AIC**	0.163	**RESET F(Prob.)**	0.891	
AR(1)	-0.330	-2.743*	**SC**	0.395	**JBT χ^2 (2)**	29.407*	
			LL	1.620	**JBT χ^2 (Prob.)**	0.000	
AUSTRALIA - UNITED KINGDOM							
AUD	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.083	0.644	**R^2**	0.277	**LMT F(1,58)**	0.404	-Residuals are not normally distributed.
LnRP	-0.031	-1.360**	**Adj. R^2**	0.204	**LMT F(Prob.)**	0.527	
Δ(LnRGDP)	1.133	0.603	**F(6,59)**	3.774*	**BPGT F(5,60)**	0.758	
Q2	-0.108	-0.496	**F(Prob.)**	0.003	**BPGT F(Prob.)**	0.584	
Q3	0.049	0.282	**DW**	1.999	**RESET F(1,58)**	0.048	
Q4	-0.145	-0.548	**AIC**	-0.976	**RESET F(Prob.)**	0.827	
AR(1)	-0.313	-2.521**	**SC**	-0.744	**JBT χ^2 (2)**	7.650**	
			LL	39.223	**JBT χ^2 (Prob.)**	0.022	
QTY	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.410	-1.613***	**R^2**	0.373	**LMT F(2,57)**	3.196**	-Residuals are serially correlated. -Model is mis-specified. -Residuals are not normally distributed. -Incorrect sign for RP; RGDP.
LnRP	0.013	0.307	**Adj. R^2**	0.309	**LMT F(Prob.)**	0.048	
Δ(LnRGDP)	-6.422	-1.730***	**F(6,59)**	5.849*	**BPGT F(5,60)**	1.910	
Q2	0.631	1.452***	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.106	
Q3	0.689	2.007**	**DW**	2.257	**RESET F(1,58)**	4.267**	
Q4	0.693	1.323***	**AIC**	0.354	**RESET F(Prob.)**	0.043	
AR(1)	-0.449	-3.815*	**SC**	0.586	**JBT χ^2 (2)**	5.24***	
			LL	-4.667	**JBT χ^2 (Prob.)**	0.073	

Nuclear Reactors, Boilers, Machinery and Mechanical Appliances; Parts Thereof
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SC – Schwartz Criterion
LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

Table: 6.15 Continued (Part E)

IMPORT DEMAND MODELS: CATEGORY 84*							
AUSTRALIA - UNITED STATES							
AUD	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.008	-0.168	**R^2**	0.520	**LMT F(2,59)**	0.090	
Δ(LnRP)	-0.022	-1.338***	**Adj. R^2**	0.481	**LMT F(Prob.)**	0.914	
Δ(LnRGDP)	0.769	1.225***	**F(5,61)**	13.21*	**BPGT F(5,61)**	0.679	
Q2	0.060	0.820	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.641	
Q3	0.018	0.304	**DW**	1.848	**RESET F(1,60)**	0.375	
Q4	-0.075	-0.848	**AIC**	-2.937	**RESET F(Prob.)**	0.542	
			SC	-2.739	**JBT χ^2 (2)**	0.906	
			LL	104.38	**JBT χ^2 (Prob.)**	0.636	
QTY	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.004	0.036	**R^2**	0.568	**LMT F(2,56)**	0.732	
Δ(LnRP)	-0.221	-5.232*	**Adj. R^2**	0.515	**LMT F(Prob.)**	0.486	
Δ(LnRGDP)	2.093	1.432***	**F(7,58)**	10.88*	**BPGT F(6,59)**	0.608	
Q2	0.004	0.024	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.723	
Q3	0.047	0.343	**DW**	2.044	**RESET F(1,57)**	0.773	
Q4	-0.195	-0.924	**AIC**	-1.311	**RESET F(Prob.)**	0.383	
Residuals (-1)	-0.145	-1.808***	**SC**	-1.046	**JBT χ^2 (2)**	1.821	
AR(1)	-0.410	-3.245*	**LL**	51.271	**JBT χ^2 (Prob.)**	0.402	

***Nuclear Reactors, Boilers, Machinery and Mechanical Appliances; Parts Thereof**
DW – Durbin-Watson Statistics
AIS – Akaike Info Criterion
SC – Schwartz Criterion
LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

According to Table 6.15, all eighteen M demand models in Category 84 are significant, except for the model between Australia and Germany based on AUD, which is not significant. For most of the models, the variable RGDP is significant, while the variables RP, Q2, Q3 and Q4 are mostly not significant.

The variable RP is significant in 8 out of the 18 models and RGDP is significant in 11 out of the 18 models. However, an incorrect (positive) sign for RP (3 out of the 18 models; 1 based on AUD and 2 based on QTY) and an incorrect (negative) sign for RGDP (2 out of the 18 models; 1 based on AUD and 1 based on QTY) is evident. The correct coefficients signs for both the RP and RGDP are found in 14 out of the 18 models, while for these 14 models, the coefficients range for the RP and RGDP is between (-0.005 and -0.221) and (0.056 and 8.325) respectively. Furthermore, the coefficients estimated for Q2, Q3 and Q4 in 10 out of 18; 7 out of 18 and 12 out of 18 models respectively are negative. In overall, these results show that the M demand in the June and December quarters is lower compared to the March quarter, and the M demand in the September quarter is higher than in the March quarter in this category.

Finally, the Adj. R^2 for all 18 models in overall in this category ranges between 3 and 62.4 percent.

In overall, out of the 18 estimated models in this category, 4 models (the M demand from the RoW and The United States of America based on AUD; Germany and The United States of America based on QTY) have the correct signs and have satisfactory passed all diagnostic tests. The M demand model from the RoW (based on AUD values) shows that a 1 percent increase in the RP will decrease the M growth rate by 0.007 percent, while 1 percent RGDP growth rate will increase the M growth rate by 0.487 percent in average. The M demand model from The United States of America (based on AUD values) shows that a 1 percent growth rate in the RP will decrease the M growth rate by 0.022 percent, while a 1 percent RGDP growth rate will increase the M growth rate by 0.769 percent in average. The M demand model from Germany (based on QTY values) shows that a 1 percent growth rate in the RP will decrease the M growth rate by 0.017 percent, while a 1 percent RGDP growth rate will increase the M growth rate by 3.095 percent in average. The M demand model from The United States of America (based on QTY values) shows that 1 percent growth rate in the RP will decrease the M growth rate by 0.221 percent, while 1 percent RGDP growth rate will increase the M growth rate by 2.093 percent in average. For these 4 models, the variable RGDP is mostly significant and the variables RP, Q2, Q3 and Q4 are mostly not significant. The coefficients for the quarterly dummy variables Q2 and Q3 in these 4 models are mostly positive and the coefficient for Q4 is mostly negative, while the coefficients range for the Q2, Q3 and Q4 is between (-0.234 and 0.091), (-0.099 and 0.073) and (-0.459 and 0.027) respectively. In overall, these figures show that the M demand for the June and September quarter is more than the M demand in the March quarter and that the M demand in the December quarter is less than in the March quarter, in average. Finally, the Adj. R^2 for the RoW and The United States of America based on AUD values is 50.8 and 48.1 percent respectively, and for Germany and The United States of America based on QTY values is 30.4 and 51.5 percent respectively.

6.5.2.3 IMPORT DEMAND MODELS; CATEGORY: 85

Table: 6.16 (Part A)

IMPORT DEMAND MODELS: CATEGORY 85*							
AUSTRALIA - RoW							
AUD	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.164	-3.018*	**R^2**	0.752	**LMT F(2,59)**	1.357	
LnRP	-0.005	-0.529	**Adj. R^2**	0.732	**LMT F(Prob.)**	0.265	
Δ(LnRGDP)	0.028	0.038	**F(5,61)**	37.06*	**BPGT F(5,61)**	1.604	
Q2	0.260	3.120*	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.173	
Q3	0.218	3.212*	**DW**	2.328	**RESET F(1,60)**	0.192	
Q4	0.218	2.158**	**AIC**	-2.668	**RESET F(Prob.)**	0.663	
			SC	-2.471	**JBT χ^2 (2)**	0.169	
			LL	95.390	**JBT χ^2 (Prob.)**	0.920	
QTY	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.139	-1.192	**R^2**	0.363	**LMT F(2,59)**	1.417	
LnRP	-0.047	-2.277**	**Adj. R^2**	0.310	**LMT F(Prob.)**	0.251	
Δ(LnRGDP)	0.171	0.111	**F(5,61)**	6.941*	**BPGT F(5,61)**	0.772	
Q2	0.114	0.637	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.573	
Q3	0.204	1.406***	**DW**	2.396	**RESET F(1,60)**	2.367	
Q4	0.001	0.007	**AIC**	-1.145	**RESET F(Prob.)**	0.129	
			SC	-0.948	**JBT χ^2 (2)**	5.50***	
			LL	44.366	**JBT χ^2 (Prob.)**	0.064	
AUSTRALIA - CHINA							
AUD	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.376	-5.280*	**R^2**	0.905	**LMT F(2,59)**	2.011	-Incorrect sign for RP; RGDP.
Δ(LnRP)	0.004	0.434	**Adj. R^2**	0.897	**LMT F(Prob.)**	0.143	
Δ(LnRGDP)	-0.311	-0.324	**F(5,61)**	116.1*	**BPGT F(5,61)**	0.900	
Q2	0.488	4.364*	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.487	
Q3	0.587	6.449*	**DW**	1.889	**RESET F(1,60)**	0.246	
Q4	0.666	4.920*	**AIC**	-2.086	**RESET F(Prob.)**	0.622	
			SC	-1.889	**JBT χ^2 (2)**	3.809	
			LL	75.895	**JBT χ^2 (Prob.)**	0.149	
QTY	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.073	-0.521	**R^2**	0.452	**LMT F(2,59)**	2.000	-Residuals are not normally distributed.
Δ(LnRP)	-0.012	-0.733	**Adj. R^2**	0.407	**LMT F(Prob.)**	0.145	
Δ(LnRGDP)	1.201	0.639	**F(5,61)**	10.06*	**BPGT F(5,61)**	0.926	
Q2	0.055	0.251	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.470	
Q3	0.257	1.443***	**DW**	2.380	**RESET F(1,60)**	0.092	
Q4	0.132	0.498	**AIC**	-0.745	**RESET F(Prob.)**	0.763	
			SC	-0.547	**JBT χ^2 (2)**	22.966*	
			LL	30.951	**JBT χ^2 (Prob.)**	0.000	

Electrical Machinery and Equipment and Parts Thereof; Sound Recorders and Producers, Television Image and Sound Recorders and Reproducers, and Parts and Accessories of Such Articles
DW – Durbin-Watson Statistics
AIS – Akaike Info Criterion
SC – Schwartz Criterion
LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

Table: 6.16 Continued (Part B)

IMPORT DEMAND MODELS: CATEGORY 85*							
AUSTRALIA - FRANCE							
AUD	**DEPENDENT VARIABLE: LnM**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	4.349	27.509*	**R^2**	0.497	**LMT F(2,57)**	0.353	-Residuals are Heteroscedastic. -Residuals are not normally distributed.
LnRP	-0.028	-1.156	**Adj. R^2**	0.446	**LMT F(Prob.)**	0.704	
Δ(LnRGDP)	3.396	1.971***	**F(6,59)**	9.706*	**BPGT F(5,60)**	2.07***	
Q2	-0.383	-1.920***	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.082	
Q3	-0.235	-1.424	**DW**	2.054	**RESET F(1,58)**	0.824	
Q4	-0.427	-1.757***	**AIC**	-0.328	**RESET F(Prob.)**	0.368	
AR(1)	0.657	6.576*	**SC**	-0.096	**JBT χ^2 (2)**	5.02***	
			LL	17.837	**JBT χ^2 (Prob.)**	0.081	
QTY	**DEPENDENT VARIABLE: LnM**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	16.075	51.761*	**R^2**	0.508	**LMT F(2,57)**	7.759*	-Residuals are serially correlated. -Residuals are Heteroscedastic. -Residuals are not normally distributed.
LnRP	-0.092	-1.972***	**Adj. R^2**	0.458	**LMT F(Prob.)**	0.001	
Δ(LnRGDP)	4.554	1.350***	**F(6,59)**	10.14*	**BPGT F(5,60)**	3.371**	
Q2	-0.408	-1.045***	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.010	
Q3	-0.364	-1.130***	**DW**	2.169	**RESET F(1,58)**	0.852	
Q4	-0.577	-1.215***	**AIC**	1.013	**RESET F(Prob.)**	0.360	
AR(1)	0.672	6.969*	**SC**	1.245	**JBT χ^2 (2)**	145.04*	
			LL	-26.431	**JBT χ^2 (Prob.)**	0.000	
AUSTRALIA - GERMANY							
AUD	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.010	0.077	**R^2**	0.274	**LMT F(2,57)**	0.306	-Residuals are not normally distributed. -Incorrect sign for RP.
Δ(LnRP)	0.001	0.035	**Adj. R^2**	0.200	**LMT F(Prob.)**	0.738	
Δ(LnRGDP)	1.614	0.882	**F(6,59)**	3.708*	**BPGT F(5,60)**	0.382	
Q2	0.025	0.119	**F(Prob.)**	0.003	**BPGT F(Prob.)**	0.859	
Q3	-0.058	-0.337	**DW**	1.985	**RESET F(1,58)**	0.001	
Q4	-0.065	-0.252	**AIC**	-0.862	**RESET F(Prob.)**	0.977	
AR(1)	-0.247	-2.001***	**SC**	-0.630	**JBT χ^2 (2)**	4.80***	
			LL	35.439	**JBT χ^2 (Prob.)**	0.091	
QTY	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.017	-0.117	**R^2**	0.320	**LMT F(2,57)**	0.347	-Model is mis-specified.
Δ(LnRP)	-0.065	-2.403**	**Adj. R^2**	0.251	**LMT F(Prob.)**	0.709	
Δ(LnRGDP)	0.427	0.220	**F(6,59)**	4.636*	**BPGT F(5,60)**	0.605	
Q2	-0.006	-0.024	**F(Prob.)**	0.001	**BPGT F(Prob.)**	0.696	
Q3	0.119	0.651	**DW**	2.015	**RESET F(1,58)**	3.18***	
Q4	-0.069	-0.251	**AIC**	-0.754	**RESET F(Prob.)**	0.080	
AR(1)	-0.285	-2.349**	**SC**	-0.521	**JBT χ^2 (2)**	4.067	
			LL	31.867	**JBT χ^2 (Prob.)**	0.131	

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LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

Table: 6.16 Continued (Part C)

IMPORT DEMAND MODELS: CATEGORY 85*							
AUSTRALIA - MALAYSIA							
AUD	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.306	-2.638**	**R^2**	0.570	**LMT F(2,59)**	5.052*	-Residuals are serially correlated. -Incorrect sign for RP; RGDP.
LnRP	0.004	0.426	**Adj. R^2**	0.535	**LMT F(Prob.)**	0.009	
Δ(LnRGDP)	-1.429	-0.920	**F(5,61)**	16.20*	**BPGT F(5,61)**	0.605	
Q2	0.498	2.760*	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.696	
Q3	0.502	3.425*	**DW**	2.229	**RESET F(1,60)**	1.088	
Q4	0.455	2.078**	**AIC**	-1.125	**RESET F(Prob.)**	0.301	
			SC	-0.928	**JBT χ^2 (2)**	0.402	
			LL	43.702	**JBT χ^2 (Prob.)**	0.818	
QTY	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.020	-0.108	**R^2**	0.148	**LMT F(2,59)**	1.187	-Residuals are Heteroscedastic. -Model is mis-specified. -Incorrect sign for RP.
LnRP	-0.009	-0.625	**Adj. R^2**	0.078	**LMT F(Prob.)**	0.312	
Δ(LnRGDP)	-0.181	-0.073	**F(5,61)**	2.1***	**BPGT F(5,61)**	2.723**	
Q2	-0.016	-0.055	**F(Prob.)**	0.076	**BPGT F(Prob.)**	0.028	
Q3	0.182	0.772	**DW**	2.243	**RESET F(1,60)**	3.12***	
Q4	0.006	0.018	**AIC**	-0.174	**RESET F(Prob.)**	0.083	
			SC	0.023	**JBT χ^2 (2)**	1.262	
			LL	11.838	**JBT χ^2 (Prob.)**	0.532	
AUSTRALIA - SINGAPORE							
AUD	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.242	-1.826***	**R^2**	0.477	**LMT F(2,56)**	0.107	-Incorrect sign for RGDP.
Δ(LnRP)	-0.016	-0.637	**Adj. R^2**	0.414	**LMT F(Prob.)**	0.899	
Δ(LnRGDP)	-1.681	-0.940	**F(7,58)**	7.569*	**BPGT F(6,59)**	0.402	
Q2	0.484	2.320**	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.875	
Q3	0.336	1.992***	**DW**	2.026	**RESET F(1,57)**	0.041	
Q4	0.341	1.346	**AIC**	-0.937	**RESET F(Prob.)**	0.840	
Residuals (-1)	-0.176	-2.264**	**SC**	-0.671	**JBT χ^2 (2)**	0.929	
AR(1)	-0.252	-1.799***	**LL**	38.906	**JBT χ^2 (Prob.)**	0.628	
QTY	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.074	-0.409	**R^2**	0.182	**LMT F(2,59)**	1.159	
Δ(LnRP)	-0.041	-1.282	**Adj. R^2**	0.115	**LMT F(Prob.)**	0.321	
Δ(LnRGDP)	0.185	0.076	**F(5,61)**	2.71**	**BPGT F(5,61)**	1.349	
Q2	0.149	0.526	**F(Prob.)**	0.028	**BPGT F(Prob.)**	0.256	
Q3	0.158	0.685	**DW**	2.322	**RESET F(1,60)**	0.078	
Q4	-0.046	-0.135	**AIC**	-0.227	**RESET F(Prob.)**	0.781	
			SC	-0.029	**JBT χ^2 (2)**	0.478	
			LL	13.589	**JBT χ^2 (Prob.)**	0.788	

Electrical Machinery and Equipment and Parts Thereof; Sound Recorders and Producers, Television Image and Sound Recorders and Reproducers, and Parts and Accessories of Such Articles

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RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

Table: 6.16 Continued (Part D)

IMPORT DEMAND MODELS: CATEGORY 85*							
AUSTRALIA - THAILAND							
AUD	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.038	0.292	**R^2**	0.510	**LMT F(2,58)**	0.459	
LnRP	-0.009	-0.548	**Adj. R^2**	0.461	**LMT F(Prob.)**	0.634	
Δ(LnRGDP)	3.109	1.826***	**F(6,60)**	10.41*	**BPGT F(6,60)**	1.186	
Q2	-0.118	-0.595	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.326	
Q3	0.052	0.321	**DW**	1.944	**RESET F(1,59)**	0.813	
Q4	-0.144	-0.598	**AIC**	-0.938	**RESET F(Prob.)**	0.371	
Residuals (-1)	-0.263	-3.306*	**SC**	-0.708	**JBT χ^2 (2)**	1.244	
			LL	38.421	**JBT χ^2 (Prob.)**	0.537	
QTY	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.121	0.612	**R^2**	0.475	**LMT F(2,59)**	0.059	
Δ(LnRP)	-0.039	-1.219***	**Adj. R^2**	0.412	**LMT F(Prob.)**	0.943	
Δ(LnRGDP)	3.228	1.212***	**F(5,61)**	7.502*	**BPGT F(5,61)**	0.681	
Q2	-0.097	-0.308	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.666	
Q3	-0.099	-0.398	**DW**	2.009	**RESET F(1,60)**	1.058	
Q4	-0.304	-0.796	**AIC**	-0.079	**RESET F(Prob.)**	0.308	
Residuals (-1)	-0.291	-2.925*	**SC**	0.186	**JBT χ^2 (2)**	2.106	
AR(1)	-0.437	-3.282*	**LL**	10.608	**JBT χ^2 (Prob.)**	0.349	
AUSTRALIA - UNITED KINGDOM							
AUD	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.027	-0.141	**R^2**	0.264	**LMT F(2,56)**	3.701**	-Residuals are serially correlated. -Residuals are Heteroscedastic. -Residuals are not normally distributed.
Δ(LnRP)	-0.103	-2.619**	**Adj. R^2**	0.175	**LMT F(Prob.)**	0.031	
Δ(LnRGDP)	0.556	0.220	**F(7,58)**	2.967*	**BPGT F(6,59)**	2.598**	
Q2	0.071	0.235	**F(Prob.)**	0.010	**BPGT F(Prob.)**	0.027	
Q3	0.070	0.296	**DW**	2.223	**RESET F(1,57)**	0.004	
Q4	-0.045	-0.123	**AIC**	-0.190	**RESET F(Prob.)**	0.952	
Residuals (-1)	-0.089	-1.555***	**SC**	0.075	**JBT χ^2 (2)**	16.418*	
AR(1)	-0.433	-3.427*	**LL**	14.271	**JBT χ^2 (Prob.)**	0.000	
QTY	**DEPENDENT VARIABLE: LnM**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	16.735	47.022*	**R^2**	0.518	**LMT F(2,57)**	3.956**	-Residuals are serially correlated. -Residuals are Heteroscedastic. -Model is mis-specified. -Residuals are not normally distributed. -Incorrect sign for RGDP.
Δ(LnRP)	-0.279	-4.352*	**Adj. R^2**	0.469	**LMT F(Prob.)**	0.025	
Δ(LnRGDP)	-0.287	-0.069	**F(6,59)**	10.56*	**BPGT F(5,60)**	3.091**	
Q2	0.263	0.550	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.015	
Q3	0.481	1.214***	**DW**	2.276	**RESET F(1,58)**	11.97**	
Q4	0.366	0.622	**AIC**	1.439	**RESET F(Prob.)**	0.001	
AR(1)	0.679	6.764*	**SC**	1.672	**JBT χ^2 (2)**	145.05*	
			LL	-40.498	**JBT χ^2 (Prob.)**	0.000	

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RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

Table: 6.16 Continued (Part E)

IMPORT DEMAND MODELS: CATEGORY 85*							
AUSTRALIA - UNITED STATES							
AUD	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.133	-1.801***	**R^2**	0.465	**LMT F(2,59)**	0.045	-Model is mis-specified. -Residuals are not normally distributed. -Incorrect sign for RGDP.
Δ(LnRP)	-0.016	-1.175***	**Adj. R^2**	0.421	**LMT F(Prob.)**	0.956	
Δ(LnRGDP)	-0.724	-0.719	**F(5,61)**	10.61*	**BPGT F(5,61)**	0.839	
Q2	0.286	2.457**	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.527	
Q3	0.139	1.468***	**DW**	2.017	**RESET F(1,60)**	4.286**	
Q4	0.191	1.351***	**AIC**	-2.007	**RESET F(Prob.)**	0.043	
			SC	-1.810	**JBT χ^2 (2)**	9.896*	
			LL	73.245	**JBT χ^2 (Prob.)**	0.007	
QTY	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.047	-0.322	**R^2**	0.347	**LMT F(2,57)**	5.781*	-Residuals are serially correlated.
Δ(LnRP)	-0.079	-2.899*	**Adj. R^2**	0.281	**LMT F(Prob.)**	0.005	
Δ(LnRGDP)	0.648	0.328	**F(6,59)**	5.224*	**BPGT F(5,60)**	0.439	
Q2	0.021	0.089	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.820	
Q3	0.122	0.657	**DW**	2.073	**RESET F(1,58)**	0.178	
Q4	-0.011	-0.041	**AIC**	-0.718	**RESET F(Prob.)**	0.675	
AR(1)	-0.240	-1.894***	**SC**	-0.486	**JBT χ^2 (2)**	1.231	
			LL	30.688	**JBT χ^2 (Prob.)**	0.540	

Electrical Machinery and Equipment and Parts Thereof; Sound Recorders and Producers, Television Image and Sound Recorders and Reproducers, and Parts and Accessories of Such Articles
DW – Durbin-Watson Statistics
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SC – Schwartz Criterion
LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

According to Table 6.16, all eighteen M demand models in Category 85 are significant, while for most of the models, the majority of the variables are not significant.

The variable RP is significant in 8 out of the 18 models and the RGDP is significant in 4 out of the 18 models. However, an incorrect (positive) sign for RP (4 out of 18 models; 3 based on AUD and 1 based on QTY) and an incorrect (negative) sign for the RGDP (5 out of 18 models; 4 based on AUD and 1 based on QTY) is evident. The correct coefficient signs for both the RP and RGDP are found in 11 out of the 18 models, while for these 11 models, the coefficients range for the RP and RGDP is between (-0.005 and -0.103) and (0.028 and 4.554) respectively. Furthermore, the coefficients estimated for Q2, Q3 and Q4 in 6 out of 18; 4 out of 18 and 9 out of 18 models respectively are negative. In overall, these results show that the M demand in the June and September quarters are higher than in the March quarter and the M demand in the December and March quarter are similar in this category. Finally, the

Adj. R^2 in overall for all of the 18 models in this category ranges between 7.8 and 73.2 percent.

In overall, out of the 18 estimated models in this category, 5 models (the M demand from the RoW and Thailand based on AUD; the RoW, Singapore and Thailand based on QTY) have the correct signs and have satisfactory passed all diagnostic tests. The M demand model from the RoW (based on AUD values) shows that a 1 percent increase in the RP will decrease the M growth rate by 0.005 percent, while a 1 percent RGDP growth rate will increase the M growth rate by 0.028 percent in average. The M demand model from Thailand (based on AUD values) shows that a 1 percent increase in the RP will decrease the M growth rate by 0.009 percent, while a 1 percent RGDP growth rate will increase the M growth rate by 3.109 percent in average. The M demand model from the RoW (based on QTY values) shows that a 1 percent increase in the RP will decrease the M growth rate by 0.047 percent, while a 1 percent RGDP growth rate will increase the M growth rate by 0.171 percent in average. The M demand model from Singapore (based on QTY values) shows that a 1 percent growth rate in the RP will decrease the M growth rate by 0.041 percent, while a 1 percent RGDP growth rate will increase the M growth rate by 0.185 percent in average. The M demand model from Thailand (based on QTY values) shows that a 1 percent growth rate in the RP will decrease the M growth rate by 0.039 percent, while a 1 percent RGDP growth rate will increase the M growth rate by 3.228 percent in average. However, for these 5 models, the majority of all variables are not significant. The coefficients for the quarterly dummy variables, Q2 and Q3 in these 5 models are mostly positive and the coefficient for Q4 is mostly negative, while the coefficient range for Q2, Q3 and Q4 is between (-0.118 and 0.260), (-0.099 and 0.218) and (-0.304 and 0.218) respectively. In overall, these figures show that the M demand for the June and September quarter is more than the M demand in the March quarter and that M demand in the December quarter is less than in the March quarter in average. Finally, the Adj. R^2 for the RoW and Thailand based on AUD values is 73.2 and 46.1 percent respectively and for the RoW, Singapore and Thailand based on QTY values is 31, 11.5 and 41.2 percent respectively.

6.5.2.4 IMPORT DEMAND MODELS; CATEGORY: 87

Table: 6.17 (Part A)

IMPORT DEMAND MODELS: CATEGORY 87*							
AUSTRALIA - RoW							
AUD	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.022	-0.358	**R^2**	0.494	**LMT F(2,59)**	0.008	-Incorrect sign for RP.
LnRP	0.015	0.859	**Adj. R^2**	0.452	**LMT F(Prob.)**	0.992	
Δ(LnRGDP)	0.970	1.219***	**F(5,61)**	11.90*	**BPGT F(5,61)**	0.360	
Q2	0.065	0.702	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.874	
Q3	0.034	0.458	**DW**	1.863	**RESET F(1,60)**	0.069	
Q4	-0.038	-0.336	**AIC**	-2.466	**RESET F(Prob.)**	0.794	
			SC	-2.269	**JBT χ^2 (2)**	2.296	
			LL	88.614	**JBT χ^2 (Prob.)**	0.317	
QTY	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.072	-0.382	**R^2**	0.216	**LMT F(2,57)**	5.134*	-Residuals are serially correlated. -Model is mis-specified. -Residuals are not normally distributed.
LnRP	-0.040	-0.911	**Adj. R^2**	0.137	**LMT F(Prob.)**	0.009	
Δ(LnRGDP)	0.367	0.149	**F(6,59)**	2.72**	**BPGT F(5,60)**	0.870	
Q2	0.138	0.476	**F(Prob.)**	0.021	**BPGT F(Prob.)**	0.507	
Q3	0.159	0.686	**DW**	2.186	**RESET F(1,58)**	3.67***	
Q4	0.114	0.323	**AIC**	-0.292	**RESET F(Prob.)**	0.061	
AR(1)	-0.249	-1.983***	**SC**	-0.060	**JBT χ^2 (2)**	405.63*	
			LL	16.632	**JBT χ^2 (Prob.)**	0.000	
AUSTRALIA - CHINA							
AUD	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.765	-2.748*	**R^2**	0.819	**LMT F(2,46)**	13.509*	-Residuals are serially correlated. -Residuals are Heteroscedastic. -Model is mis-specified.
LnRP	-0.001	-0.055	**Adj. R^2**	0.800	**LMT F(Prob.)**	0.000	
Δ(LnRGDP)	0.543	0.149	**F(5,61)**	43.38*	**BPGT F(5,48)**	4.287*	
Q2	0.799	1.867***	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.003	
Q3	1.533	4.470*	**DW**	2.218	**RESET F(1,47)**	12.812*	
Q4	0.889	1.747***	**AIC**	0.397	**RESET F(Prob.)**	0.001	
			SC	0.618	**JBT χ^2 (2)**	1.034	
			LL	-4.727	**JBT χ^2 (Prob.)**	0.596	
QTY	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.665	-2.504**	**R^2**	0.778	**LMT F(2,46)**	11.894*	-Residuals are serially correlated.
LnRP	-0.007	-0.488	**Adj. R^2**	0.755	**LMT F(Prob.)**	0.000	
Δ(LnRGDP)	0.599	0.172	**F(5,48)**	33.69*	**BPGT F(5,48)**	1.435	
Q2	0.773	1.892***	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.229	
Q3	1.283	3.919*	**DW**	2.366	**RESET F(1,47)**	1.136	
Q4	0.645	1.327***	**AIC**	0.304	**RESET F(Prob.)**	0.292	
			SC	0.525	**JBT χ^2 (2)**	1.051	
			LL	-2.217	**JBT χ^2 (Prob.)**	0.591	

Vehicles Other Than Railway or Tramway Rolling-Stock, and Parts and Accessories Thereof
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AIS – Akaike Info Criterion
SC – Schwartz Criterion
LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

Table: 6.17 Continued (Part B)

IMPORT DEMAND MODELS: CATEGORY 87*							
AUSTRALIA - FRANCE							
AUD	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.190	0.884	**R^2**	0.275	**LMT F(2,33)**	0.390	
LnRP	-0.020	-1.673***	**Adj. R^2**	0.172	**LMT F(Prob.)**	0.680	
Δ(LnRGDP)	1.412	0.460	**F(5,35)**	2.66**	**BPGT F(5,35)**	1.549	
Q2	-0.260	-0.738	**F(Prob.)**	0.039	**BPGT F(Prob.)**	0.200	
Q3	-0.028	-0.098	**DW**	2.116	**RESET F(1,34)**	1.776	
Q4	-0.386	-0.921	**AIC**	-0.246	**RESET F(Prob.)**	0.192	
			SC	0.004	**JBT χ^2 (2)**	0.953	
			LL	11.049	**JBT χ^2 (Prob.)**	0.621	
QTY	**DEPENDENT VARIABLE: LnM**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	8.253	15.345*	**R^2**	0.536	**LMT F(2,31)**	0.608	-Incorrect sign for RGDP.
LnRP	-0.113	-2.411**	**Adj. R^2**	0.451	**LMT F(Prob.)**	0.551	
Δ(LnRGDP)	-12.923	-1.794***	**F(6,33)**	6.344*	**BPGT F(5,34)**	1.699	
Q2	1.549	1.860***	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.162	
Q3	1.476	2.214**	**DW**	2.072	**RESET F(1,32)**	1.081	
Q4	2.072	2.126**	**AIC**	1.744	**RESET F(Prob.)**	0.306	
AR(1)	0.478	2.794*	**SC**	2.040	**JBT χ^2 (2)**	2.744	
			LL	-27.886	**JBT χ^2 (Prob.)**	0.254	
AUSTRALIA - GERMANY							
AUD	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.024	0.162	**R^2**	0.039	**LMT F(2,59)**	1.083	-Residuals are not normally distributed. -Incorrect sign for RP. -Model is not significant.
LnRP	0.001	0.047	**Adj. R^2**	0.040	**LMT F(Prob.)**	0.345	
Δ(LnRGDP)	0.861	0.426	**F(5,61)**	0.489	**BPGT F(5,61)**	1.208	
Q2	-0.019	-0.081	**F(Prob.)**	0.784	**BPGT F(Prob.)**	0.316	
Q3	-0.005	-0.025	**DW**	2.199	**RESET F(1,60)**	1.229	
Q4	-0.056	-0.198	**AIC**	-0.651	**RESET F(Prob.)**	0.272	
			SC	-0.453	**JBT χ^2 (2)**	5.49***	
			LL	27.792	**JBT χ^2 (Prob.)**	0.064	
QTY	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.794	-2.354**	**R^2**	0.135	**LMT F(2,59)**	0.763	-Residuals are not normally distributed.
LnRP	-0.002	-0.099	**Adj. R^2**	0.064	**LMT F(Prob.)**	0.471	
Δ(LnRGDP)	11.254	2.456**	**F(5,61)**	1.899*	**BPGT F(5,61)**	1.930	
Q2	1.244	2.332**	**F(Prob.)**	0.008	**BPGT F(Prob.)**	0.102	
Q3	1.144	2.627**	**DW**	1.842	**RESET F(1,60)**	0.039	
Q4	1.468	2.272**	**AIC**	0.987	**RESET F(Prob.)**	0.845	
			SC	1.184	**JBT χ^2 (2)**	54.84*	
			LL	-27.054	**JBT χ^2 (Prob.)**	0.000	

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LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

Table: 6.17 Continued (Part C)

IMPORT DEMAND MODELS: CATEGORY 87*							
AUSTRALIA - MALAYSIA							
AUD	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.170	-0.402	**R^2**	0.089	**LMT F(2,59)**	1.250	-Residuals are not normally distributed. -Incorrect sign for RP; RGDP.
LnRP	0.066	1.808***	**Adj. R^2**	0.014	**LMT F(Prob.)**	0.294	
Δ(LnRGDP)	-3.456	-0.594	**F(5,61)**	1.2***	**BPGT F(5,61)**	1.068	
Q2	0.353	0.525	**F(Prob.)**	0.065	**BPGT F(Prob.)**	0.387	
Q3	0.458	0.837	**DW**	1.750	**RESET F(1,60)**	1.839	
Q4	0.667	0.814	**AIC**	1.486	**RESET F(Prob.)**	0.180	
			SC	1.683	**JBT χ^2 (2)**	16.878*	
			LL	-43.777	**JBT χ^2 (Prob.)**	0.000	
QTY	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.196	0.550	**R^2**	0.160	**LMT F(2,59)**	1.452	-Model is mis-specified.
LnRP	-0.012	-0.374	**Adj. R^2**	0.092	**LMT F(Prob.)**	0.243	
Δ(LnRGDP)	5.997	1.224***	**F(5,61)**	2.3***	**BPGT F(5,61)**	0.962	
Q2	-0.549	-0.970	**F(Prob.)**	0.053	**BPGT F(Prob.)**	0.448	
Q3	-0.129	-0.279	**DW**	2.300	**RESET F(1,60)**	3.87***	
Q4	-0.503	-0.730	**AIC**	1.140	**RESET F(Prob.)**	0.054	
			SC	1.338	**JBT χ^2 (2)**	0.316	
			LL	-32.204	**JBT χ^2 (Prob.)**	0.854	
AUSTRALIA - SINGAPORE							
AUD	**DEPENDENT VARIABLE: LnM**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.027	-0.067	**R^2**	0.675	**LMT F(2,57)**	7.045*	-Residuals are serially correlated.
Δ(LnRP)	-0.075	-3.363*	**Adj. R^2**	0.642	**LMT F(Prob.)**	0.002	
Δ(LnRGDP)	2.302	0.671	**F(6,59)**	20.41*	**BPGT F(5,60)**	0.708	
Q2	-0.309	-0.779	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.620	
Q3	-0.238	-0.727	**DW**	2.317	**RESET F(1,58)**	1.628	
Q4	-0.436	-0.905	**AIC**	1.213	**RESET F(Prob.)**	0.207	
AR(1)	0.831	10.883*	**SC**	1.445	**JBT χ^2 (2)**	1.193	
			LL	-33.032	**JBT χ^2 (Prob.)**	0.551	
QTY	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.955	0.992	**R^2**	0.301	**LMT F(2,57)**	1.464	-Residuals are Heteroscedastic.
LnRP	-0.100	-1.534***	**Adj. R^2**	0.229	**LMT F(Prob.)**	0.240	
Δ(LnRGDP)	13.523	1.033***	**F(6,59)**	4.224*	**BPGT F(5,60)**	2.34***	
Q2	-1.431	-0.919	**F(Prob.)**	0.001	**BPGT F(Prob.)**	0.052	
Q3	-1.206	-0.984	**DW**	2.079	**RESET F(1,58)**	0.006	
Q4	-1.361	-0.727	**AIC**	3.062	**RESET F(Prob.)**	0.939	
AR(1)	-0.446	-3.810*	**SC**	3.295	**JBT χ^2 (2)**	1.050	
			LL	-94.059	**JBT χ^2 (Prob.)**	0.592	

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RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

Table: 6.17 Continued (Part D)

IMPORT DEMAND MODELS: CATEGORY 87*							
AUSTRALIA - THAILAND							
AUD	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.192	0.501	**R^2**	0.131	**LMT F(2,59)**	0.047	-Residuals are not normally distributed. -Model is not significant.
LnRP	-0.017	-0.558	**Adj. R^2**	0.060	**LMT F(Prob.)**	0.954	
Δ(LnRGDP)	4.169	0.816	**F(5,61)**	1.835	**BPGT F(5,61)**	0.528	
Q2	-0.277	-0.466	**F(Prob.)**	0.119	**BPGT F(Prob.)**	0.754	
Q3	0.040	0.083	**DW**	1.927	**RESET F(1,60)**	0.004	
Q4	-0.294	-0.406	**AIC**	1.247	**RESET F(Prob.)**	0.952	
			SC	1.445	**JBT χ^2 (2)**	18.998*	
			LL	-35.778	**JBT χ^2 (Prob.)**	0.000	
QTY	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.709	0.924	**R^2**	0.412	**LMT F(2,57)**	0.722	-Model is mis-specified.
LnRP	-0.008	-0.199	**Adj. R^2**	0.352	**LMT F(Prob.)**	0.490	
Δ(LnRGDP)	18.263	1.828***	**F(6,59)**	6.880*	**BPGT F(5,60)**	1.673	
Q2	-1.274	-1.039***	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.155	
Q3	-0.993	-1.062***	**DW**	1.718	**RESET F(1,58)**	2.88***	
Q4	-1.444	-0.984	**AIC**	2.578	**RESET F(Prob.)**	0.095	
AR(1)	-0.556	-5.130*	**SC**	2.811	**JBT χ^2 (2)**	1.006	
			LL	-78.085	**JBT χ^2 (Prob.)**	0.605	
AUSTRALIA - UNITED KINGDOM							
AUD	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.146	-0.725	**R^2**	0.380	**LMT F(2,57)**	0.587	-Residuals are Heteroscedastic. -Model is mis-specified.
LnRP	-0.001	-0.031	**Adj. R^2**	0.317	**LMT F(Prob.)**	0.559	
Δ(LnRGDP)	0.178	0.065	**F(6,59)**	6.029*	**BPGT F(5,60)**	2.415**	
Q2	0.369	1.134***	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.046	
Q3	0.090	0.352	**DW**	2.071	**RESET F(1,58)**	5.022**	
Q4	0.179	0.456	**AIC**	-0.098	**RESET F(Prob.)**	0.029	
AR(1)	-0.424	-3.681*	**SC**	0.134	**JBT χ^2 (2)**	0.446	
			LL	10.244	**JBT χ^2 (Prob.)**	0.800	
QTY	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.214	-0.432	**R^2**	0.044	**LMT F(2,59)**	3.185**	-Residuals are serially correlated. -Residuals are not normally distributed. -Incorrect sign for RGDP. Model is not significant.
Δ(LnRP)	-0.041	-1.211	**Adj. R^2**	0.034	**LMT F(Prob.)**	0.049	
Δ(LnRGDP)	-3.409	-0.506	**F(5,61)**	0.567	**BPGT F(5,61)**	1.480	
Q2	0.276	0.354	**F(Prob.)**	0.725	**BPGT F(Prob.)**	0.209	
Q3	0.163	0.257	**DW**	2.244	**RESET F(1,60)**	0.016	
Q4	0.456	0.482	**AIC**	1.794	**RESET F(Prob.)**	0.899	
			SC	1.991	**JBT χ^2 (2)**	13.468*	
			LL	-54.090	**JBT χ^2 (Prob.)**	0.001	

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RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

Table: 6.17 Continued (Part E)

IMPORT DEMAND MODELS: CATEGORY 87*							
AUSTRALIA - UNITED STATES							
AUD	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.095	0.756	**R^2**	0.037	**LMT F(2,59)**	1.157	-Incorrect sign for RP. -Model is not significant.
LnRP	0.006	0.358	**Adj. R^2**	0.042	**LMT F(Prob.)**	0.321	
Δ(LnRGDP)	1.533	0.920	**F(5,61)**	0.468	**BPGT F(5,61)**	0.954	
Q2	-0.126	-0.651	**F(Prob.)**	0.799	**BPGT F(Prob.)**	0.453	
Q3	-0.134	-0.855	**DW**	2.053	**RESET F(1,60)**	0.287	
Q4	-0.176	-0.749	**AIC**	-0.994	**RESET F(Prob.)**	0.594	
			SC	-0.796	**JBT χ^2 (2)**	1.626	
			LL	39.287	**JBT χ^2 (Prob.)**	0.444	
QTY	**DEPENDENT VARIABLE: LnM**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	13.043	45.288*	**R^2**	0.527	**LMT F(2,57)**	0.803	-Residuals are not normally distributed.
LnRP	-0.174	-2.525**	**Adj. R^2**	0.479	**LMT F(Prob.)**	0.453	
Δ(LnRGDP)	2.600	0.734	**F(6,59)**	10.95*	**BPGT F(5,60)**	0.123	
Q2	-0.275	-0.664	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.987	
Q3	-0.290	-0.834	**DW**	1.848	**RESET F(1,58)**	1.256	
Q4	-0.303	-0.611	**AIC**	1.045	**RESET F(Prob.)**	0.267	
AR(1)	0.661	6.841*	**SC**	1.277	**JBT χ^2 (2)**	20.542*	
			LL	-27.476	**JBT χ^2 (Prob.)**	0.000	

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LL – Log Likelihood
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BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

According to Table 6.17, out of the eighteen M demand models in Category 87, 14 models are significant and four M demand models for Germany, Thailand and The United States of America based on AUD; and The United Kingdom based on QTY, are not significant, while for most of the models, the majority of the variables are not significant.

The variables RP and RGDP are significant in 6 out of the 18 models. However, an incorrect (positive) sign for RP (4 out of the 18 models; all 4 are based on AUD) and an incorrect (negative) sign for the RGDP (3 out of the 18 models; 1 based on AUD and 2 based on QTY) is evident. The correct coefficients signs for both the RP and the RGDP are found in 12 out of the 18 models, while for these 12 models, the coefficients range for the RP and RGDP is between (-0.001 and -0.174) and (0.178 and 18.263) respectively. Furthermore, the coefficients estimated for Q2, Q3 and Q4 in 9 out of 18; 8 out of 18 and 10 out of the 18 models respectively are negative. In overall, these results show that the M demand in the September quarter is higher than in the March quarter, that the M demand in the December quarter is lower than in the

March quarter, while the M demand in the June quarter is similar to the March quarter in this category. Finally, the Adj. R^2 in overall for all of the 18 models in this category ranges between 1.4 and 80 percent.

In overall, out of the 18 estimated models in this category, only 1 model (the M demand from France based on AUD) has the correct signs and has satisfactory passed all diagnostic tests, however, only 1 variable, the RP is significant. This model shows that a 1 percent increase in the RP will decrease the M growth rate by 0.020 percent, while a 1 percent RGDP growth rate will increase the M growth rate by 1.412 percent in average. The coefficients for the quarterly dummy variables Q2, Q3 and Q4 are all negative which shows that the M demand in the June, September and December quarters are lower by 26, 2.8 and 38.6 percent respectively compared to the March quarter in average, while the Adj. R^2 for this model is only 17.2 percent.

6.5.2.5 IMPORT DEMAND MODELS; CATEGORY: 3004

Table: 6.18 (Part A)

IMPORT DEMAND MODELS: CATEGORY 3004*							
AUSTRALIA - RoW							
AUD	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.239	3.525*	**R^2**	0.435	**LMT F(2,57)**	0.917	-Residuals are not normally distributed. -Incorrect sign for RP.
Δ(LnRP)	0.001	0.190	**Adj. R^2**	0.378	**LMT F(Prob.)**	0.405	
Δ(LnRGDP)	2.686	2.936*	**F(6,59)**	7.571*	**BPGT F(5,60)**	1.084	
Q2	-0.284	-2.637**	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.378	
Q3	-0.218	-2.544**	**DW**	2.120	**RESET F(1,58)**	0.020	
Q4	-0.452	-3.467*	**AIC**	-2.250	**RESET F(Prob.)**	0.889	
AR(1)	-0.347	-2.869*	**SC**	-2.017	**JBT χ^2 (2)**	25.102*	
			LL	81.237	**JBT χ^2 (Prob.)**	0.000	
QTY	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.278	0.920	**R^2**	0.933	**LMT F(2,59)**	2.53***	-Residuals are serially correlated. -Residuals are Heteroscedastic. -Residuals are not normally distributed.
Δ(LnRP)	-0.890	-28.879*	**Adj. R^2**	0.927	**LMT F(Prob.)**	0.088	
Δ(LnRGDP)	2.539	0.623	**F(5,61)**	169.0*	**BPGT F(5,61)**	2.373**	
Q2	-0.308	-0.650	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.049	
Q3	-0.414	-1.072***	**DW**	2.361	**RESET F(1,60)**	0.688	
Q4	-0.469	-0.815	**AIC**	0.797	**RESET F(Prob.)**	0.410	
Residuals (-1)	0.278	0.920	**SC**	0.995	**JBT χ^2 (2)**	8.030**	
			LL	-20.703	**JBT χ^2 (Prob.)**	0.018	
AUSTRALIA - FRANCE							
AUD	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.034	0.135	**R^2**	0.249	**LMT F(2,28)**	1.815	-Incorrect sign for RGDP. -Model is not significant.
LnRP	-0.004	-0.248	**Adj. R^2**	0.099	**LMT F(Prob.)**	0.181	
Δ(LnRGDP)	-0.111	-0.029	**F(6,30)**	1.660	**BPGT F(5,31)**	0.878	
Q2	0.007	0.017	**F(Prob.)**	0.165	**BPGT F(Prob.)**	0.507	
Q3	0.071	0.205	**DW**	2.274	**RESET F(1,29)**	0.112	
Q4	-0.006	-0.012	**AIC**	-0.237	**RESET F(Prob.)**	0.740	
AR(1)	-0.477	-2.889*	**SC**	0.068	**JBT χ^2 (2)**	3.667	
			LL	11.388	**JBT χ^2 (Prob.)**	0.160	
QTY	**DEPENDENT VARIABLE: LnM**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	11.879	22.605*	**R^2**	0.319	**LMT F(2,30)**	0.025	-Model is mis-specified. -Residuals are not normally distributed.
LnRP	-0.137	-2.962*	**Adj. R^2**	0.212	**LMT F(Prob.)**	0.975	
Δ(LnRGDP)	5.031	0.629	**F(5,32)**	2.99**	**BPGT F(5,32)**	2.008	
Q2	-0.618	-0.708	**F(Prob.)**	0.025	**BPGT F(Prob.)**	0.104	
Q3	-0.151	-0.210	**DW**	2.028	**RESET F(1,31)**	6.907**	
Q4	-0.580	-0.562	**AIC**	1.392	**RESET F(Prob.)**	0.013	
			SC	1.650	**JBT χ^2 (2)**	170.13*	
			LL	-20.442	**JBT χ^2 (Prob.)**	0.000	

****Medicaments (Excluding Goods of 3002, 3005 or 3006) Consisting of Mixed or Unmixed Products for Therapeutic or Prophylactic Uses, Put Up in Measured Doses or in Forms or Packagings for Retail Sale***
DW – Durbin-Watson Statistics
AIS – Akaike Info Criterion
SC – Schwartz Criterion
LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

Table: 6.18 Continued (Part B)

IMPORT DEMAND MODELS: CATEGORY 3004*							
AUSTRALIA - GERMANY							
AUD	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.320	1.479	R^2	0.303	**LMT F(2,34)**	1.097	-Model is mis-specified. -Incorrect sign for RP.
LnRP	0.002	0.111	**Adj.** R^2	0.207	**LMT F(Prob.)**	0.345	
Δ(LnRGDP)	5.390	1.881***	**F(5,36)**	3.14**	**BPGT F(5,36)**	0.695	
Q2	-0.527	-1.606***	**F(Prob.)**	0.019	**BPGT F(Prob.)**	0.631	
Q3	-0.236	-0.874	**DW**	2.415	**RESET F(1,35)**	3.26***	
Q4	-0.722	-1.850***	**AIC**	-0.344	**RESET F(Prob.)**	0.079	
			SC	-0.096	**JBT** χ^2 **(2)**	1.286	
			LL	13.223	**JBT** χ^2 **(Prob.)**	0.526	
QTY	**DEPENDENT VARIABLE: LnM**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	12.067	9.861*	R^2	0.460	**LMT F(2,34)**	1.451	-Model is mis-specified. -Residuals are not normally distributed.
LnRP	-0.440	-4.897*	**Adj.** R^2	0.385	**LMT F(Prob.)**	0.249	
Δ(LnRGDP)	15.337	0.946	**F(5,36)**	6.135*	**BPGT F(5,36)**	0.810	
Q2	-1.347	-0.726	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.551	
Q3	-0.579	-0.380	**DW**	1.460	**RESET F(1,35)**	3.73***	
Q4	-1.519	-0.687	**AIC**	3.123	**RESET F(Prob.)**	0.061	
			SC	3.372	**JBT** χ^2 **(2)**	4.84***	
			LL	-59.589	**JBT** χ^2 **(Prob.)**	0.089	
AUSTRALIA - UNITED KINGDOM							
AUD	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.193	0.999	R^2	0.456	**LMT F(2,24)**	5.689**	-Residuals are serially correlated.
Δ(LnRP)	-0.013	-1.070***	**Adj.** R^2	0.331	**LMT F(Prob.)**	0.010	
Δ(LnRGDP)	1.619	0.536	**F(6,26)**	3.639*	**BPGT F(5,27)**	0.766	
Q2	-0.208	-0.631	**F(Prob.)**	0.009	**BPGT F(Prob.)**	0.582	
Q3	-0.175	-0.666	**DW**	2.579	**RESET F(1,25)**	0.124	
Q4	-0.379	-0.986	**AIC**	-0.925	**RESET F(Prob.)**	0.728	
AR(1)	-0.571	-3.496*	**SC**	-0.608	**JBT** χ^2 **(2)**	0.691	
			LL	22.265	**JBT** χ^2 **(Prob.)**	0.708	
QTY	**DEPENDENT VARIABLE: LnM**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	8.571	4.571*	R^2	0.743	**LMT F(2,24)**	3.41***	-Residuals are serially correlated. -Model is mis-specified.
Δ(LnRP)	-0.533	-7.269*	**Adj.** R^2	0.684	**LMT F(Prob.)**	0.050	
Δ(LnRGDP)	21.832	0.942	**F(6,26)**	12.52*	**BPGT F(5,27)**	0.977	
Q2	-2.016	-0.825	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.450	
Q3	-1.236	-0.602	**DW**	1.281	**RESET F(1,25)**	9.230*	
Q4	-1.794	-0.628	**AIC**	3.525	**RESET F(Prob.)**	0.006	
AR(1)	0.812	6.477*	**SC**	3.842	**JBT** χ^2 **(2)**	0.501	
			LL	-51.157	**JBT** χ^2 **(Prob.)**	0.779	

Medicaments (Excluding Goods of 3002, 3005 or 3006) Consisting of Mixed or Unmixed Products for Therapeutic or Prophylactic Uses, Put Up in Measured Doses or in Forms or Packagings for Retail Sale
DW – Durbin-Watson Statistics
AIS – Akaike Info Criterion
SC – Schwartz Criterion
LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
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RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

According to Table 6.18, all eight M demand models in Category 3004 are significant except for the model between Australia and France based on AUD, which is not significant. For most of the models, the variable RP is significant, while the variables RGDP, Q2, Q3 and Q4 are mostly not significant.

The variable RP is significant in 5 out of the 8 models and variable RGDP is significant in 2 out of the 8 models. However, an incorrect (positive) sign for RP (2 out of the 8 models; both are based on AUD) and an incorrect (negative) sign for the RGDP (1 out of the 8 models; based on AUD) is evident. The correct coefficients signs for both the RP and RGDP are found in 5 out of the 8 models, while for these 5 models, the coefficients range for the RP and RGDP is between (-0.013 and -0.890) and (1.619 and 21.832) respectively. Furthermore, the coefficients estimated for Q2, Q3 and Q4 in 7 out of 8; 7 out of 8 and 8 out of the 8 models respectively are negative. In overall, these results show that the M demand in the June, September and December quarters are lower than in the March quarter in average in this category. Finally, the Adj. R^2 in overall for all 8 models in this category ranges between 9.9 and 92.7 percent.

In overall, none of the 8 estimated models in this category have satisfactory passed all diagnostic tests.

6.5.2.6 IMPORT DEMAND MODELS; CATEGORY: 8471

Table: 6.19 (Part A)

IMPORT DEMAND MODELS: CATEGORY 8471*							
AUSTRALIA - RoW							
AUD	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.047	-0.692	**R^2**	0.759	**LMT F(2,59)**	1.043	-Model is mis-specified. -Residuals are not normally distributed.
LnRP	-0.011	-0.679	**Adj. R^2**	0.740	**LMT F(Prob.)**	0.359	
Δ(LnRGDP)	0.254	0.261	**F(5,61)**	38.52*	**BPGT F(5,61)**	1.156	
Q2	0.261	2.320	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.341	
Q3	-0.068	-0.737	**DW**	1.952	**RESET F(1,60)**	3.05***	
Q4	-0.002	-0.014	**AIC**	-2.200	**RESET F(Prob.)**	0.086	
			SC	-2.002	**JBT χ^2 (2)**	6.726**	
			LL	79.691	**JBT χ^2 (Prob.)**	0.035	
QTY	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.046	0.483	**R^2**	0.505	**LMT F(2,59)**	1.967	-Model is mis-specified. -Residuals are not normally distributed.
LnRP	-0.050	-2.248**	**Adj. R^2**	0.465	**LMT F(Prob.)**	0.149	
Δ(LnRGDP)	0.648	0.475	**F(5,61)**	12.47*	**BPGT F(5,61)**	1.236	
Q2	0.068	0.431	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.303	
Q3	-0.114	-0.880	**DW**	1.704	**RESET F(1,60)**	6.443**	
Q4	-0.223	-1.156***	**AIC**	-1.516	**RESET F(Prob.)**	0.014	
			SC	-1.319	**JBT χ^2 (2)**	67.034*	
			LL	56.791	**JBT χ^2 (Prob.)**	0.000	
AUSTRALIA - CHINA							
AUD	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.529	1.138***	**R^2**	0.261	**LMT F(2,57)**	42.364*	-Residuals are serially correlated. -Residuals are Heteroscedastic. -Model is mis-specified. -Residuals are not normally distributed.
LnRP	-0.016	-0.301	**Adj. R^2**	0.186	**LMT F(Prob.)**	0.000	
Δ(LnRGDP)	8.641	1.427***	**F(6,59)**	3.479*	**BPGT F(5,60)**	3.367**	
Q2	-0.408	-0.583	**F(Prob.)**	0.005	**BPGT F(Prob.)**	0.010	
Q3	-0.484	-0.839	**DW**	2.262	**RESET F(1,60)**	38.199*	
Q4	-1.008	-1.182***	**AIC**	1.855	**RESET F(Prob.)**	0.000	
AR(1)	0.332	3.516*	**SC**	2.087	**JBT χ^2 (2)**	83.106*	
			LL	-54.214	**JBT χ^2 (Prob.)**	0.000	
QTY	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.236	0.428	**R^2**	0.245	**LMT F(2,58)**	4.001**	-Residuals are serially correlated. -Residuals are Heteroscedastic. -Model is mis-specified. -Residuals are not normally distributed.
Δ(LnRP)	-0.015	-0.332	**Adj. R^2**	0.170	**LMT F(Prob.)**	0.024	
Δ(LnRGDP)	4.032	0.542	**F(6,60)**	3.247*	**BPGT F(6,60)**	8.769*	
Q2	0.012	0.013	**F(Prob.)**	0.008	**BPGT F(Prob.)**	0.000	
Q3	0.020	0.029	**DW**	2.129	**RESET F(1,59)**	4.822**	
Q4	-0.467	-0.445	**AIC**	2.014	**RESET F(Prob.)**	0.032	
Residuals (-1)	-0.214	-3.567*	**SC**	2.245	**JBT χ^2 (2)**	105.35*	
			LL	-60.484	**JBT χ^2 (Prob.)**	0.000	

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JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

Table: 6.19 Continued (Part B)

IMPORT DEMAND MODELS: CATEGORY 8471*							
AUSTRALIA - FRANCE							
AUD	**DEPENDENT VARIABLE: LnM**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.821	1.639	**R^2**	0.251	**LMT F(2,57)**	1.341	
LnRP	-0.110	-2.304**	**Adj. R^2**	0.175	**LMT F(Prob.)**	0.270	
Δ(LnRGDP)	0.927	0.139	**F(6,59)**	3.293*	**BPGT F(5,60)**	0.276	
Q2	0.129	0.168	**F(Prob.)**	0.007	**BPGT F(Prob.)**	0.924	
Q3	0.322	0.508	**DW**	2.039	**RESET F(1,58)**	2.184	
Q4	0.376	0.401	**AIC**	2.038	**RESET F(Prob.)**	0.145	
AR(1)	0.334	2.788*	**SC**	2.270	**JBT χ^2 (2)**	1.196	
			LL	-60.259	**JBT χ^2 (Prob.)**	0.550	
QTY	**DEPENDENT VARIABLE: LnM**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	9.920	16.215*	**R^2**	0.343	**LMT F(2,57)**	0.812	
LnRP	-0.026	-0.469	**Adj. R^2**	0.277	**LMT F(Prob.)**	0.449	
Δ(LnRGDP)	32.750	3.975*	**F(6,59)**	5.145*	**BPGT F(5,60)**	0.709	
Q2	-3.175	-3.334*	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.619	
Q3	-2.427	-3.093*	**DW**	2.137	**RESET F(1,58)**	0.911	
Q4	-3.998	-3.443*	**AIC**	2.307	**RESET F(Prob.)**	0.344	
AR(1)	0.210	1.759***	**SC**	2.540	**JBT χ^2 (2)**	4.464	
			LL	-69.141	**JBT χ^2 (Prob.)**	0.107	
AUSTRALIA - GERMANY							
AUD	**DEPENDENT VARIABLE: LnM**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	1.275	5.382*	**R^2**	0.475	**LMT F(2,57)**	4.037**	
LnRP	-0.033	-1.171***	**Adj. R^2**	0.422	**LMT F(Prob.)**	0.023	
Δ(LnRGDP)	1.744	0.597	**F(6,59)**	8.906*	**BPGT F(5,60)**	0.428	-Residuals are serially correlated.
Q2	0.430	1.277***	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.828	-Model is mis-specified.
Q3	0.403	1.446***	**DW**	2.450	**RESET F(1,58)**	6.487**	
Q4	0.456	1.108	**AIC**	0.653	**RESET F(Prob.)**	0.014	
AR(1)	0.635	6.503*	**SC**	0.885	**JBT χ^2 (2)**	2.918	
			LL	-14.546	**JBT χ^2 (Prob.)**	0.233	
QTY	**DEPENDENT VARIABLE: LnM**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	8.347	18.084*	**R^2**	0.532	**LMT F(2,57)**	3.698**	
LnRP	-0.235	-4.172*	**Adj. R^2**	0.484	**LMT F(Prob.)**	0.031	-Residuals are serially correlated.
Δ(LnRGDP)	-2.067	-0.353	**F(6,59)**	11.17*	**BPGT F(5,60)**	0.834	-Model is mis-specified.
Q2	0.580	0.858	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.531	-Residuals are not normally distributed.
Q3	0.446	0.798	**DW**	2.296	**RESET F(1,58)**	5.802**	-Incorrect sign for RGDP.
Q4	0.715	0.867	**AIC**	1.989	**RESET F(Prob.)**	0.019	
AR(1)	0.584	5.516*	**SC**	2.221	**JBT χ^2 (2)**	8.631**	
			LL	-58.642	**JBT χ^2 (Prob.)**	0.013	

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**** significant at 1%, ** significance at 5%, ***significance at 10%***

Table: 6.19 Continued (Part C)

IMPORT DEMAND MODELS: CATEGORY 8471*							
AUSTRALIA - MALAYSIA							
AUD	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.581	-1.237***	**R^2**	0.128	**LMT F(2,59)**	1.284	-Model is mis-specified. -Residuals are not normally distributed. -Incorrect sign for RP.
Δ(LnRP)	0.049	0.693	**Adj. R^2**	0.056	**LMT F(Prob.)**	0.285	
Δ(LnRGDP)	7.251	1.142***	**F(5,61)**	1.8***	**BPGT F(5,61)**	1.139	
Q2	1.271	1.724***	**F(Prob.)**	0.099	**BPGT F(Prob.)**	0.350	
Q3	0.750	1.249	**DW**	2.069	**RESET F(1,60)**	3.98***	
Q4	1.306	1.458	**AIC**	1.691	**RESET F(Prob.)**	0.051	
			SC	1.889	**JBT χ^2 (2)**	394.73*	
			LL	-50.652	**JBT χ^2 (Prob.)**	0.000	
QTY	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.397	-0.855	**R^2**	0.123	**LMT F(2,59)**	2.279	-Residuals are not normally distributed.
Δ(LnRP)	-0.073	-1.037***	**Adj. R^2**	0.051	**LMT F(Prob.)**	0.111	
Δ(LnRGDP)	6.380	1.018***	**F(5,61)**	1.7***	**BPGT F(5,61)**	0.838	
Q2	1.084	1.488***	**F(Prob.)**	0.089	**BPGT F(Prob.)**	0.528	
Q3	0.498	0.841	**DW**	2.167	**RESET F(1,60)**	0.929	
Q4	0.955	1.079	**AIC**	1.667	**RESET F(Prob.)**	0.339	
			SC	1.864	**JBT χ^2 (2)**	2157.3*	
			LL	-49.829	**JBT χ^2 (Prob.)**	0.000	
AUSTRALIA - SINGAPORE							
AUD	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.058	-0.435	**R^2**	0.528	**LMT F(2,59)**	0.910	
LnRP	-0.039	-1.079***	**Adj. R^2**	0.489	**LMT F(Prob.)**	0.408	
Δ(LnRGDP)	0.538	0.289	**F(5,61)**	13.63*	**BPGT F(5,61)**	0.654	
Q2	0.305	1.410***	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.660	
Q3	-0.131	-0.734	**DW**	2.276	**RESET F(1,60)**	1.097	
Q4	0.014	0.055	**AIC**	-0.828	**RESET F(Prob.)**	0.299	
			SC	-0.630	**JBT χ^2 (2)**	1.005	
			LL	33.736	**JBT χ^2 (Prob.)**	0.605	
QTY	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.320	1.894***	**R^2**	0.365	**LMT F(2,59)**	1.345	-Residuals are Heteroscedastic.
LnRP	-0.086	-1.875***	**Adj. R^2**	0.313	**LMT F(Prob.)**	0.268	
Δ(LnRGDP)	3.758	1.589***	**F(5,61)**	7.019*	**BPGT F(5,61)**	3.565*	
Q2	-0.364	-1.327	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.007	
Q3	-0.544	-2.407**	**DW**	2.232	**RESET F(1,60)**	1.733	
Q4	-0.779	-2.336**	**AIC**	-0.350	**RESET F(Prob.)**	0.193	
			SC	-0.153	**JBT χ^2 (2)**	0.411	
			LL	17.740	**JBT χ^2 (Prob.)**	0.814	

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**** significant at 1%, ** significance at 5%, ***significance at 10%***

Table: 6.19 Continued (Part D)

IMPORT DEMAND MODELS: CATEGORY 8471*							
AUSTRALIA - THAILAND							
AUD	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.384	-1.085	**R^2**	0.205	**LMT F(2,58)**	1.335	-Residuals are Heteroscedastic. -Model is mis-specified. -Residuals are not normally distributed. -Incorrect sign for RP; RGDP.
LnRP	0.001	0.023	**Adj. R^2**	0.125	**LMT F(Prob.)**	0.271	
Δ(LnRGDP)	-6.752	-1.388***	**F(6,60)**	2.57**	**BPGT F(6,60)**	3.825*	
Q2	0.952	1.678***	**F(Prob.)**	0.028	**BPGT F(Prob.)**	0.003	
Q3	0.502	1.089	**DW**	2.278	**RESET F(1,59)**	6.292**	
Q4	0.686	0.994	**AIC**	1.080	**RESET F(Prob.)**	0.015	
Residuals (-1)	-0.062	-1.130	**SC**	1.310	**JBT χ^2 (2)**	19.426*	
			LL	-29.179	**JBT χ^2 (Prob.)**	0.000	
QTY	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.568	-1.348	**R^2**	0.274	**LMT F(2,57)**	1.471	-Model is mis-specified.
LnRP	-0.008	-0.244	**Adj. R^2**	0.200	**LMT F(Prob.)**	0.238	
Δ(LnRGDP)	10.300	1.774***	**F(6,59)**	3.707*	**BPGT F(5,60)**	0.620	
Q2	1.242	1.801***	**F(Prob.)**	0.003	**BPGT F(Prob.)**	0.685	
Q3	0.760	1.395***	**DW**	1.884	**RESET F(1,58)**	17.317*	
Q4	1.046	1.255	**AIC**	1.414	**RESET F(Prob.)**	0.000	
AR(1)	-0.400	-3.347*	**SC**	1.646	**JBT χ^2 (2)**	1.353	
			LL	-39.657	**JBT χ^2 (Prob.)**	0.508	
AUSTRALIA - UNITED KINGDOM							
AUD	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.110	0.417	**R^2**	0.301	**LMT F(2,57)**	0.295	-Residuals are not normally distributed.
Δ(LnRP)	-0.030	-1.343***	**Adj. R^2**	0.229	**LMT F(Prob.)**	0.746	
Δ(LnRGDP)	2.736	0.774	**F(6,59)**	4.226*	**BPGT F(5,60)**	0.746	
Q2	-0.007	-0.016	**F(Prob.)**	0.001	**BPGT F(Prob.)**	0.592	
Q3	-0.239	-0.715	**DW**	1.963	**RESET F(1,58)**	0.723	
Q4	-0.398	-0.780	**AIC**	0.347	**RESET F(Prob.)**	0.399	
AR(1)	-0.380	-3.104*	**SC**	0.579	**JBT χ^2 (2)**	7.763**	
			LL	-4.438	**JBT χ^2 (Prob.)**	0.021	
QTY	**DEPENDENT VARIABLE: LnM**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	9.522	25.821*	**R^2**	0.334	**LMT F(2,57)**	0.723	
Δ(LnRP)	-0.106	-3.547*	**Adj. R^2**	0.266	**LMT F(Prob.)**	0.490	
Δ(LnRGDP)	2.567	0.541	**F(6,59)**	4.931*	**BPGT F(5,60)**	1.530	
Q2	-0.064	-0.116	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.194	
Q3	-0.081	-0.178	**DW**	2.116	**RESET F(1,58)**	1.594	
Q4	-0.393	-0.583	**AIC**	1.490	**RESET F(Prob.)**	0.212	
AR(1)	0.479	4.100*	**SC**	1.722	**JBT χ^2 (2)**	0.197	
			LL	-42.172	**JBT χ^2 (Prob.)**	0.906	

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**** significant at 1%, ** significance at 5%, ***significance at 10%***

According to Table 6.19, all sixteen M demand models in Category 8471 are significant. Furthermore, for most of the models, the variable RP is significant, while the variables RGDP, Q2, Q3 and Q4 are mostly not significant.

The variable RP is significant in 9 out of the 16 models and RGDP is significant in 7 out of the 16 models. However, an incorrect (positive) sign for the RP (2 out of 16 models; both based on AUD) and an incorrect (negative) sign for the RGDP (2 out of the 16 models; 1 based on AUD and 1 based on QTY) is evident. The correct coefficients signs for both the RP and RGDP are found in 13 out of the 16 models, while for these 13 models, the coefficients range for the RP and RGDP is between (-0.008 and -0.106) and (0.254 and 32.750) respectively. Furthermore, the coefficients estimated for Q2, Q3 and Q4 in 5 out of 16; 8 out of 16 and 8 out of the 16 models respectively are negative. These results show in overall that M demand in June quarter is higher than in March quarter and M demand in September and December quarters compared to the March quarter are similar in this category. Finally, the Adj. R^2 in overall for all of the 16 models in this category ranges between 5.1 and 74 percent.

In overall, out of the 16 estimated models in this category, 4 models (the M demand from France and Singapore based on AUD; France and The United Kingdom based on QTY) have the correct signs and have satisfactory passed all diagnostic tests. The M demand model from France (based on AUD values) shows that a 1 percent increase in the RP will decrease the M demand by 0.110 percent, while a 1 percent RGDP growth rate will increase the M demand by 0.927 percent in average. The M demand model from Singapore (based on AUD values) shows that a 1 percent increase in the RP will decrease the M growth rate by 0.039 percent, while a 1 percent RGDP growth rate will increase the M growth rate by 0.538 percent in average. The M demand model from France (based on QTY values) shows that a 1 percent increase in the RP will decrease the M demand by 0.026 percent, while a 1 percent RGDP growth rate will increase the M demand by a staggering 32.750 percent in average. The M demand model from The United Kingdom (based on QTY values) shows that a 1 percent growth rate in the RP will decrease the M demand by 0.106 percent, while a 1 percent RGDP growth rate will increase the M demand by 2.567 percent in average. For these 4 models, the variable RP is mostly significant and the variables RGDP, Q2, Q3 and Q4 are mostly not significant. The coefficients for the quarterly dummy variable Q3 is mostly positive and for the coefficients Q2 and Q4, half are positive and the other half are negative, while the coefficients range for the Q2, Q3 and Q4 is between (-3.175 and 0.305), (-2.427 and 0.322) and (-3.998 and 0.376) respectively. In overall, these figures show that the M demand for the September quarter is less than the M demand in the March quarter and that the M demand in the June and December quarter are similar to the March quarter in average. Finally, the Adj. R^2 for France and Singapore based on AUD values is 17.5 and 48.9 percent respectively and for France and The United Kingdom based on QTY, the values are 27.7 and 26.6 percent respectively.

6.5.2.7 IMPORT DEMAND MODELS; CATEGORY: 8473

Table: 6.20

IMPORT DEMAND MODELS: CATEGORY 8473*							
AUSTRALIA - RoW							
AUD	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.004	0.066	**R^2**	0.501	**LMT F(2,59)**	3.231**	-Residuals are serially correlated. -Residuals are Heteroscedastic.
LnRP	-0.002	-0.195	**Adj. R^2**	0.460	**LMT F(Prob.)**	0.047	
Δ(LnRGDP)	0.119	0.159	**F(5,61)**	12.25*	**BPGT F(5,61)**	2.0***	
Q2	0.089	1.029***	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.092	
Q3	-0.060	-0.846	**DW**	2.402	**RESET F(1,60)**	0.656	
Q4	-0.053	-0.504	**AIC**	-2.614	**RESET F(Prob.)**	0.421	
			SC	-2.416	**JBT χ^2 (2)**	0.778	
			LL	93.561	**JBT χ^2 (Prob.)**	0.678	
QTY	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.744	2.403**	**R^2**	0.211	**LMT F(2,59)**	1.644	-Residuals are Heteroscedastic. -Residuals are not normally distributed.
LnRP	-0.107	-1.774***	**Adj. R^2**	0.147	**LMT F(Prob.)**	0.202	
Δ(LnRGDP)	13.499	3.284*	**F(5,61)**	3.267*	**BPGT F(5,61)**	2.34***	
Q2	-1.347	-2.818*	**F(Prob.)**	0.011	**BPGT F(Prob.)**	0.052	
Q3	-1.160	-2.978*	**DW**	2.250	**RESET F(1,60)**	0.001	
Q4	-1.912	-3.295*	**AIC**	0.801	**RESET F(Prob.)**	0.977	
			SC	0.998	**JBT χ^2 (2)**	171.59*	
			LL	-20.832	**JBT χ^2 (Prob.)**	0.000	

****Parts and Accessories (Other Than Covers, Carrying Cases and the Like) Suitable for Use Solely or Principally with Office Machines***
DW – Durbin-Watson Statistics
AIS – Akaike Info Criterion
SC – Schwartz Criterion
LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

According to Table 6.20, due to data availability, only two M demand models in Category 8473 are estimated. Both models are significant, however, in the model based on AUD values, only the dummy variable Q2 is significant, while in the model based on QTY values, all variables are significant.

Furthermore, the signs for the variables RP and RGDP in both models are according to expectations, whereas the quarterly dummy variables Q2, Q3 and Q4 are all negative except the variable Q2 in the model based on AUD values. However, none of these two M demand models estimated, have passed all diagnostic tests.

6.5.2.8 IMPORT DEMAND MODELS; CATEGORY: 8517

Table: 6.21 (Part A)

IMPORT DEMAND MODELS: CATEGORY 8517*							
AUSTRALIA - RoW							
AUD	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.108	0.829	**R^2**	0.278	**LMT F(2,59)**	0.185	-Residuals are Heteroscedastic. -Residuals are not normally distributed.
LnRP	-0.011	-0.514	**Adj. R^2**	0.219	**LMT F(Prob.)**	0.832	
Δ(LnRGDP)	2.676	1.556***	**F(5,61)**	4.704*	**BPGT F(5,61)**	2.14***	
Q2	-0.074	-0.371	**F(Prob.)**	0.001	**BPGT F(Prob.)**	0.073	
Q3	-0.157	-0.967	**DW**	2.057	**RESET F(1,60)**	0.237	
Q4	-0.232	-0.956	**AIC**	-0.925	**RESET F(Prob.)**	0.628	
			SC	-0.727	**JBT χ^2 (2)**	7.097**	
			LL	36.977	**JBT χ^2 (Prob.)**	0.029	
QTY	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.211	-1.655***	**R^2**	0.608	**LMT F(2,59)**	4.114**	-Residuals are serially correlated.
LnRP	-0.011	-0.548	**Adj. R^2**	0.575	**LMT F(Prob.)**	0.021	
Δ(LnRGDP)	0.949	0.567	**F(5,61)**	18.88*	**BPGT F(5,61)**	0.842	
Q2	0.308	1.583***	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.525	
Q3	0.217	1.370***	**DW**	2.003	**RESET F(1,60)**	0.235	
Q4	0.288	1.221	**AIC**	-0.979	**RESET F(Prob.)**	0.630	
			SC	-0.781	**JBT χ^2 (2)**	1.057	
			LL	38.788	**JBT χ^2 (Prob.)**	0.589	
AUSTRALIA - GERMANY							
AUD	**DEPENDENT VARIABLE: LnM**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	1.216	3.121*	**R^2**	0.569	**LMT F(2,57)**	0.840	-Incorrect sign for RP.
LnRP	0.044	2.253**	**Adj. R^2**	0.526	**LMT F(Prob.)**	0.437	
Δ(LnRGDP)	9.216	2.313**	**F(6,59)**	13.01*	**BPGT F(5,60)**	1.751	
Q2	0.915	1.980***	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.137	
Q3	0.937	2.447**	**DW**	1.816	**RESET F(1,58)**	0.143	
Q4	1.458	2.594**	**AIC**	1.468	**RESET F(Prob.)**	0.707	
AR(1)	0.767	9.162*	**SC**	1.700	**JBT χ^2 (2)**	0.505	
			LL	-41.439	**JBT χ^2 (Prob.)**	0.777	
QTY	**DEPENDENT VARIABLE: LnM**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	7.216	11.160*	**R^2**	0.536	**LMT F(2,57)**	0.485	-Incorrect sign for RGDP.
LnRP	-0.204	-5.509*	**Adj. R^2**	0.488	**LMT F(Prob.)**	0.618	
Δ(LnRGDP)	-5.782	-0.684	**F(6,59)**	11.34*	**BPGT F(5,60)**	1.668	
Q2	0.685	0.699	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.156	
Q3	0.390	0.484	**DW**	2.001	**RESET F(1,58)**	1.224	
Q4	0.888	0.746	**AIC**	2.592	**RESET F(Prob.)**	0.273	
AR(1)	0.397	3.438*	**SC**	2.824	**JBT χ^2 (2)**	0.072	
			LL	-78.538	**JBT χ^2 (Prob.)**	0.965	

Electrical Apparatus for Line Telephony or Line Telegraphy, Including Line Telephone Sets with Cordless Handsets and Telecommunication Apparatus for Carrier-Current Line Systems or for Digital Line Systems; Videophones

DW – Durbin-Watson Statistics
AIS – Akaike Info Criterion
SC – Schwartz Criterion
LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

Table: 6.21 Continued (Part B)

IMPORT DEMAND MODELS: CATEGORY 8517*							
AUSTRALIA - MALAYSIA							
AUD	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.313	-0.792	**R^2**	0.166	**LMT F(2,57)**	1.735	-Model is mis-specified. -Residuals are not normally distributed.
Δ(LnRP)	-0.052	-2.385**	**Adj. R^2**	0.082	**LMT F(Prob.)**	0.186	
Δ(LnRGDP)	3.870	0.724	**F(6,59)**	2.0***	**BPGT F(5,60)**	0.936	
Q2	0.578	0.925	**F(Prob.)**	0.085	**BPGT F(Prob.)**	0.465	
Q3	0.496	0.987	**DW**	2.075	**RESET F(1,58)**	3.85***	
Q4	0.639	0.844	**AIC**	1.278	**RESET F(Prob.)**	0.055	
AR(1)	-0.223	-1.758***	**SC**	1.510	**JBT χ^2 (2)**	37.619*	
			LL	-35.172	**JBT χ^2 (Prob.)**	0.000	
QTY	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.540	-1.099	**R^2**	0.272	**LMT F(2,59)**	1.178	-Residuals are not normally distributed. -Incorrect sign for RGDP.
Δ(LnRP)	-0.096	-3.634*	**Adj. R^2**	0.212	**LMT F(Prob.)**	0.315	
Δ(LnRGDP)	-3.617	-0.545	**F(5,61)**	4.556*	**BPGT F(5,61)**	1.355	
Q2	0.766	0.992	**F(Prob.)**	0.001	**BPGT F(Prob.)**	0.254	
Q3	0.703	1.119***	**DW**	2.377	**RESET F(1,60)**	1.976	
Q4	1.034	1.104***	**AIC**	1.780	**RESET F(Prob.)**	0.165	
			SC	1.977	**JBT χ^2 (2)**	82.56*	
			LL	-53.615	**JBT χ^2 (Prob.)**	0.000	
AUSTRALIA - SINGAPORE							
AUD	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.007	-0.015	**R^2**	0.205	**LMT F(2,57)**	1.759	
LnRP	-0.020	-0.767	**Adj. R^2**	0.124	**LMT F(Prob.)**	0.182	
Δ(LnRGDP)	2.052	0.323	**F(6,59)**	2.536*	**BPGT F(5,60)**	0.846	
Q2	0.237	0.318	**F(Prob.)**	0.030	**BPGT F(Prob.)**	0.523	
Q3	-0.122	-0.203	**DW**	2.152	**RESET F(1,58)**	2.428	
Q4	-0.189	-0.209	**AIC**	1.587	**RESET F(Prob.)**	0.125	
AR(1)	-0.319	-2.642**	**SC**	1.819	**JBT χ^2 (2)**	0.110	
			LL	-45.377	**JBT χ^2 (Prob.)**	0.947	
QTY	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.552	-0.840	**R^2**	0.257	**LMT F(2,57)**	1.896	
LnRP	-0.041	-1.076***	**Adj. R^2**	0.181	**LMT F(Prob.)**	0.160	
Δ(LnRGDP)	0.383	0.043	**F(6,59)**	3.399*	**BPGT F(5,60)**	1.685	
Q2	0.750	0.717	**F(Prob.)**	0.006	**BPGT F(Prob.)**	0.152	
Q3	0.736	0.871	**DW**	2.127	**RESET F(1,58)**	0.468	
Q4	0.654	0.515	**AIC**	2.269	**RESET F(Prob.)**	0.497	
AR(1)	-0.267	-2.146**	**SC**	2.501	**JBT χ^2 (2)**	3.095	
			LL	-67.877	**JBT χ^2 (Prob.)**	0.213	

Electrical Apparatus for Line Telephony or Line Telegraphy, Including Line Telephone Sets with Cordless Handsets and Telecommunication Apparatus for Carrier-Current Line Systems or for Digital Line Systems; Videophones
DW – Durbin-Watson Statistics
AIS – Akaike Info Criterion
SC – Schwartz Criterion
LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

Table: 6.21 Continued (Part C)

IMPORT DEMAND MODELS: CATEGORY 8517*							
AUSTRALIA - UNITED KINGDOM							
AUD	**DEPENDENT VARIABLE: LnM**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	2.668	3.509*	**R^2**	0.804	**LMT F(2,57)**	1.643	-Residuals are Heteroscedastic. -Model is mis-specified.
LnRP	-0.023	-0.673	**Adj. R^2**	0.784	**LMT F(Prob.)**	0.202	
Δ(LnRGDP)	1.395	0.303	**F(6,59)**	40.29*	**BPGT F(5,60)**	3.159**	
Q2	0.105	0.197	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.014	
Q3	0.223	0.506	**DW**	2.251	**RESET F(2,57)**	3.842**	
Q4	0.215	0.331	**AIC**	1.858	**RESET F(Prob.)**	0.027	
AR(1)	0.894	15.589*	**SC**	2.091	**JBT χ^2 (2)**	3.940	
			LL	-54.330	**JBT χ^2 (Prob.)**	0.139	
QTY	**DEPENDENT VARIABLE: LnM**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	8.665	14.013*	**R^2**	0.457	**LMT F(2,57)**	1.370	
LnRP	-0.093	-1.794***	**Adj. R^2**	0.402	**LMT F(Prob.)**	0.262	
Δ(LnRGDP)	6.145	0.834	**F(6,59)**	8.271*	**BPGT F(5,60)**	0.730	
Q2	-0.603	-0.706	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.604	
Q3	-0.085	-0.120	**DW**	2.140	**RESET F(1,58)**	2.323	
Q4	-0.799	-0.768	**AIC**	2.554	**RESET F(Prob.)**	0.133	
AR(1)	0.650	6.414*	**SC**	2.786	**JBT χ^2 (2)**	0.002	
			LL	-77.277	**JBT χ^2 (Prob.)**	0.999	

Electrical Apparatus for Line Telephony or Line Telegraphy, Including Line Telephone Sets with Cordless Handsets and Telecommunication Apparatus for Carrier-Current Line Systems or for Digital Line Systems; Videophones
DW – Durbin-Watson Statistics
AIS – Akaike Info Criterion
SC – Schwartz Criterion
LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

According to Table 6.21, all ten M demand models in Category 8517 are significant. Furthermore, for most of the models, the variable RP is significant, while the variables RGDP, Q2, Q3 and Q4 are mostly not significant.

The variable RP is significant in 6 out of the 10 models and the RGDP is significant in 2 out of the 10 models. However, an incorrect (positive) sign for the RP (1 out of 10 models; based on AUD) and an incorrect (negative) sign for the RGDP (2 out of 10 models; both based on QTY) is evident. The correct coefficients signs for both the RP and RGDP are found in 7 out of the 10 models, while for these 7 models the coefficients range for the RP and RGDP is between (-0.011 and -0.093) and (0.383 and 6.145) respectively. Furthermore, the coefficients estimated for Q2, Q3 and Q4 in 2 out of 10; 3 out of 10 and 3 out of the 10 models respectively are negative. In overall, these results show that the M demand in the June, September and December quarters are higher than in the March quarter in this category. Finally, the Adj. R^2 in overall for all 10 models in this category ranges between 8.2 and 78.4 percent.

In overall, out of the 10 estimated models in this category, 3 models (the M demand from Singapore based on AUD; Singapore and The United Kingdom based on QTY) have the correct signs and have satisfactory passed all diagnostic tests. The M demand model from Singapore (based on AUD values) shows that a 1 percent increase in the RP will decrease the M growth rate by 0.020 percent, while a 1 percent RGDP growth rate will increase the M growth rate by 2.052 percent in average. The M demand model from Singapore (based on QTY values) shows that a 1 percent increase in the RP will decrease the M growth rate by 0.041 percent, while a 1 percent RGDP growth rate will increase the M growth rate by 0.383 percent in average. The M demand model from The United Kingdom (based on QTY values) shows that a 1 percent increase in the RP will decrease the M demand by 0.093 percent, while a 1 percent RGDP growth rate will increase the M demand by 6.145 percent in average. For these 3 models, the variable RP is mostly significant and the variables RGDP, Q2, Q3 and Q4 are mostly not significant. The coefficients for the quarterly dummy variable Q2 is mostly positive and for the coefficients Q3 and Q4 are mostly negative, while the coefficients range for the Q2, Q3 and Q4 is between (-0.603 and 0.750), (-0.122 and 0.736) and (-0.799 and 0.654) respectively. In overall, these figures show that the M demand for the June quarter is more than the M demand in the March quarter and that the M demand in the September and December quarters is less than the M demand in the March quarter in average. Finally, the Adj. R^2 for Singapore based on AUD values is 12.4 percent and for Singapore and The United Kingdom based on QTY values is 18.1 and 40.2 percent respectively.

6.5.2.9 IMPORT DEMAND MODELS; CATEGORY: 8703

Table: 6.22 (Part A)

IMPORT DEMAND MODELS: CATEGORY 8703*							
AUSTRALIA - RoW							
AUD	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.010	-0.117	**R^2**	0.377	**LMT F(2,59)**	1.252	-Residuals are Heteroscedastic. -Incorrect sign for RP.
Δ(LnRP)	0.054	0.922	**Adj. R^2**	0.326	**LMT F(Prob.)**	0.293	
Δ(LnRGDP)	0.868	0.773	**F(5,61)**	7.381*	**BPGT F(5,61)**	2.29***	
Q2	0.082	0.619	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.056	
Q3	0.036	0.339	**DW**	2.174	**RESET F(1,60)**	2.470	
Q4	-0.048	-0.299	**AIC**	-1.777	**RESET F(Prob.)**	0.121	
			SC	-1.579	**JBT χ^2 (2)**	1.599	
			LL	65.524	**JBT χ^2 (Prob.)**	0.450	
QTY	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.047	-0.586	**R^2**	0.265	**LMT F(2,57)**	0.275	-Incorrect sign for RGDP.
Δ(LnRP)	-0.021	-0.344	**Adj. R^2**	0.191	**LMT F(Prob.)**	0.761	
Δ(LnRGDP)	-0.777	-0.722	**F(6,59)**	3.553*	**BPGT F(5,60)**	0.451	
Q2	0.144	1.118***	**F(Prob.)**	0.005	**BPGT F(Prob.)**	0.811	
Q3	0.085	0.837	**DW**	1.888	**RESET F(1,58)**	0.011	
Q4	0.064	0.413	**AIC**	-1.928	**RESET F(Prob.)**	0.915	
AR(1)	-0.358	-3.050*	**SC**	-1.696	**JBT χ^2 (2)**	1.017	
			LL	70.637	**JBT χ^2 (Prob.)**	0.601	
AUSTRALIA - GERMANY							
AUD	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.018	0.085	**R^2**	0.040	**LMT F(2,59)**	3.236**	-Residuals are serially correlated. -Model is mis-specified. -Residuals are not normally distributed. -Model is not significant.
LnRP	-0.003	-0.110	**Adj. R^2**	0.039	**LMT F(Prob.)**	0.046	
Δ(LnRGDP)	1.078	0.371	**F(5,61)**	0.509	**BPGT F(5,61)**	1.423	
Q2	-0.002	-0.005	**F(Prob.)**	0.768	**BPGT F(Prob.)**	0.229	
Q3	0.013	0.048	**DW**	2.295	**RESET F(1,60)**	2.85***	
Q4	-0.082	-0.199	**AIC**	0.127	**RESET F(Prob.)**	0.097	
			SC	0.325	**JBT χ^2 (2)**	8.728**	
			LL	1.736	**JBT χ^2 (Prob.)**	0.013	
QTY	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.263	-1.251	**R^2**	0.069	**LMT F(2,59)**	3.02***	-Residuals are serially correlated. -Residuals are not normally distributed. -Incorrect sign for RGDP. -Model is not significant.
LnRP	-0.007	-0.287	**Adj. R^2**	0.007	**LMT F(Prob.)**	0.057	
Δ(LnRGDP)	-3.512	-1.233	**F(5,61)**	0.902	**BPGT F(5,61)**	0.419	
Q2	0.454	1.371	**F(Prob.)**	0.486	**BPGT F(Prob.)**	0.834	
Q3	0.388	1.441	**DW**	2.167	**RESET F(1,60)**	0.413	
Q4	0.430	1.067	**AIC**	0.086	**RESET F(Prob.)**	0.523	
			SC	0.283	**JBT χ^2 (2)**	35.803*	
			LL	3.133	**JBT χ^2 (Prob.)**	0.000	

Motor Cars and Other Motor Vehicles Principally Designed for the Transport of Persons (Other Than Public Transport Type), Including Station Wagons and Racing Cars
DW – Durbin-Watson Statistics
AIS – Akaike Info Criterion
SC – Schwartz Criterion
LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

Table: 6.22 Continued (Part B)

IMPORT DEMAND MODELS: CATEGORY 8703*							
AUSTRALIA - MALAYSIA							
AUD	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.606	0.592	**R^2**	0.383	**LMT F(2,33)**	0.180	
Δ(LnRP)	-0.545	-4.231*	**Adj. R^2**	0.295	**LMT F(Prob.)**	0.836	
Δ(LnRGDP)	0.152	0.010	**F(5,35)**	4.351*	**BPGT F(5,35)**	1.164	
Q2	-0.598	-0.359	**F(Prob.)**	0.003	**BPGT F(Prob.)**	0.346	
Q3	-0.881	-0.643	**DW**	1.694	**RESET F(1,34)**	0.343	
Q4	-0.682	-0.345	**AIC**	2.986	**RESET F(Prob.)**	0.562	
			SC	3.237	**JBT χ^2 (2)**	0.768	
			LL	-55.222	**JBT χ^2 (Prob.)**	0.681	
QTY	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.119	0.169	**R^2**	0.434	**LMT F(2,32)**	0.342	-Residuals are not normally distributed. -Incorrect sign for RP.
Δ(LnRP)	0.081	0.893	**Adj. R^2**	0.335	**LMT F(Prob.)**	0.713	
Δ(LnRGDP)	5.087	0.509	**F(6,34)**	4.352*	**BPGT F(6,34)**	0.834	
Q2	-0.104	-0.091	**F(Prob.)**	0.002	**BPGT F(Prob.)**	0.552	
Q3	-0.162	-0.172	**DW**	1.833	**RESET F(1,33)**	1.723	
Q4	0.257	0.189	**AIC**	2.253	**RESET F(Prob.)**	0.198	
Residuals (-1)	-0.514	-4.041*	**SC**	2.546	**JBT χ^2 (2)**	8.980**	
			LL	-39.187	**JBT χ^2 (Prob.)**	0.011	
AUSTRALIA - SINGAPORE							
AUD	**DEPENDENT VARIABLE: LnM**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-3.510	-4.052*	**R^2**	0.356	**LMT F(2,37)**	2.363	-Model is mis-specified.
LnRP	-0.235	-2.048**	**Adj. R^2**	0.257	**LMT F(Prob.)**	0.108	
Δ(LnRGDP)	6.514	0.583	**F(6,39)**	3.594*	**BPGT F(5,40)**	1.519	
Q2	0.756	0.586	**F(Prob.)**	0.006	**BPGT F(Prob.)**	0.206	
Q3	0.369	0.346	**DW**	2.260	**RESET F(1,38)**	6.266**	
Q4	0.627	0.403	**AIC**	3.019	**RESET F(Prob.)**	0.017	
AR(1)	0.417	3.034*	**SC**	3.297	**JBT χ^2 (2)**	1.705	
			LL	-62.429	**JBT χ^2 (Prob.)**	0.426	
QTY	**DEPENDENT VARIABLE: LnM**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	1.253	1.590***	**R^2**	0.238	**LMT F(2,37)**	1.812	
LnRP	-0.234	-2.424**	**Adj. R^2**	0.120	**LMT F(Prob.)**	0.178	
Δ(LnRGDP)	2.853	0.271	**F(6,39)**	2.0***	**BPGT F(5,40)**	0.365	
Q2	0.335	0.275	**F(Prob.)**	0.085	**BPGT F(Prob.)**	0.869	
Q3	0.108	0.108	**DW**	2.158	**RESET F(1,38)**	1.689	
Q4	0.362	0.248	**AIC**	2.757	**RESET F(Prob.)**	0.202	
AR(1)	0.288	1.965***	**SC**	3.035	**JBT χ^2 (2)**	2.527	
			LL	-56.408	**JBT χ^2 (Prob.)**	0.283	

Motor Cars and Other Motor Vehicles Principally Designed for the Transport of Persons (Other Than Public Transport Type), Including Station Wagons and Racing Cars

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LL – Log Likelihood

LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation

BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity

RESET – Ramsey RESET Test for Model Specification

JBT – Jarques-Bera Test for normality of the residuals

**** significant at 1%, ** significance at 5%, ***significance at 10%***

Table: 6.22 Continued (Part C)

IMPORT DEMAND MODELS: CATEGORY 8703*							
AUSTRALIA - THAILAND							
AUD	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	2.507	2.134**	**R^2**	0.283	**LMT F(2,32)**	1.018	-Residuals are not normally distributed.
Δ(LnRP)	-0.150	-0.887	**Adj. R^2**	0.157	**LMT F(Prob.)**	0.373	
Δ(LnRGDP)	41.614	2.485**	**F(6,34)**	2.2***	**BPGT F(6,34)**	0.594	
Q2	-4.332	-2.256**	**F(Prob.)**	0.063	**BPGT F(Prob.)**	0.733	
Q3	-2.894	-1.838***	**DW**	1.634	**RESET F(1,33)**	0.373	
Q4	-4.615	-2.030***	**AIC**	3.266	**RESET F(Prob.)**	0.546	
Residuals (-1)	-0.191	-1.534	**SC**	3.558	**JBT χ^2 (2)**	73.283*	
			LL	-59.943	**JBT χ^2 (Prob.)**	0.000	
QTY	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	3.215	2.677**	**R^2**	0.274	**LMT F(2,33)**	1.050	-Residuals are not normally distributed.
Δ(LnRP)	-0.261	-1.638	**Adj. R^2**	0.170	**LMT F(Prob.)**	0.361	
Δ(LnRGDP)	48.067	2.811*	**F(5,35)**	2.64**	**BPGT F(5,35)**	0.985	
Q2	-5.327	-2.710**	**F(Prob.)**	0.040	**BPGT F(Prob.)**	0.441	
Q3	-4.207	-2.621**	**DW**	2.214	**RESET F(1,34)**	0.019	
Q4	-5.555	-2.394**	**AIC**	3.304	**RESET F(Prob.)**	0.891	
			SC	3.555	**JBT χ^2 (2)**	42.640*	
			LL	-61.731	**JBT χ^2 (Prob.)**	0.000	
AUSTRALIA - UNITED KINGDOM							
AUD	**DEPENDENT VARIABLE: LnM**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	3.351	10.321*	**R^2**	0.628	**LMT F(2,57)**	6.286*	-Residuals are serially correlated. -Residuals are Heteroscedastic. -Model is mis-specified. -Residuals are not normally distributed.
LnRP	-0.064	-1.686***	**Adj. R^2**	0.590	**LMT F(Prob.)**	0.003	
Δ(LnRGDP)	2.629	0.746	**F(6,59)**	16.57*	**BPGT F(5,60)**	2.468**	
Q2	0.630	1.552***	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.042	
Q3	0.472	1.426	**DW**	2.573	**RESET F(1,58)**	9.274*	
Q4	0.552	1.107	**AIC**	1.080	**RESET F(Prob.)**	0.004	
AR(1)	0.737	9.232*	**SC**	1.312	**JBT χ^2 (2)**	16.358*	
			LL	-28.641	**JBT χ^2 (Prob.)**	0.000	
QTY	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.527	-2.003***	**R^2**	0.325	**LMT F(2,57)**	1.705	-Model is mis-specified.
LnRP	-0.039	-1.395***	**Adj. R^2**	0.257	**LMT F(Prob.)**	0.191	
Δ(LnRGDP)	4.468	1.239***	**F(6,59)**	4.738*	**BPGT F(5,60)**	1.691	
Q2	0.937	2.221**	**F(Prob.)**	0.001	**BPGT F(Prob.)**	0.151	
Q3	0.551	1.627***	**DW**	1.932	**RESET F(1,58)**	3.15***	
Q4	0.811	1.590***	**AIC**	0.464	**RESET F(Prob.)**	0.081	
AR(1)	-0.290	-2.634**	**SC**	0.696	**JBT χ^2 (2)**	3.366	
			LL	-8.305	**JBT χ^2 (Prob.)**	0.186	

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LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

Table: 6.22 Continued (Part D)

IMPORT DEMAND MODELS: CATEGORY 8703*							
AUSTRALIA - UNITED STATES							
AUD	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.273	-0.806	**R^2**	0.199	**LMT F(2,58)**	0.056	-Model is mis-specified. -Residuals are not normally distributed. -Incorrect sign for RP; RGDP.
Δ(LnRP)	0.170	2.011**	**Adj. R^2**	0.119	**LMT F(Prob.)**	0.945	
Δ(LnRGDP)	-1.700	-0.371	**F(6,60)**	2.48**	**BPGT F(5,60)**	0.638	
Q2	0.527	0.990	**F(Prob.)**	0.033	**BPGT F(Prob.)**	0.700	
Q3	0.396	0.913	**DW**	2.010	**RESET F(1,59)**	2.88***	
Q4	0.434	0.671	**AIC**	1.032	**RESET F(Prob.)**	0.095	
Residuals (-1)	-0.108	-1.716***	**SC**	1.262	**JBT χ^2 (2)**	36.553*	
			LL	-27.565	**JBT χ^2 (Prob.)**	0.000	
QTY	**DEPENDENT VARIABLE: Δ(LnM)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.051	-0.129	**R^2**	0.499	**LMT F(2,58)**	0.799	-Residuals are not normally distributed.
Δ(LnRP)	-0.620	-6.270*	**Adj. R^2**	0.449	**LMT F(Prob.)**	0.455	
Δ(LnRGDP)	0.948	0.177	**F(6,60)**	9.946*	**BPGT F(6,60)**	0.168	
Q2	0.183	0.295	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.984	
Q3	0.151	0.300	**DW**	2.225	**RESET F(1,59)**	0.727	
Q4	0.013	0.017	**AIC**	1.346	**RESET F(Prob.)**	0.397	
Residuals (-1)	-0.276	-3.140*	**SC**	1.576	**JBT χ^2 (2)**	11.947*	
			LL	-38.083	**JBT χ^2 (Prob.)**	0.003	

Motor Cars and Other Motor Vehicles Principally Designed for the Transport of Persons (Other Than Public Transport Type), Including Station Wagons and Racing Cars
DW – Durbin-Watson Statistics
AIS – Akaike Info Criterion
SC – Schwartz Criterion
LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at 1%, ** significance at 5%, ***significance at 10%***

According to Table 6.22, out of fourteen M demand models in Category 8703, 12 models are significant, while remaining 2 models (Germany based on both AUD and QTY values) are not significant. Furthermore, for most of the models, the variables are not significant, while the variable RP is significant in a half of the models estimated.

The variable RP is significant in 7 out of the 14 models and RGDP is significant in 3 out of the 14 models. However, an incorrect (positive) sign for RP (3 out of 14 models; 2 based on AUD and 1 based on QTY) and an incorrect (negative) sign for RGDP (3 out of 14 models; 1 based on AUD and 2 based on QTY) is evident. The correct coefficient signs for both the RP and RGDP are found in 9 out of 14 models, while for these 9 models, the coefficients range for the RP and RGDP is between (-0.003 and -0.620) and (0.152 and 48.067) respectively. Furthermore, the coefficients estimated for Q2, Q3 and Q4 in 5 out of 14; 4 out of 14 and 5 out of the 14 models respectively are negative. In overall, these results show that the M demand in the June, September and December quarters are higher than in the March quarter in this category. Finally, the Adj. R^2 in overall for all of the 14 models in this category ranges between 0.7 and 59 percent.

In overall, out of the 14 estimated models in this category, 2 models (the M demand from Malaysia based on AUD; Singapore based on QTY) have the correct signs and have satisfactory passed all diagnostic tests. The M demand model from Malaysia (based on AUD values) shows that a 1 percent growth rate in the RP will decrease the M growth rate by 0.545 percent, while a 1 percent RGDP growth rate will increase the M growth rate by 0.152 percent in average. The M demand model from Singapore (based on QTY values) shows that a 1 percent increase in the RP will decrease the M demand by 0.234 percent, while a 1 percent RGDP growth rate will increase the M demand by 2.853 percent in average. For these 2 models, the variable RP is significant and the variables RGDP, Q2, Q3 and Q4 are not significant. The coefficients for the quarterly dummy variable Q2, Q3 and Q4 for Malaysia are all negative, while for Singapore, they are all positive. These quarterly dummy variables shows that the M demand from Malaysia for the June, September and December quarters are lower than in the March quarter by 59.8, 88.1 and 68.2 percent in average respectively. On the other hand quarterly dummy variables for Singapore shows that the M demand for the June, September and December quarters are higher than in the March quarter by 33.5, 10.8 and 36.2 percent in average respectively. Finally, the Adj. R^2 for Malaysia based on AUD values is 29.5 percent and for Singapore based on QTY values is 12 percent.

6.5.2.10 SUMMARY - IMPORT DEMAND MODELS; HS-2, HS-4

In this section, one hundred and sixteen M demand models are estimated and the results are interpreted. These 116 models consist of 66 models (33 based on AUD and 33 based on QTY) based on HS-2 and 50 models (25 based on AUD and 25 based on QTY) based on HS-4 level of aggregation. Accordingly, the initial summaries and the specific findings are made individually for the HS-2 and HS-4 level of aggregation, followed by the overall combined summaries for both levels of aggregation.

Summary: HS-2

Based on HS-2 level of aggregation, 60 out of 66 models, are significant and 6 models (China for the Category 30 - based on AUD, Germany for the Category 84 - based on AUD, Germany Thailand and The United States of America for the Category 87 - based on AUD and The United Kingdom for the Category 87 - based on QTY) are not significant. However, an incorrect (positive) sign for RP (12 out of 66 models; 9 based on AUD and 3 based on QTY) and for the RGDP (negative) (12 out of 66 models; 7 based on AUD and 5 based on QTY) is evident. The correct coefficient signs for both the RP and RGDP are found in 47 out of the 66 models (21 based on AUD and 26 based on QTY), while for these 47 models, the coefficients range for the RP and RGDP is between (-0.001 and -1.012) and (0.028 and 44.319) respectively. Furthermore, the coefficients estimated for Q2, Q3 and Q4 in 34 out of 66; 28 out of 66 and 40 out of the 66 models respectively, are negative. In overall, these results show that the M demand in the June and December quarters is lower compared to the March quarter, and the M demand in the September quarter is higher than in the March quarter. Finally, the Adj. R^2 in overall for all of the 66 models ranges between 0.1 and 98.9 percent.

In overall, out of the 66 estimated models based on HS-2, 15 models (the M demand from the RoW, France and The United States of America for the Category 30 - based on AUD values; China and The United States for the Category 30 - based on QTY values; the RoW and The United States of America for the Category 84 - based on AUD values; Germany and The United States of America for the Category 84 - based on QTY values; the RoW and Thailand for the Category 85 - based on AUD values; the RoW, Singapore and Thailand for the Category 85 - based on QTY values; France for the Category 87 - based on AUD values) have the correct signs and have satisfactory passed all diagnostic tests. Furthermore, for these 15 models, the coefficients range for the RP and the RGDP is between (-0.001 and -0.276) and (0.028 and 44.319) respectively. The variables RP is significant in 8 out of the 15 models and the variable RGDP is significant in 7 out of the 15 models, while the quarterly dummy variables Q2, Q3 and Q4 are significant in 4 out of 15, 6 out of 15 and 3 out of the 15 models respectively. Furthermore, all quarterly dummy variables in these 15 models are mostly negative, which show that the M demand in average for the June, September and December quarters is lower compared to the March quarter. Finally, the Adj. R^2 for these 15 models ranges between 11.5 and 73.2 percent.

Summary: HS-4

Based on HS-4 level of aggregation out of the 50 models, 47 models are significant and 3 models (France for the Category 3004 - based on AUD and Germany for the Category 8703 - based on both AUD and QTY) are not significant. However, an incorrect (positive) sign for the RP (8 out of 50 models; 7 based on AUD and 1 based on QTY) and for the RGDP (negative) (8 out of the 50 models; 4 based on AUD and 4 based on QTY) is evident. The correct coefficient signs for both the RP and the RGDP are found in 36 out of the 50 models (17 based on AUD and 19 based on QTY), while for these 36 models, the coefficients range for the RP and the RGDP is between (-0.002 and -0.890) and (0.119 and 48.067) respectively. Furthermore, the coefficients estimated for Q2, Q3 and Q4 in 20 out of 50; 24 out of 50 and 26 out of the 50 models respectively, are negative. In overall, these results show the that the M demand in the December quarter is lower compared to the March quarter, and the M demand in the June and September quarters are higher than in the March quarter. Finally, the Adj. R^2 in overall for all of the 50 models ranges between 0.7 and 92.7 percent.

In overall, out of the 50 estimated models based on HS-4, 9 models (the M demand from France and Singapore for the Category 8471 - based on AUD values; France and The United Kingdom for the Category 8471 - based on QTY values; Singapore for the Category 8517 - based on AUD values; Singapore and The United Kingdom for the Category 8517 - based on QTY values; Malaysia for the Category 8703 - based on AUD values and Singapore for the Category 8703 - based on QTY values) have the correct signs and have satisfactory passed all diagnostic tests. Furthermore, for these 9 models, the coefficients range for the RP and the RGDP is between (-0.020

and -0.545) and (0.152 and 32.750) respectively. The variables RP are significant in 7 out of 9 the models and the variable RGDP is significant in 1 out of 9 models, while the quarterly dummy variables Q2, Q3 and Q4 are significant in 2 out of 9, 1 out of 9 and 1 out of the 9 models respectively. Furthermore, the quarterly dummy variables Q3 and Q4 in these 9 models are mostly negative and the dummy variable Q2 is mostly positive. This shows that the M demand in average for the September and December quarters is lower compared to the March quarter and the M demand in the June quarter is higher than in the March quarter. Finally, the Adj. R^2 for these 9 models ranges between 12 and 48.9 percent.

Overall Summary

Based on both HS-2 and HS-4 level of aggregation out of the one hundred and sixteen M demand models, 107 models are significant and 9 models are not significant. However, an incorrect (positive) sign for the RP (20 out of the 116 models; 16 based on AUD and 4 based on QTY) and for the RGDP (negative) (20 out of the 116 models; 11 based on AUD and 9 based on QTY) is evident. The correct coefficient signs for both the RP and the RGDP are found in 83 out of the 116 models (38 based on AUD and 45 based on QTY), while for these 83 models, the coefficients range for the RP and RGDP is between (-0.001 and -1.012) and (0.028 and 48.067) respectively. Furthermore, the coefficients estimated for Q2, Q3 and Q4 in 54 out of 116; 52 out of 116 and 66 out of the 116 models respectively, are negative. In overall, these results show that the M demand in the June and September quarters are higher compared to the March quarter, and the M demand in the December quarter is lower than in the March quarter.

Out of 116 estimated models based on both HS-2 and HS-4, 24 models have the correct signs and have satisfactory passed all diagnostic tests, while these 24 models; 12 are based on AUD and 12 are based on QTY values. The coefficients range for the RP and the RGDP in these 24 models is between (-0.001 and -0.545) and (0.028 and 44.319) respectively. The variables RP are significant in 15 out of the 24 models and the variable RGDP is significant in 8 out of the 24 models, while the quarterly dummy variables Q2, Q3 and Q4 are significant in 6 out of 24, 7 out of 24 and 4 out of the 24 models respectively. Furthermore, the quarterly dummy variables Q2, Q3 and Q4 in these 24 models are mostly negative, which shows that the M demand in average for the June, September and December quarters is lower compared to the March quarter. Finally, the Adj. R^2 for these 24 models ranges between 11.5 and 73.2 percent.

In overall, the one hundred and sixteen M demand models estimated in this section has revealed valuable information, however, as in the X supply models these overall results indicate several problems. The main problems are that the majority of the models did not pass some or all of the diagnostic tests and such models must be viewed with caution. Furthermore, unlike in the X supply models where the models based on AUD values have produced better results, in this section, the M demand models estimated based on both AUD and QTY values have produced similar results. Furthermore, most of the M demand models estimated show that the M demand is price inelastic and income elastic. Finally, the overall findings suggest that most of the M demand models estimated in this section requires further improvements. These improvements include and are not limited to like further corrections, adjustments and/or even considerable modification of most of the models in order to obtain more reliable models which will in turn, make it possible to get a clearer understanding of the determinants of the M demand from the selected TD countries in the selected TD categories.

6.6 EMPIRICAL FINDINGS

Now that one hundred and sixteen X supply and one hundred and sixteen M demand models based on HS-2 and HS-4 level of aggregation are estimated, this section will summarise the major empirical findings.

In overall, out of the 232 models estimated - 218 models are significant (one hundred and eleven X supply models and one hundred and seven M demand models), while the remaining 14 models (five X supply models and nine M demand models) are not significant. However, an incorrect sign for the RP is evident in 82 out of the 232 models (62 for the X supply and 20 for the M demand), while incorrect RP signs in the X supply models are mainly based on QTY values and the M demand models are mainly based on AUD values. Furthermore, an incorrect sign for the RGDP is evident in 31 out of the 232 models (11 for the X supply and 20 for the M demand), while incorrect RGDP signs are found in similar numbers based on both AUD and QTY values. The correct coefficient signs for both the RP and the RGDP are found in 134 out of the 232 models (51 models for the X supply and 83 models for the M demand), while in the X supply models - all are based on AUD values and in the M demand model - 38 based on AUD and 45 based on QTY values. In overall, the coefficients estimated for the dummy variables (Trend and Dummy for the X supply models) show inconclusive evidence that capacity utilization increases the X supply, while some evidence exists that since the GST was introduced in July 2000, it has stimulated the X supply in most of the categories. In addition, the coefficients estimated for dummy variables (Q2, Q3 and Q4 for the M demand models) suggest that the M demand in the June and September quarters are higher compared to the March quarter and the M demand in the December quarter is lower than in the March quarter in average.

Out of the 232 estimated models, 42 models (18 for the X supply and 24 for the M demand) have the correct signs and have satisfactory passed all diagnostic tests. Furthermore, all eighteen X supply models are based on AUD values, while out of the twenty-four M demand models, 12 models are based on AUD and 12 on QTY values. The coefficients estimated for the RP in these 42 models are mostly significant in both the X supply and the M demand models, while the coefficient estimated for the RGDP is mostly significant in the X supply models and mostly not significant in the M demand models. The coefficients estimated for dummies, which includes Trend, Dummy, Q2, Q3 and Q4 are mostly not significant. The dummy variables (Trend and Dummy) for these 18 X supply models show only marginal and inconclusive evidence that capacity utilization increases the X supply, however, since the GST has been introduced, the overall X supply has considerably increased in most of the categories. The dummy variables (Q2, Q3 and Q4) shows that the M demand for the June, September and December quarters are lower in average compared to the March quarter. Finally, the Adj. R^2 for the eighteen X supply models ranges between 4.8 and 55 percent and the twenty-four M demand models ranges between 11.5 and 73.2 percent.

6.7 CONCLUSION

In this chapter, the econometric methodology, theoretical developments of the X supply and M demand models and relevant empirical studies have been reviewed. A comprehensive review of the econometric methodology highlighted the importance of testing the variables for the unit root, cointegration and to carry out numerous diagnostic tests in order to choose suitable econometric models and to validate estimated models reliability. Furthermore, a review of theoretical development and the existing empirical literature for the X supply and M demand models has identified suitable variables that have been used in these models.

Based on this review, the selected independent variables for the X supply are the RP, RGDP, Trend and Dummy and for the M demand model are RP, RGDP, Q2, Q3 and Q4. The variable RP is calculated as AUV for the X over AUV for the M for the X supply models and as AUV for the M over AUV for the X for the M demand models. This approach of calculating the RP variable is to the best of my knowledge, not been used in any previous studies. The most likely reason that this approach has not previously been adopted previously is the lack of X and M trade data that contains both the X and M AUD values and their corresponding QTY. Since the trade data from the TDI used in this study contains such information, it has provided a unique opportunity to adopt this approach, which at the same time, is one of the significant contributions of this study. Furthermore, the RGDP data is obtained from the ABS, while the Trend is a proxy dummy variable for the capacity utilization and dummy variable Dummy is denoted 0 before July 2000 (before the introduction of the GST in Australia) and 1 after July 2000. The dummy variable used in the M demand model (Q2, Q3 and Q4) is a quarterly dummy variable for the June, September and December quarters respectively.

The total number of models estimated in this chapter is 232, which includes one hundred and sixteen X supply and one hundred and sixteen M demand models. Both the X supply and M demand models are estimated based on HS-2 and HS-4 level of aggregation. The one hundred and sixteen X supply and M demand models estimated, consists of 66 models based on HS-2 level of aggregation and 50 models based on HS-4 level of aggregation. Furthermore, these models are estimated side-by-side for each category based on AUD and QTY values. As a result, the 33 models are estimated based on AUD and 33 based on QTY values based on HS-2 level of aggregation and 25 models are estimated based on AUD and 25 based on QTY values based on HS-4 level of aggregation for both the X supply and M demand models. The adopted approach of estimating the X supply and M demand models side-by-side based on AUD and QTY values for each category is another significant contribution of this study, as it allows to compare the disparities (comparative analysis) and to evaluate the corresponding results from a different perspectives.

Due to data unavailability, neither the X supply nor the M demand models for the selected TD service categories based on ANZSIC-1 and ANZSIC-2 level of aggregation are not estimated. Furthermore, due to data unavailability, the X supply and M demand models are also not estimated for some of the TD goods categories[116].

In overall, in 163 out of the 232 models (ninety-four X supply and sixty-nine M demand), the unit root was present only in some variables, while in the remaining 69 models (twenty-six X supply and forty-three M demand), the unit root was present in all variables. For the 163 models where only some variables contained the unit root, the first difference of such variable was taken, which proves to be sufficient in all of the cases for all such variables to become stationary. Once non-stationary variables become stationary, the OLS procedure was applied followed by the standard diagnostic tests. For the remaining 69 models, where all variables were non-stationary, the JMLP test for cointegration was carried out. The JMLP revealed that 25 out of the 69 models were cointegrated and one cointegrating equation was identified for each of these models, while the remaining 44 models were not cointegrated. For the 25 cointegrated models (with one cointegrating equation each), the ECM was applied, followed by the standard diagnostic tests. For remaining the 44 models, the first difference of all variable was taken, which proves to be sufficient in all of the cases for all such variables to become stationary. Once all non-stationary variables become stationary, the OLS was applied, followed by the standard diagnostic tests.

Furthermore, only one correction procedure was carried out, which is for the serial correlation. This procedure is known as an iterative Cochrane-Orcutt procedure, and it was applied in 140 out of the 232 models. The Cochrane-Orcutt procedure proved to very successful in all 140 models (the models in which the serial correlation was detected), which consisted of seventy-nine X supply models and sixty-one M demand models.

In overall, 218 out of 232 models are significant and 42 out of 232 models (eighteen X supply and twenty-four M demand) have the correct signs and have satisfactory passed all diagnostic tests. Out of these 42 models, all eighteen X supply models are based on AUD values and for the twenty-four M demand models, 12 models are

[116] For a complete list of the models which are not estimated due to data unavailability (for both the goods and the service categories), refer to Tables 6.1-6.2 for the X supply models and Tables 6.12-6.13 for the M demand models.

based on AUD and 12 on QTY values. As a result, it can be concluded that the X supply models based on AUD values performed better, while the M demand models performed similarly based on both AUD and QTY values. For these 42 models, the estimated coefficient for the RP in both the X supply and M demand models is mostly significant, and the RGDP is mostly significant in the X supply models and mostly not significant in the M demand models. Furthermore, in both the X supply and the M demand models, the coefficients for the RP indicate that the X supply and M demand are price inelastic, while the RGDP coefficients indicates in overall that both the X supply and the M demand are income elastic. In addition, the dummy variables in both the X supply models (Trend and Dummy) and in the M demand models (Q2, Q3 and Q4) are mostly not significant based on both AUD and QTY values. In overall, the dummy variables in the X supply models indicate that only marginal and inconclusive evidence exists that capacity utilization increases the X supply, while since the introduction of the GST in July 2000, the overall X supply has considerably increased in most of the categories. Furthermore, the dummy variables in the M demand models indicate that the M demand for the June, September and December quarters is lower compared to the March quarter in average. Finally, by evaluating the model fits, the Adj. R^2 for these 18 X supply models ranges between 4.8 and 55 percent and for these 24 M demand models ranges between 11.5 and 73.2 percent.

In summary, the overall findings suggest that most of the X supply and M demand models estimated in this chapter require further improvements. However, given the constraints associated with the scope of this study, this study has given a reasonable understanding of the variables which are influencing the X supply and M demand in the selected TD categories between Australia and the selected TD countries.

Now that the X supply and M demand models have been estimated, another important aspect is the extent of a simultaneous X and M in these categories, known as Intra-Industry Trade (IIT). This is important since the TD categories analysed are all in the manufactured goods categories, which are operating in a highly competitive environment where product differentiation and economies of scale play an important function in the X and M flows. The next chapter, Chapter 7 will attempt to address these questions where the extent of the IIT will be calculated for the selected TD categories between Australia and the selected TD countries.

CHAPTER 7

7. EXTENT OF INTRA-INDUSTRY TRADE

7.1 INTRODUCTION

Chapter 5 employed Comparative Advantage (CA) analysis to examine the trade flow of the selected Trade Deficit (TD) categories and countries. The CA analyses were carried out using Balassa (1965) and Vollrath (1991) indices. The CA analyses provided valuable information of the revealed CA or disadvantage in the selected TD categories between Australia and the selected TD countries according to the „classical trade theory'. The „classical trade theory' explains the trade flows of homogeneous products between countries under perfectly competitive market condition, while the production is assumed to be of constant return to scale. This is known as Inter-Industry Trade, when countries trade with each other by exporting and importing the products from heterogeneous industries.

According to the Year Book 2001 (ABS, 2008b), the historical composition of the Australian Export (X) and Import (M) has been by exporting predominantly natural-resource-based products while importing manufactured products. However, since the 1960s, the trade patterns in a simultaneous X and M of the products between countries that belongs to the same industry has emerged. This phenomenon is known as Intra-Industry Trade (IIT), which explains a simultaneous X and M of the product within the same industry. Grubel & Lloyd (1971; 1975) have been one of the early researchers to empirically investigate the IIT in the Australian manufacturing sector. The IIT is also known as a „new trade theory', which has been extensively developed since the late 1970s by numerous researchers, including Krugman (1979b), Lancaster (1980) Helpman (1981) and Helpman & Krugman (1985).

So far, the selected and analyzed TD categories in this research are associated with a simultaneous X and M within the same industry. This has been established in Chapter 4, were a simultaneous X and M played a significant role in the selection of the TD categories and the corresponding industries. Consequently, the aim of this chapter is to establish the extent of the IIT and corresponding trends in the selected TD categories between Australia and the selected TD countries.

The structure of this chapter is divided into 5 sections – Section 7.2 data and data sources, Section 7.3 theoretical framework, followed by Section 7.4 empirical testing. The last 2 sections are Section 7.5 summary of empirical findings and finally, Section 7.6 presents the concluding remarks. Section 7.2 defines the data and the data sources, while Section 7.3 comments on the underlying IIT theoretical framework and the measurements of the extent of IIT. The major empirical testings and analysis are presented in Section 7.4, and this section contains the analysis of the extent of the IIT based on HS-2[117] and ANZSIC-1[118] level of aggregation presented in Sections 7.4.1, while Section 7.4.2 contains the analysis of the extent of the IIT based on HS-4[119] and the ANZSIC-2[120] level of aggregation. Section 7.4.1.6 and Section 7.4.2.7 summarizes the findings for (HS-2, ANZSIC-1) and (HS-4, ANZSIC-2) respectively, while the overall summary of the empirical findings are presented in Section 7.5.

7.2 DATA AND DATA SOURCES

The data used in this chapter are obtained from the Trade Data International (TDI) and the Australian Bureau of Statistics (ABS). The TDI data are used for the selected TD goods categories, while the data from the ABS are used for the selected TD service categories. All data used in this chapter are in the quarterly time-series intervals based on HS-2 and HS-4 level of aggregation for goods categories, whilst the service categories are based on ANZSIC-1 and ANZSIC-2 level of aggregation. Furthermore, all data used in this chapter are the same data that are used in Chapter 4, and details of the conversion from nominal to real values, conversion from monthly to quarterly time-series data and all other relevant information of the data layout are explained in details in Chapter 4.

7.3 THEORETICAL FRAMEWORK

The explanation of why countries trade with each other and the benefits of trade between countries is covered extensively in the literature. As mentioned in Chapter 4, the earliest theories date back to the 18th century when David Ricardo (Ricardo, 1817) developed the doctrine of CA theory, followed by Heckscher-Ohlin Theory (HO-theory) (Heckscher, 1919; Ohlin, 1933). Both of these CA and HO-theory has made a lasting impact on our understanding of why countries engage in trade, what are the

[117] Harmonized Commodity Description and Coding System - Second Level of aggregation (HS-2).
[118] Australian and New Zealand Standard Industrial Classification - Main Divisional Level of the aggregation (ANZSIC-1).
[119] Harmonized Commodity Description and Coding System - Forth Level of aggregation (HS-4).
[120] Australian and New Zealand Standard Industrial Classification - First Sub-divisional level of the aggregation (ANZSIC-2).

benefits of trade and what countries are likely to X and M from and to each other. According to CA and HO-theory, trading countries are likely to specialize in production and X the products in which they hold a CA, and M the products in which they hold a Comparative Disadvantage (CD), while the exported and imported products are from different industries.

Up-until the late 1960's and early 1970's, both the CA and HO-theory has explained trade between countries relatively well. However, since the 1960's, a new pattern of trade between countries have emerged. Countries have increasingly exported and imported the products within the same industry and the countries' factor endowments alone has failed to explain the reasons for this type of trade flows between countries. Lancaster (1966; 1980) first attempted to provide an explanation for this phenomenon using the consumer theory, by stating that all products are differentiated and consumers demand the products according to their different characteristics. Lancaster's (1980) approach suggests that consumers favour the product's characteristics, while the alternative approach by Chamberlinian suggests that consumers are willing to consume as many varieties as possible of any specific product (Krugman, 1981). The causes for a simultaneous X and M of the products within the same industry was first explained by Lancaster (1966), while Balassa (1966) developed one of the first measures for IIT, which measures the countries' IIT specialization status. Grubel & Lloyd (1971; 1975) made additional contributions to the initial model introduced by Balassa (1966), by correcting the aggregate imbalance that was found in Balassa's measurement formula.

The IIT theory that is associated with a simultaneous X and M of the products within the same industry is based on product differentiation, imperfectly competitive markets and the economies of scale (Krugman, 1979b & 1980; Helpman, 1981; Werner & Trefler, 2002). According to Caves (1981), most of the trade between developed countries is in the differentiated products. While Grubel & Lloyd (1975) explained the IIT as a simultaneous X and M of the differentiated products which belongs to the same industry; Grimwade (2000) argues that the IIT can also take place in homogenous products, due to factors such as geographical distance and seasonality. In addition, Grimwade (2000) pointed-out that the product differentiation can be classified according to horizontal and vertical differentiation, where horizontal differentiation refers to differentiation according to the variety of the products with similar quality, while vertical differentiation refers to a differentiation according to the variety of products with dissimilar qualities. A noteworthy empirical work in respect to Horizontal IIT (HIIT) and Vertical IIT (VIIT) can be found in Greenway *et al*. (1994; 1995), Nielsen & Lüthje (2002), Kandogan (2003) and Sharma (2004). According to Nielsen & Lüthje (2002), horizontally differentiated products have a positive demand when they are offered to buyers at the same price.

The first model in the literature which attempted to explain the IIT according to horizontal and vertical differentiation was developed by Lancaster (1966; 1979; 1980). Lancaster (1980) linked product differentiation and increasing return to scale to volumes of the IIT and also suggested that IIT is likely to increase consumer welfare. One possible case of such increases in consumer welfare is an increase in product variety to buyers (Krugman, 1981). According to Broda & Weinstein (2003), estimations and welfare gains from product variety associated with IIT for the United States of America accounts for a 3 percent of their GDP.

Further work on Lancaster's (1980) model was carried out by Helpman (1981) and Helpman & Krugman (1985). Helpman (1981) found a relationship between the differences in factor endowments and volumes of IIT, which shows an inverse relationship in the intensity of factors between countries and the extent of the IIT. The main findings by Helpman (1981) stated that as the differences between relative factors endowments between countries increases, the IIT share is likely to decline, while at the same time the Inter-industry share is likely to rise.

Krugman (1981) suggested that due to economies of scale, the countries are likely to specialize in the production of a limited number of products, while specific specialization in the production of the products, is likely to depend on country factor endowments (Falvey, 1981). The model developed by Falvey (1981) revealed that a country with a high Capital (K) to Labour (L) ratio is likely to produce higher quality goods, while countries with a low K to L ration are likely to specialize in low quality products. Falvey's (1981) findings were supported by Bergstrand (1990), with the suggestion that K intensive industries are likely to produce more differentiated products, while countries with higher K/L ratio are likely to experience higher Intra-industry specialization.

One of the major downside of Falvey's (1981) model is the inclusion of only the market supply side, while the market demand side is not considered. This has been addressed by Falvey & Kierzkowski (1987) by incorporating market demand side which included consumer preferences in respect to their income levels. This model has been further developed by Helpman (1987) and Stockey (1991), which suggested that the volumes of IIT according to horizontal differentiation is linked to human K and technological progress overtime. Additional models that explain the IIT based on horizontal differentiation from the point of monopolistic competition, was introduced by Dixit & Stiglitz (1977); and further work on this model was carried-out by Krugman (1979b; 1980; 1981) which included emphasis on the diversity of consumer preferences and transportation cost.

The first model which explained the IIT according to vertical differentiation was developed by Linder (1961). This model placed emphasis on the demand side factors and suggested that high income countries are likely to demand high quality products, while low income countries are likely to demand low quality products. Whereas some studies viewed IIT based on horizontal or vertical product differentiation, some studies specifically separated the product categories according to their differentiation. Empirical work which separated horizontal and vertical differentiation as a basis of IIT was proposed by Abd-el-Rahman (1991) and followed by numerous studies such as Greenaway *et al*. (1994; 1995; 1999), Nielsen & Lüthje (2002), Sharma (2004) and Černoša (2007). These studies first separated the IIT based on horizontal and vertical differentiation and then calculated their contribution to the total IIT.

7.3.1 INTRA-INDUSTRY TRADE MEASUREMENTS

Over time, as the IIT between countries gained more significance, various measurement of the extent of the IIT has emerged. One of the first attempts at measuring the IIT for examining the changing international trade patterns was introduced by Verdoorn (1960), which is known as Verdoorn's Index (VEI) and is presented in Equation 7.1:

$$VEI_{ij}^{\ t} = \left(X_{ij}^{\ t} / M_{ij}^{\ t}\right) \tag{7.1}$$

where: 'X' is Export, 'M' is Import, 'i' is the industry for the category i, 'j' is a country j and 't' is a time period. The possible VEI value range is between 0 and positive infinity, where 1 indicates that all trade is IIT and 0 indicates that all trade is Inter-industry trade.

According to Grubel & Lloyd (1975), due to its inherent structure, the VEI is unable to measure the extent of the IIT specialization. In order to overcome this downside, Balassa (1966) has proposed the Trade Specialization Index (TSI) in Equation 7.2:

$$TSI_{ij}^{\ t} = \left(\left|X_{ij}^{\ t} - M_{ij}^{\ t}\right| / \left(X_{ij}^{\ t} + M_{ij}^{\ t}\right)\right) \times 100 \tag{7.2}$$

The possible TSI value range is between 0 and 100, while the value 100 indicates that all trade is IIT.

Greenway & Milner (1986) have criticized the Balassa index in Equation 7.2 due to its weighting characteristics, as this index is unlikely to correct the aggregate trade imbalances. In response to this concern, which was pointed-out by Greenway & Milner (1986), Balassa (1966) adjusted this index to measure the unweighted ratios (Equation 7.3), which was subsequently applied by Balassa (1967) in the study measuring the extent of IIT between the European countries.

$$BAI_{ij}^{\ t} = \left((1/n)\sum_{i=1}^{n}\left|X_{ij}^{\ t} - M_{ij}^{\ t}\right| / \left(X_{ij}^{\ t} + M_{ij}^{\ t}\right)\right) \times 100 \tag{7.3}$$

where: 'n' is a sample size of the pair-wise X and M observations.

The major criticism of the Balassa Index (BAI) in Equation 7.3 is twofold. Firstly, its failure to adjust the aggregate trade imbalance; and secondly, its weakness to recognize individual industries' shares in the total trade (Grubel & Lloyd, 1971; 1975). To overcome these weaknesses, Grubel & Lloyd (1975) made adjustments to the Balassa index in Equation 7.3 and the Grubel & Lloyd Index (GLI) is presented as GLI index.

$$GLI_{ij}^{\ t} = \left(1 - \left(\left|X_{ij}^{\ t} - M_{ij}^{\ t}\right| / \left|X_{ij}^{\ t} + M_{ij}^{\ t}\right|\right)\right) \times 100 \tag{7.4}$$

The possible GLI value range is between 0 and 100, while the value 100 indicates that all trade is IIT and 0 indicates that all trade is in Inter-industry trade.

One of the weaknesses in the GLI in Equation 7.4 is that when trade between countries is unbalanced, it leads the extent of the IIT to be downward biased. In order to correct this problem, Grubel & Lloyd (1975) proposed the Adjusted Grubel & Lloyd Index (Adj-GLI), where the IIT is calculated as a proportion of the total trade after removing the trade imbalance, and this Adj-GLI formula is presented in Equation 7.5:

$$Adj\text{-}GLI_{ij}^{t} = \left[\left(\left(\sum_{i=1}^{n} X_{ij}^{t} + M_{ij}^{t}\right) - \left(\sum_{i=1}^{n}\left|X_{ij}^{t} - M_{ij}^{t}\right|\right)\right) \Big/ \left(\left(\sum_{i=1}^{n} X_{ij}^{t} + M_{ij}^{t}\right) - \left|\sum_{i=1}^{n} X_{ij}^{t} - \sum_{i=1}^{n} M_{ij}\right|\right)\right] \times 100 \tag{7.5}$$

Although the Adj-GLI provided some correction for the trade imbalances, Aquino (1978) and Greenway & Milner (1986) have identified other downsides of the Adj-GLI. Aquino (1978) suggested that the Adj-GLI rectifies trade imbalances for industries disproportionably and consequently, it is not a reliable measure of the extent of the IIT on neither a highly aggregated nor a disaggregated level, as it is likely to produce an upward or downward bias of the extent of IIT. While Aquino (1978) suggested that the Adj-GLI is inclined to produce both an upward and downward bias, Greenway & Milner (1986) argued that this index is likely to produce an upward bias only, hence to overestimate the extent of the IIT.

Aquino (1986) proposed methods to overcome the inadequacy of the Adj-GLI by correcting the trade imbalance effect proportionally for all industries. In this adjustment process, the X and M values are first estimated and then used in the calculation of the IIT. The formulas to estimate the X and M are presented in Equation 7.6, 7.7 respectively, and the Aquino Index (AQI) formula is presented in Equation 7.8:

$$est.X_{ij}^{t} = \left(X_{ij}^{t}\right) \times \left(\left(\tfrac{1}{2}\sum_{i=1}^{n} X_{ij}^{t} + M_{ij}^{t}\right) \Big/ \sum_{i=1}^{n} X_{ij}^{t}\right) \tag{7.6}$$

$$estM_{ij}^{t} = \left(M_{ij}^{t}\right) \times \left(\left(\tfrac{1}{2}\sum_{i=1}^{n} X_{ij}^{t} + M_{ij}^{t}\right) \Big/ \sum_{i=1}^{n} M_{ij}^{t}\right) \tag{7.7}$$

$$AQI_{ij}^{t} = \left[\left(\sum_{i=1}^{n}\left(X_{ij}^{t} + M_{ij}^{t}\right) - \sum_{i=1}^{n}\left|est.X_{ij}^{t} - est.M_{ij}^{t}\right|\right) \Big/ \left(\sum_{i=1}^{n}\left(X_{ij}^{t} + M_{ij}^{t}\right)\right)\right] \times 100 \tag{7.8}$$

where: '$est.X$' is estimated X and '$est.M$' is estimated M

AQI was used in numerous empirical studies, which includes Aquino (1978), Loertscher & Wolter (1980), Bergstrand (1983) and Balassa & Bauwens (1987). However, Bergstrand (1983) argues that the AQI was only adjusted for a multilateral trade imbalance, which is insufficient. He suggest that the trade imbalances should reflect both bilateral and multilateral trade imbalances, while giving more emphasis on bilateral rather than multilateral trade flows. Following his arguments, he proposed an alternative measure to account for the bilateral trade flows, however, the major downside of this proposed measurement is the lack of adequate justifications. However, both the AQI and Bergstrand Index (BEI) proposed by Bergstrand (1983) that was corrected for the trade imbalances was questioned by several other researchers.

One of the major criticisms of the AQI is that adjusting the trade imbalances is similar to imposing an equilibrium condition on trade; however, such an approach has not been theoretically justified (Greenway & Milner, 1983; Vona, 1991; Clark, 1993, Somma, 1994).

Greenway & Milner (1983) maintained that bilateral and multilateral trade imbalances are relatively consistent, and by adjusting the trade imbalances by calculating the IIT, there is a risk that the important factors which explain trade specialization and the IIT, are likely to be removed by both indices procedures. Further criticism of Aquino's (1987) and Bergstrand's (1983) approach for the adjustment of the trade imbalances was put forward by Vona (1991), who insisted that adjustments for trade imbalances can not be justified on neither theoretical or on empirical grounds. Vona (1991) explained that the unadjusted GLI in Equation 7.4 was a superior measure compared to the adjusted indices and he recommended the use of the unadjusted GLI for the measurement of the IIT.

The proposition made by Vona (1991) has been widely accepted in numerous studies for the measurement of the IIT. The studies which have utilized an unadjusted GLI for the measurement of the IIT includes; Tharakan (1986), Hamilton & Kniest (1991), Vona (1991), Ballance *et al*. (1992), Clark (1993), Somma (1994), Evenett & Keller (2001), Brülhart & Elliott (2002), Havrila & Gunawardana (2003), Havrila (2004) and Kang & Lee (2007).

Despite the fact that an unadjusted GLI is a widely accepted measure of the extent of IIT, many researchers continue to make further criticisms of an unadjusted GLI. For example, Caves (1981) argues that due to the structure of the formula, it fails to measure the true increases in the IIT, since an absolute raise of the IIT did not reflect a rise in the extent of the IIT. Furthermore, Hamilton & Kniest (1991) pointed-out that the comparisons of the IIT overtime using the unadjusted GLI do not reflect the structural changes in the IIT. As a result, they proposed a Marginal Intra-Industry Trade (MIIT) measure, presented in Equation 7.9, which measures the structural change in trading patterns:

$$MIIT_{ij}^{t} = \begin{cases} \left(X_{ij}^{\ t} - X_{ij}^{\ t-n}\right) / \left(M_{ij}^{\ t} - M_{ij}^{\ t-n}\right) \xrightarrow{For} \left(M_{ij}^{\ t} - M_{ij}^{\ t-n}\right) > \left(X_{ij}^{\ t} - X_{ij}^{\ t-n}\right) > 0 \\ \left(M_{ij}^{\ t} - M_{ij}^{\ t-n}\right) / \left(X_{ij}^{\ t} - X_{ij}^{\ t-n}\right) \xrightarrow{For} \left(X_{ij}^{\ t} - X_{ij}^{\ t-n}\right) > \left(M_{ij}^{\ t} - M_{ij}^{\ t-n}\right) > 0 \\ 1 \xrightarrow{For} \left(X_{ij}^{\ t} - X_{ij}^{\ t-n}\right) = \left(M_{ij}^{\ t} - M_{ij}^{\ t-n}\right) = 1 \\ Undefined \xrightarrow{For} \left(X_{ij}^{\ t} - X_{ij}^{\ t-n}\right) < 0 \ \ or \ \left(M_{ij}^{\ t} - M_{ij}^{\ t-n}\right) < 0 \end{cases} \tag{7.9}$$

where: $'X_{ij}^{\ t} - X_{ij}^{\ t-n}'$ is change (Δ) in X, $'M_{ij}^{\ t} - M_{ij}^{\ t-n}'$ is change (Δ) in M, $'n'$ is the time period in years and $'t-n'$ is a number of lags.

According to the MIIT measurements in Equation 7.9, the MIIT value ranges between 0 and 1; if Δ in the X or M are positive values, the MIIT would be greater than 0. If the Δ in the X and M are equal to each other, the MIIT would be equal to 1 and if either the Δ in the X or M is a negative value, then MIIT would be undefined.

Greenway *et al*. (1994) criticized the MIIT proposed by Hamilton & Kniest (1991) (Equation 7.9) for numerous inherent limitations. Such limitation includes an insufficient information with respect to the initial trade levels; deficient weighting with the proportion of the IIT over the total trade and the inability to define the extent of the MIIT when changes in the X or M are negative. According to Greenway *et al*. (1994), these shortcomings of the MIIT have a potential to give biased results and as a result, Greenway *et al*. proposed an adjusted measure of the MIIT, which is presented as the Greenway-Milner Index (GMI).

$$GMI_{ij}^{\ t} = \left[\left(X_{ij}^{\ t} + M_{ij}^{\ t}\right) - \left|X_{ij}^{\ t} - M_{ij}^{\ t}\right|\right] - \left[\left(X_{ij}^{\ t-n} + M_{ij}^{\ t-n}\right) - \left|X_{ij}^{\ t-n} - M_{ij}^{\ t-n}\right|\right] \tag{7.10}$$

where: $'n'$ is the time period.

Observing the GMI in Equation 7.10, it is clear that this index measures the IIT change overtime in absolute values, unlike the GLI in Equation 7.4, where the measurement of the IIT was expressed as a ratio. The main shortcoming in the GMI is similar to that of the GLI, as it falls short of the measurement in the structural changes in trading patterns (Brülhart, 2002).

Although the unadjusted GLI is a widely accepted measure of the extent of IIT, this index is strictly a static measure and not a dynamic measure of IIT. Brülhart (1994) used Grubel & Lloyd's (1975) unadjusted GLI to decompose the proportion of change in Inter-industry trade and IIT and this Brülhart Index (BRI) is presented in Equation 7.11

$$BRI_{ij}^{\ t} = 1 - \left(\left| \Delta X_{ij}^{\ t} - \Delta M_{ij}^{\ t} \right| / \left(\left| \Delta X_{ij}^{\ t} \right| + \left| \Delta M_{ij}^{\ t} \right| \right) \right) \quad (7.11)$$

The values calculated for the BRI ranges between 0 and 1, where 0 shows that all trade in the observed industry is Inter-industry trade, while 1 shows that all trade in the observed industry is IIT. The marginal IIT index BRI introduced by Brülhart (1994), was used in a number of studies and one such recent study includes an analysis of the structural changes in the X diversity for South Africa investigated by Petersson (2005).

According to Thom & McDowell (1999), one of the limitations of BRI is the inability to separate the Inter-industry trade from the vertical IIT. Consequently, they have made an extension of the marginal IIT measurement and successfully separated the HIIT from the total IIT and derived the extent of the VIIT presented in Thom & McDowell's Index (TMI).

$$TMI_I = 1 - \left[\left(\left| \Delta X_I \right| - \left| \Delta M_I \right| \right) / \left(\sum_{s=1}^{S} \left| \Delta X_s \right| + \sum_{s=1}^{S} \left| \Delta M_s \right| \right) \right] \quad (7.12)$$

where: $'I'$ is the broad industry, $'S'$ is a number of sub-sectors within industry $'I'$, $X_I = \sum_{i}^{S} X_{ij}^{\ t}$ and $M_I = \sum_{i}^{S} M_{ij}^{\ t}$.

Further contributions for the measurement of the dynamic IIT were developed by Dixon & Menon (1994; 1995; 1996), who measured the changes in IIT when imbalances (positive or negative values) existed. Such imbalances maybe due to trade diversion or the trade creation associated with the formation of the Regional Trade Agreements (RTA). Dixon & Menon (1995) argued that such circumstances using an unadjusted GLI would be misleading. In order to handle this issue, they have developed an identity equation for the decomposition of growth in the Total Trade (TT) Equation 7.13, into contribution of growth in the Net Trade (NT) Equation 7.14 and IIT Equation 7.15.

$$TT_{ij}^{\ t} = NT_{ij}^{\ t} + IIT_{ij}^{\ t} \tag{7.13}$$

$$NT_{ij}^{\ t} = \left| NT_{ij}^{\ t} - IIT_{ij}^{\ t} \right| \tag{7.14}$$

$$IIT_{ij}^{\ t} = \left(X_{ij}^{\ t} + M_{ij}^{\ t} \right) - \left| X_{ij}^{\ t} - M_{ij}^{\ t} \right| \tag{7.15}$$

Furthermore, the percentages of growth in the Total Trade (tt) is represented by contribution growth in the Net Trade (Cnt) Equation 7.16 and IIT ($Ciit$) Equation 7.17:

$$Cnt_{ij}^{\ t} = \left(1 - GL_{ij}^{\ t}\right) \ nt_{ij}^{\ t} \tag{7.16}$$

$$Ciit_{ij}^{\ t} = \left(GL_{ij}^{\ t}\right) \ iit_{ij}^{\ t} \tag{7.17}$$

where: $GL_{ij}^{\ t} = IIT_{ij}^{\ t} / TT_{ij}^{\ t}$

Finally, contributions to (tt) is presented in Equation 7.18:

$$tt_{ij}^{\ t} = Cxtt_{ij}^{\ t} + Cmtt_{ij}^{\ t} \tag{7.18}$$

where: 'x' is X contribution, 'm' is M contribution, whilst

$$Cmtt_{ij}^{\ t} = \left(M_{ij}^{\ t} / TT_{ij}^{\ t}\right) \ m_{ij}^{\ t} \tag{7.19}$$

$$Cxtt_{ij}^{\ t} = \left(X_{ij}^{\ t} / TT_{ij}^{\ t}\right) \ x_{ij}^{\ t} \tag{7.20}$$

$$Cmnt_{ij}^{\ t} = \left(M_{ij}^{\ t} / \left(M_{ij}^{\ t} - X_{ij}^{\ t}\right)\right) \ m_{ij}^{\ t} \tag{7.21}$$

$$Cxnt_{ij}^{\ t} = \left(X_{ij}^{\ t} / \left(X_{ij}^{\ t} - M_{ij}^{\ t}\right)\right) \ x_{ij}^{\ t} \tag{7.22}$$

where: $Cmiit_{ij}^{\ t} = \delta_{ij}^{\ t} m_{ij}^{\ t}$, $Cxiit_{ij}^{t} = (1 - \delta_{ij}^{t})\, x_{ij}^{t}$; while $\delta_{ij}^{\ t} = 1$ if $X_{ij}^{\ t} > M_{ij}^{\ t}$ and $\delta_{ij}^{\ t} = 0$ if $X_{ij}^{\ t} < M_{ij}^{\ t}$ under assumption $X_{ij}^{\ t} \neq M_{ij}^{\ t}$.

An alternative measure of IIT was proposed by Azhar & Elliott (2001), which is presented in Equation 7.23 as Azhar & Elliott Index (AEI):

$$AEI_{ij}^{\ t} = \left(\left(X_{ij}^{\ t} - X_{ij}^{\ t-n}\right) - \left(M_{ij}^{\ t} - M_{ij}^{\ t-n}\right)\right) / \left(2Max\left(\left|X_{ij}^{\ t} - X_{ij}^{\ t-n}\right|, \left|M_{ij}^{\ t} - M_{ij}^{\ t-n}\right|\right)\right) \tag{7.23}$$

AEI takes the values between –1 and +1, with the negative values indicate the deteriorating sectoral trade balance, while the positive values indicate the improvement in the sectoral trade balance over a specific time period. The main disadvantage of this index as pointed-out by Brülhart (2002), is that the values of AEI in interval –1 and –0.5 along with +0.5 and +1 can not be undeniably interpreted.

Now that the main measurements of the extent of the IIT have been reviewed, the main question to ask is which method should be used to adopt for the measurement of the extent of IIT in this chapter? The two main categories of measurement of the extent of the IIT are the static and dynamic measures. The static measures of the IIT measures the importance of IIT at any particular point of time, while the dynamic measures of the IIT measures the changes overtime. According to the literature review, all IIT measures are subject to some advantages and disadvantages, which implies that choosing a suitable index measure of the extent of IIT should be assessed on empirical situation. Vona (1991) and Menon & Dixon (1994) recommended the unadjusted GLI measure of the IIT; however, Menon & Dixon (1994) suggested that the MIIT would be more appropriate when the study is associated with the emergence of a RTA; while Fertő & Hubbard (2001) suggested that a MIIT is more appropriate in the content of trade liberalization and economic adjustment cost.

Observing numerous studies in the current literature, the unadjusted GLI is most commonly used Tharakan (1986), Hamilton & Kniest (1991), Vona (1991), Ballance *et al*. (1992), Clark (1993), Somma (1994), Havrila & Gunawardana (2003), Havrila (2004), Kang & Lee (2007) and Fertő & Soós (2008). Based on this literature review, the adopted approach of measuring the extent of the IIT in this study is the unadjusted GLI[121] presented in Equation 7.4 The main reason for this approach, is that the empirical scenario of this study is similar to the existing studies which have used an unadjusted GLI. Furthermore, the only differences between this and existing studies which have used an unadjusted GLI, is that the empirical analysis in this study is to examine several different categories simultaneously.

Additionally, there are numerous reasons why this index was chosen, and according to Vona (1991), an unadjusted GLI is a superior measure to most of the indices measuring the extent of the IIT, while Menon & Dixon (1994) indicate that an unadjusted GLI is a relatively reliable measure of IIT. Furthermore, this research

[121] Grubel & Lloyd (1975) pointed-out that this index is affected by the size of the trade imbalance, and the higher the trade imbalance, an unadjusted GLI is likely to produce a relatively smaller extent of the IIT. The TD categories analysed in this research inherently accounts for a high trade imbalances, however, this shortcoming of an unadjusted GLI is likely to ensure that the extent of the IIT is not overstated.

analysed only individual TD categories and according to Pieri *et al*., 1997, an unadjusted GLI in such cases is even more justified. Pieri *et al*. (1997) pointed-out that the trade imbalance is consistent with disequilibrium, and hence the assumption of the proportionate spreading of equilibrating forces across all industries is not applicable since not all industries are analysed.

Now that the unadjusted GLI has been chosen, there are 3 related empirical issues that need to be addressed. Firstly, the level of aggregation, secondly, whether multilateral or bilateral analysis should be carried-out and lastly, choosing the appropriate time intervals for the selected TD categories.

High levels of aggregation tend to overestimate the IIT, while high levels of disaggregation tend to underestimate the extent of the IIT. This issue is known as a „Sectoral Aggregation Bias'. Finger (1975) and Pomfret (1979) pointed-out that at the highest level of disaggregation, the IIT would disappear and all trade would only be Inter-industry trade, while Lüthje (2006) suggested that the IIT's share of the world total trade is far smaller than what was usually understood. Grubel & Lloyd (1975) have disputed the views of Finger and Pomfret and argued that even as the IIT level declines at a lower level of aggregation, this would not lead to a zero of the IIT. Furthermore, this view has been supported by Bergstrand's (1983) empirical findings, where a notable IIT has been recorded at a 8-digit Standard Industrial Trade Classification (SITC) level of disaggregation.

The most used level of aggregation in the current literature is at a 3-digit SITC (SITC-3), which is also recommended by Greenway & Milner (1983) and adopted by many other researchers (Grubel & Lloyd, 1975; Aquino, 1978; Menon & Dixon, 1996; Havrila & Gunawardana, 2003; Havrila, 2004 and Lee, 2006). In accordance with these researchers, the chosen approach in this study is to analyze the TD categories equivalent to the SITC-2 and SITC-3.

The second important aspect is to establish whether the analysis of the IIT is to be conducted on a multilateral or bilateral trade level. It is expected that the level of IIT at the multilateral level is likely to be higher than the bilateral level due to the Triangular Trade Relationship (TTR[122]) (Thurow, 1992). Deardorff (1979) refers to such a relationship as „Chain of Comparative Advantage' rather than the IIT

[122] The TTR refers to country A exporting the product „x' to a country B and then importing the product „x' from country C, and this would be counted as an IIT for the country A.

associated with product differentiation and imperfectly competitive markets. In order to ensure that the extent of the IIT is measured more comprehensively, the extent of the IIT in this study is analyzed on both a multilateral and bilateral levels.

Finally, establishing the time intervals for calculating the extent of IIT is a significant issue of the analysis. Amongst the existing studies, the smallest time intervals utilized in the IIT analysis are annual time-series data. The studies which have utilized annual time-series data includes Dixon & Menon (1995), Sharma (2000), Havrila & Gunawardana (2003), Thorpe & Zhang (2005), Ekanayake *et al*. (2006), Sichei *et al*. (2007). Another example is the time-series frequencies greater than a year, and such studies includes Havrila (2004) which analyses in 5 years intervals. Some studies only observed 2 periods at a time, and examples of such studies are by Sharma (2004) which only analysed the periods between 1988-1989 and 1998-1999; Fontagne *et al*., (2005) analysed two years between 1995 and 2002, while Al-Mawali (2005) analysed the years between 1995 and 2000. Another approach of the IIT analysis is observing only one single period and such studies include Greenway *et al*. (1995), who only analyzed the year 1988 and Janda & Münich (2004) only analysed the year 2000.

Observing these studies, lengthy time intervals used in the analysis have a tendency of omitting trade fluctuations within the year. In order to obtain more valid information of the extent of the IIT in the selected TD categories between Australia and the selected TD countries in this chapter, the quarterly time series data are used in this study. This approach is likely to show a more distinct variation in the IIT between time intervals and may reveal seasonal effects, which are concealed when annual time series data are employed. In support of Haan *et al*. (2008), quarterly data is used, as according to Haan *et al.* avoiding annual time-series data in favour of the quarterly time-series data are likely to capture a high frequency fluctuations which also refers to „Shock Accounting' that looks at seasonal and cyclical fluctuation within the industries.

7.4 EMPIRICAL TESTING

The Australian IIT volumes, compared to the member countries of the Organization for Economic Development and Cooperation (OECD) is relatively low (Ratnayake & Athukorala, 1992, Menon, 1994b). This finding is supported by more recent released official figures by the OECD according to the 4 dimensions classification of the IIT: „*High and Increasing IIT*', „*High and Stable IIT*', „*Low and Increasing IIT*' and „*Low and Stable IIT*', with Australia falling in the latter category „*Low and Stable*' (OECD, 2008c).

The empirical studies which examine the IIT in the Australian manufacturing sector include Grubel & Lloyd (1975), Lowe (1991), Ratnayake & Jayasuriya (1991), Ratnayake & Athukorala (1992), Menon & Dixon (1994), Sharma (2000), Havrila & Gunawardana (2003) and Havrila (2004). Although examinations of the IIT in some manufacturing sectors were extensively covered, empirical studies, which specifically examine the IIT in the Australian service sector, are to the best of my knowledge not available. Some of the most recent examples of the examination of the IIT in the service sector that may relate to Australia are for the United States of America and South Africa, and includes studies by Donghui *et al*. (2003), Moshirian *et al*. (2005) and Sichei *et al*. (2007).

As a result of the literature review, the adopted approach in this study is to calculate the side-by-side unadjusted GLI (Equation 7.4) based on monetary and Quantity (QTY) values. This approach is likely to facilitate the comparisons of the extent of the IIT between monetary and QTY values, and further contributes to the understanding of IIT based on QTY. According to Oguro *et al*. (2008), the X or M prices and corresponding QTY are likely to respond differently to exchange rate fluctuations; consequently, additional information can be revealed by using QTY instead of monetary values.

Furthermore, the monetary values and corresponding QTY for the X and M are used in calculating the Average Unit Value (AUV[123]), which in turn is used in calculating the unadjusted GLI (Equation 7.4). This approach is a pioneering effort in calculating

[123] Once the AUV are calculated for both the X, M, these values are subsequently used as proxies for determining the quality of the X relative to M, and vice-versa, where a higher AUV is considered of being of a higher quality; while equal AUV shows that the X and M are of the same quality. Furthermore, a higher AUV does not ultimately guarantee that either the X or M will be of a higher quality, however, this assumption is sensible to adopt (as a higher AUV usually implies a higher quality of the product), as pointed-out by Abd-el Rahman (1991), who states that relative prices are likely to reflect differences in the qualities.

the extent of the HIIT and VIIT[124]. As mentioned earlier in this chapter, the IIT can be divided into HIIT and VIIT, where HIIT is determined by product differentiation and economies of scale (Lancaster, 1980; Krugman, 1980), while the VIIT is determined by relative factor endowments (Falvey, 1981). As the determinants of the HIIT and VIIT are different, this approach is likely to provide information about the composition of the IIT levels. The proposed[125] formula for calculating the level of HIIT and VIIT is according to the unadjusted GLI (Equation 7.4) with the slight modification and is presented in Equation 7.24:

$$GLI^{*}{}_{ij}{}^{t} = \left(1 - \left(\left|\left(X_{ij}{}^{t} / X^{*}{}_{ij}{}^{t}\right) - \left(M_{ij}{}^{t} / M^{*}{}_{ij}{}^{t}\right)\right| / \left|\left(X_{ij}{}^{t} / X^{*}{}_{ij}{}^{t}\right) + \left(M_{ij}{}^{t} / M^{*}{}_{ij}{}^{t}\right)\right|\right)\right) \times 100 \qquad (7.24)$$

where: '$GLI^{*}{}_{ij}{}^{t}$' is the modified unadjusted GLI which measures the extent of the HIIT (IIT in the products of similar quality), *($X_{ij}{}^{t}$ / $X^{*}{}_{ij}{}^{t}$* is the AUV for the X, *($M_{ij}{}^{t}$ / $M^{*}{}_{ij}{}^{t}$* is the AUV for the M, while 'X' and 'M' are the X and M based on monetary values and 'X^{*}' and 'M^{*}' are the X and M corresponding QTY.

This index takes values between 0 and 100; 0 indicates that the extent of the IIT is 100 percent in dissimilar qualities (VIIT) and 100 indicates that all IIT are in the products with similar qualities (HIIT). Finally, increasing the value of this index overtime shows that the IIT is increasing in more similar product qualities (a rise in the HIIT and a fall in the VIIT), while the falling index value overtime shows that the extent of the IIT is increasing in more dissimilar product qualities (a rise in the VIIT and a fall in the HIIT)[126].

The calculated GLI based on monetary values, QTY and AUV for the Long Term (LT), for the period between 1990-2006 and the Short Term (ST), for the period between 2000-2006 are presented in Appendix Tables 7.1-7.27. The indices are calculated for all TD categories and countries[127] based on (HS-2, ANZSIC-1) level of

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[124] Disentangling the IIT into HIIT and VIIT based on AUV was initiated by Abd-el Rahman (1991), followed by Greenway *et al*. (1994; 1995), and subsequently used by Sharma (2004); however, the methodology used for separating the IIT into HIIT and VIIT in these studies is significantly different from the proposed method used in this chapter. The method used in this chapter has been utilizing for the first time, the unadjusted GLI alone for separating the IIT into HIIT and VIIT. This proposed method is simple to calculate, compared to the current methods without the complexity of calculation that uses different levels of aggregation, needs for the critical values that are at present (±15 percent), while lacking the precise range definition. Moreover, according to the current methods, the separation of HIIT and VIIT for one observation at a time is not possible or at very least the way of doing it, is unexplained.

[125] This index is easier to compute given that the corresponding QTY for X and M monetary values are available, compared to the formula proposed by Thom & McDowell (1999), which requires the industry index and initial calculation of the corresponding weights. Finally, the separation of HIIT and VIIT for one observation, is also not possible according to the method proposed by Thom & McDowell (1999).

[126] The index value does not show whether the quality of the X or M have increases and/or decreases - it shows only the level of HIIT.

[127] Selected TD service categories are not analysed on a country level, due to data unavailability.

aggregation presented in Appendix Tables 7.1-7.9 and the (HS-4, ANZSIC-2) level of aggregation presented in Appendix Tables 7.10-7.27.

These unadjusted GLI from Appendix Tables 7.1-7.27 are used to obtain the GLI median values for all selected TD categories and countries. The median GLI values are obtained for three periods; 1990-1995, 1996-2001 and 2002-2006 to observe the median extent of the GLI overtime for the monetary values, QTY and the AUV.

In addition to the GLI median values, the calculated GLI indices from Appendix Tables 7.1-7.27 are used to obtain the LT and ST Time-coefficients for the GLI using Equation 7.25, in order to observe the trend in GLI overtime.

$$GLI_{ij} = \alpha_0 + \alpha_1(Time) \qquad (7.25)$$

These GLI Time-coefficients are based on HS-2 and ANZSIC-1 and are presented in Tables 7.2-7.6; while Tables 7.7-7.12 contain the Time-coefficients based on HS-4 and ANZSIC-2 level of aggregation, for all of the selected TD categories and countries.

All Time-coefficients that have been estimated according to Equation 7.25, are analysed in Tables 7.2-7.12 in the „Status' column. These analyses are carried out by observing the GLI trend movements in the LT and ST period for the monetary values QTY and AUV. The „Status' criteria in all Tables follow the protocol that is summarized in Table 7.1:

Table: 7.1

IIT TRENDS – STATUS CRITERIA			
Ranking	**Time Period**		**Description**
	LT	**ST**	
A	↑ - Increasing	↑ - Increasing	IIT growth rate in the ST is faster than in the LT
B	↑ - Increasing	↑ - Increasing	IIT growth rate in the ST is slower than in the LT
C	↑ - Increasing	↓ - Decreasing	IIT increasing in the LT and decreasing in the ST
A*	↓ - Decreasing	↑ - Increasing	IIT decreasing in the LT and increasing in the ST
B*	↓ - Decreasing	↓ - Decreasing	IIT decrease rate in the LT is higher than in the ST
C*	↓ - Decreasing	↓ - Decreasing	IIT decrease rate in the ST is higher that in the LT

According to this Table 7.1, the GLI trends in all subsequent Tables 7.2-7.12 are observed from the LT and ST perspectives according to the ratings A, B, C and A*, B*, C*. The ratings have been ordered in such way, that if the tendency of the GLI is to be higher in the ST compared to the LT, then rating is higher, while the A, B, C rating are when the LT Time-coefficients are positive and A*, B*, C* rating are when the Time-coefficients in the LT are negative.
The analysis of all the selected TD categories and countries in Tables 7.2-7.12 are made firstly for the median values followed by the GLI Time-coefficients.

Now that the methods of analysis are defined, the following sections will individually comment on all the TD categories and the countries analysed in this chapter.

7.4.1 INTRA-INDUSTRY TRADE; HS-2, ANZSIC-1

The analysis in this section consists of 4 goods categories based on HS-2 level of aggregation and 1 service category based on ANZSIC-1 level of aggregation and all calculated GLI indices for both the LT and the ST, are presented in Appendix Tables 7.1-7.9. The analysis for the selected TD goods categories consists of multilateral and bilateral trade analysis between Australia and the selected TD countries, while the service category is analyzed only on a multilateral basis, due to data unavailability on a country level for the service categories.

7.4.1.1 INTRA-INDUSTRY TRADE; CATEGORY: 30

Table: 7.2

IIT MEDIAN VALUES AND TRENDS: CATEGORY 30*
(March 1990:1 – December 2006:4) - (AUD, mill. constant prices – 1990 & Qty.* '000's – grams)

MEDIAN VALUES

GLI	AUD			QTY			AUD/QTY (AUV)		
AUSTRALIA -	1990-1995	1996-2001	2002-2006	1990-1995	1996-2001	2002-2006	1990-1995	1996-2001	2002-2006
RoW: -IIT	61.04	67.28	63.45	15.67	31.14	72.03	30.86	29.65	40.43
China: - IIT	55.54	69.92	73.96	50.88	52.76	69.19	36.38	48.56	56.09
France: -IIT	24.33	11.59	13.24	18.63	3.78	9.46	7.26	34.36	52.97
Germany: -IIT	3.60	7.75	12.26	5.53	17.38	56.85	0.50	30.03	8.03
Malaysia: -IIT	35.48	7.35	4.85	-	-	-	-	-	-
Singapore: -IIT	16.45	45.31	50.54	0.02	0.01	0.09	0.11	0.00	0.10
Thailand: -IIT	27.02	15.50	3.66	-	-	-	-	-	-
United Kingdom: -IIT	35.82	36.39	30.23	2.68	29.60	26.81	0.73	8.17	6.28
United States: -IIT	23.07	30.34	39.87	3.16	10.08	17.72	24.65	32.22	55.90

TIME TRENDS

Time-Coefficients	AUD			QTY			AUD/QTY (AUV)		
AUSTRALIA -	LT	ST	Status	LT	ST	Status	LT	ST	Status
RoW: -IIT	+0.1301	-0.2154	↑↓ - C	+0.9338	+0.9406	↑↑ - A	-0.1143	+0.3122	↓↑ - A*
China: - IIT	+0.415	-0.1435	↑↓ - C	+0.6442	+0.213	↑↑ - B	+0.5905	+0.0175	↑↑ - B
France: -IIT	-0.1999	-0.426	↓↓ - C*	-0.3151	+1.0218	↓↑ - A*	+0.4634	+1.6055	↑↑ - A
Germany: -IIT	+0.2126	+0.0975	↑↑ - B	+0.8914	-0.4051	↑↓ - C	-0.1823	+0.212	↓↑ - A*
Malaysia: -IIT	-0.6669	-0.0246	↓↓ - B*	-	-	-	-	-	-
Singapore: -IIT	+0.6808	-0.5033	↑↓ - C	+0.5083	+5.1095	↑↑ - A	+0.2148	+1.1203	↑↑ - A
Thailand: -IIT	-0.4974	-0.3808	↓↓ - B*	-	-	-	-	-	-
United Kingdom: -IIT	+0.0113	-0.0146	↑↓ - C	+0.1535	-1.5915	↑↓ - C	+0.0953	-0.9964	↑↓ - C
United States: -IIT	+0.4442	-1.078	↑↓ - C	+0.3309	-0.398	↑↓ - C	+0.7097	+0.4936	↑↑ - B

***Pharmaceutical Products**
Source: Compiled from Trade Data International, (2007) and the ABS (2007a; 2007g; 2007f)

According to Table 7.2, the median extent of the IIT in category 30 between Australia and RoW based on monetary values is relatively steady; the median extent of the IIT of 61.04 percent in the period between 1990-1995 have increased to 67.28 percent in the period between 1996-2001, and then dropped to 63.45 percent in the period between 2002-2006. Based on QTY, the median value of IIT between Australia and RoW is steadily increasing from 15.67 in the period between 1990-1995 to 72.03 percent in the period between 2002-2006. Observing the AUV, it shows that the median values have increased from 30.86 in 1990-1995 to 40.43 percent in the period between 2002-2006. This suggests that the percentage of the IIT between Australia and the RoW is increasing in HIIT, while the share of VIIT is decreasing. In the period between 1990-1996, the median value of the HIIT in this category accounted for 30.86 percent, while the VIIT accounted for 69.14 percent; and the median HIIT in the period between 2002-2006 accounted for 40.43 percent, while the VIIT accounted for 59.57 percent in this period. This clearly shows that the IIT in this category between Australia and the RoW is increasing in HIIT, which is associated with the X and M of similar quality products. Observing the corresponding Time-coefficients in this category between Australia and the RoW, it indicates that the IIT is based on monetary values and is increasing by 0.1301 percent per quarter in the LT, while in the ST it is decreasing by 0.2154 percent per quarter. The IIT trends based on QTY are increasing in both periods by 0.9338 and 0.9406 percent in the LT and ST respectively. Finally, by observing the AUV, it is apparent that the trends are increasing in both the LT and the ST; while this increase is more pronounced in the ST, where the trend is increasing by 0.1332 percent per quarter. This percentage increase is corresponding with the increase in HIIT in this category between Australia and the RoW.

The bilateral analysis between Australia and the selected TD countries in Table 7.2 shows that the highest median value of IIT in monetary terms is for China in all 3 periods, while the highest increase is for Singapore from 16.45 in 1990-1995 to 50.54 percent in 2002-2006. Furthermore, the percentage increases in the HIIT in this category is noticeable for most of the countries. An increase is the most pronounced for France, which is moving from a median value of 7.26 percent in 1990-1995 to 52.97 percent in 2002-2206; while the most pronounced decrease in the HIIT is for Germany from 30.03 percent in the period between 1996-2001 to 8.03 percent in 2002-2006. Observing the Time-coefficients based on monetary values, all of the IIT trends are decreasing in the ST except for Germany, while in the LT most of the trends were increasing. The highest IIT trend decrease in the ST is for The United States of America, where the IIT is decreasing at a rate of 1.078 percent per quarter. Finally, most of the trends show increases in the HIIT overtime in this category.

In summary, the median extent of the IIT shows that the extent of the IIT between Australia and most of the countries, are to some extent increasing. Observing the trends estimates, in particular in the ST, the extent of the IIT is decreasing for most of the countries. Finally, by observing the AUV, it is clear that the IIT between Australia and the selected countries is increasing in HIIT, which suggested that the X and M of the products within this category were increasing of similar quality.

7.4.1.2 INTRA-INDUSTRY TRADE; CATEGORY: 84

Table: 7.3

IIT MEDIAN VALUES AND TRENDS: CATEGORY 84*
(March 1990:1 – December 2006:4) - (AUD, mill. constant prices – 1990 & Qty.* '000's – number)

MEDIAN VALUES									
GLI	**AUD**			**QTY**			**AUD/QTY (AUV)**		
AUSTRALIA -	**1990-1995**	**1996-2001**	**2002-2006**	**1990-1995**	**1996-2001**	**2002-2006**	**1990-1995**	**1996-2001**	**2002-2006**
RoW: -IIT	51.14	58.38	52.84	13.17	7.97	11.48	39.70	19.38	27.21
China: - IIT	78.03	44.19	27.88	0.35	0.66	1.32	0.53	2.12	6.84
France: -IIT	18.55	24.13	24.16	1.07	1.40	4.81	8.79	12.05	29.13
Germany: -IIT	27.61	24.07	15.00	4.09	1.33	6.49	24.08	10.88	62.46
Malaysia: -IIT	69.67	40.88	24.87	12.18	7.47	13.30	6.96	26.76	59.09
Singapore: -IIT	77.16	66.30	66.39	31.51	17.01	10.93	26.47	34.67	20.71
Thailand: -IIT	54.60	46.32	46.50	8.95	5.86	10.56	4.06	15.24	31.07
United Kingdom: -IIT	54.03	52.81	57.85	12.55	15.20	19.55	32.15	34.73	38.79
United States: -IIT	24.54	36.67	40.05	11.79	7.40	8.56	61.09	27.35	27.84

TIME TRENDS									
Time-Coefficients	**AUD**			**QTY**			**AUD/QTY (AUV)**		
AUSTRALIA -	**LT**	**ST**	**Status**	**LT**	**ST**	**Status**	**LT**	**ST**	**Status**
RoW: -IIT	+0.1255	-0.4092	↑↓ - C	-0.0837	+0.1832	↓↑ - A*	-0.2879	+0.6374	↓↑ - A*
China: - IIT	-0.906	-0.5387	↓↓ - B*	+0.02	+0.0178	↑↑ - B	+0.1875	+0.3112	↑↑ - A
France: -IIT	+0.0987	-0.5338	↑↓ - C	-0.1066	-0.0055	↓↓ - B*	+0.2893	+0.2303	↑↑ - B
Germany: -IIT	-0.2723	-0.437	↓↓ - C*	+0.0195	+0.5226	↑↑ - A	+0.5783	+3.5256	↑↑ - A
Malaysia: -IIT	-0.8425	-0.758	↓↓ - B*	-0.0346	-0.3229	↓↓ - C*	+1.0934	+0.0849	↑↑ - B
Singapore: -IIT	-0.1595	+0.7603	↓↑ - A*	-0.439	-0.4687	↓↓ - C*	-0.187	-1.1678	↓↓ - C*
Thailand: -IIT	-0.3101	-0.2586	↓↓ - B*	+0.0236	+0.1208	↑↑ - A	+0.576	-0.1192	↑↓ - C
United Kingdom: -IIT	+0.159	-0.2426	↑↓ - C	+0.2109	+0.9153	↑↑ - A	+0.3055	+1.454	↑↑ - A
United States: -IIT	+0.4076	-0.5421	↑↓ - C	-0.0196	+0.1691	↓↑ - A*	-0.5625	+0.8519	↓↑ - A*

Nuclear Reactors, Boilers, Machinery and Mechanical Appliances; Parts Thereof
Source: Compiled from Trade Data International, (2007) and the ABS (2007a; 2007g; 2007f)

According to Table 7.3, the median values of the IIT in category 84 between Australia and RoW based on monetary and QTY values is somewhat fluctuating; while the IIT is considerably lower based on QTY compared to monetary values. The AUV at the same time shows a decrease in the median HIIT between Australia and the RoW between the period 1990-1995 and 1996-2001; while in the period between 1996-2001 and 2002-2006, the median extent of the HIIT has increased. Observing the trends, the IIT in this category is increasing in the LT and is decreasing in the ST based on monetary values; while based on QTY, these trends are moving in the opposite direction. Finally, by observing the AUV trends, it shows an increase in the HIIT in the ST with a quarterly increase of 0.6374 percent, while in the LT, the trends shows a decrease in HIIT by 0.2879 percent per quarter.

In overall, the median extent of the IIT based on monetary values between Australia and the eight selected countries is mixed. The highest percentage of the IIT is in the period between 1990-1995 for China, which records 78.03 percent; and the highest in the periods between 1996-2001 and 2002-2006 is for Singapore, which records 66.3 and 66.39 percent respectively. The extent of the IIT based on QTY shows considerably lower levels of IIT, compared to the IIT based on monetary values. Observing the median values for the AUV, it is apparent that most of the IIT is in the form of VIIT. The highest median value of HIIT is in the period between 2002-2006 for Germany, which accounts for 62.46 percent and the lowest median for the HIIT for the same period is for China, which accounts for only 6.84 percent in the HIIT.

The Time-coefficient shows that the extent of the IIT based on monetary values in the LT is decreasing for most of the countries, while this downward trend is more pronounced in the ST. The highest decreases in the LT is for China, which accounts for a 0.906 percent decrease per quarter, and the highest decrease in the ST is for Malaysia, which accounts for a 0.758 percent decrease per quarter. Furthermore, it is apparent that in the ST, a positive IIT trend is recorded for Singapore only, where the IIT trend is increasing by 0.7603 percent per quarter. By referring to the IIT trends based on QTY, the situation is somewhat different and most of the countries' trends were positive which shows an increase in the IIT overtime in both the LT and the ST; while the Time-coefficients for AUV (all except for Singapore and Thailand) shows an increase in HIIT overtime.

In summary, for most of the countries, the median extent of the IIT is decreasing overtime based on monetary values, while based on QTY, the extent of the IIT is slightly increasing. These movements are similar with the Time-coefficients, which shows a similar patterns. Finally, according to the AUV, there is evidence that for most countries, the HIIT is increasing, while at the same time the VIIT is decreasing.

7.4.1.3 INTRA-INDUSTRY TRADE; CATEGORY: 85

Table: 7.4

IIT MEDIAN VALUES AND TRENDS: CATEGORY 85* (March 1990:1 – December 2006:4) - (AUD, mill. constant prices – 1990 & Qty.* '000's – number)									
MEDIAN VALUES									
GLI	**AUD**			**QTY**			**AUD/QTY (AUV)**		
AUSTRALIA -	**1990-1995**	**1996-2001**	**2002-2006**	**1990-1995**	**1996-2001**	**2002-2006**	**1990-1995**	**1996-2001**	**2002-2006**
RoW: -IIT	38.04	42.15	27.19	11.96	6.69	12.77	41.59	24.18	57.95
China: - IIT	26.83	13.44	7.25	1.91	0.71	1.07	7.79	6.98	25.31
France: -IIT	12.94	11.65	10.39	0.75	0.58	1.25	10.69	9.17	18.92
Germany: -IIT	16.12	56.27	50.08	2.63	13.74	63.48	26.43	41.55	73.94
Malaysia: -IIT	35.78	15.49	7.96	48.66	1.70	1.32	74.03	12.78	34.43
Singapore: -IIT	60.00	35.86	28.20	11.75	2.98	4.62	24.16	9.59	20.11
Thailand: -IIT	84.76	52.34	20.87	42.21	11.35	15.94	45.88	30.15	67.46
United Kingdom: -IIT	31.08	24.76	39.16	5.83	3.74	13.59	31.16	25.22	41.01
United States: -IIT	17.70	25.23	25.92	1.16	5.95	9.95	11.72	31.98	40.43
TIME TRENDS									
Time-Coefficients	**AUD**			**QTY**			**AUD/QTY (AUV)**		
AUSTRALIA -	**LT**	**ST**	**Status**	**LT**	**ST**	**Status**	**LT**	**ST**	**Status**
RoW: -IIT	-0.1637	-0.7859	↓↓ - **C***	-0.1712	+0.0398	↓↑ - **A***	+0.2786	+1.4038	↑↑ - **A**
China: - IIT	-0.4068	-0.3824	↓↓ - **B***	-0.0709	+0.0376	↓↑ - **A***	+0.1954	+1.0704	↑↑ - **A**
France: -IIT	-0.0758	-0.2094	↓↓ - **C***	+0.0072	+0.0855	↑↑ - **A**	+0.1708	+1.556	↑↑ - **A**
Germany: -IIT	+0.6765	-1.6499	↑↓ - **C**	+1.2125	+1.2278	↑↑ - **A**	+0.9991	+0.1356	↑↑ - **B**
Malaysia: -IIT	-0.6975	-0.4267	↓↓ - **B***	-1.0785	-0.0544	↓↓ - **B***	-0.6722	+0.9527	↓↑ - **A***
Singapore: -IIT	-0.7379	-0.4666	↓↓ - **B***	-0.0929	+0.4497	↓↑ - **A***	+0.2433	+1.6497	↑↑ - **A**
Thailand: -IIT	-1.1662	-1.5425	↓↓ - **C***	-0.7961	+0.0417	↓↑ - **A***	+0.2514	+0.8502	↑↑ - **A**
United Kingdom: -IIT	+0.1667	+0.633	↑↑ - **A**	+0.1296	+0.5422	↑↑ - **A**	+0.2639	+0.7867	↑↑ - **A**
United States: -IIT	+0.2446	-0.2446	↑↓ - **C**	+0.3179	+0.4374	↑↑ - **A**	+0.7215	+0.05	↑↑ - **B**

Electrical Machinery and Equipment and Parts Thereof; Sound Recorders and Producers, Television Image and Sound Recorders and Reproducers, and Parts and Accessories of Such Articles
Source: Compiled from Trade Data International, (2007) and the ABS (2007a; 2007g; 2007f)

According to Table 7.4, the median extent of IIT in category 85 between Australia and RoW based on monetary are rather fluctuating and have decreased from 38.04 percent in the period between 1990-1995 to 27.19 percent in the period between 2002-2006. Based on QTY, this fluctuation is also noticeable; however, the median extent of the IIT has marginally increased between these two periods. Furthermore, the AUV at the same time shows an overall increase in the median HIIT between Australia and the RoW, between the period 1990-1995 and 2002-2006; while for the periods between 1990-1995 and 1996-2001, the median HIIT has decreased. Observing the trends, the IIT in this category decreased in both the LT and ST based on monetary values, while based on QTY, these trends are moving in the opposite direction. Finally, by observing the AUV trends, it shows an increase in the HIIT in both the LT and the ST, while this increase is more pronounced in the ST, where an increase of 1.4038 percent per quarter is recorded.

The overall extent of the median IIT based on monetary values between Australia and eight selected countries is increasing for Germany, The United Kingdom and The United States of America, and for the rest of the countries, it is decreasing, while the most pronounced increase is for Germany. The highest percentage of the extent of the IIT is in the period between 1990-1995 for Thailand, which recorded 84.76 percent, and the highest in the periods between 1996-2001 and 2002-2006 is for Germany, which recorded 56.27 and 50.08 percent respectively. The extent of the IIT based on QTY noticeably shows a lower extent of the IIT compared to the IIT based on monetary values. According to QTY, the highest increase in the extent of the IIT is for Germany, while the highest decrease is for Malaysia. Observing the median values for AUV, it is apparent that the extent of the IIT is approximately half in the HIIT and half in the VIIT. Furthermore, the overall figures suggest that for all countries, except for Malaysia and Singapore, the median extent of the HIIT overtime is more significant. The highest median value of the extent of HIIT is in the period between 2002-2006 for Germany which accounted for 73.94 percent, and the lowest median value for the same period is for France, which accounted for 18.92 percent.

The Time-coefficient shows that the extent of the IIT based on monetary values in the LT was decreasing for most of the countries, while this downward trend is more pronounced in the ST, where all countries trends are negative except for The United Kingdom. The highest decrease in the LT is for Thailand, which accounted for 1.1662 percent decrease per quarter and the highest decrease in the ST is for Germany, which accounted for 1.6449 percent decrease per quarter. By referring to the IIT trends based on QTY, the extent of the IIT trends for most of the countries are positive, while these positive trends are more pronounced in the ST. The Time-coefficients based on the AUV shows that the extent of the HIIT in both the LT and the ST, is increasing for all countries except for Malaysia, which recorded a decrease in the HIIT in the LT. The highest increases in the ST in the HIIT are recorded for Singapore and China, while the lowest increase in HIIT is for The United States of America.

In summary, for most of the countries, the median extent of the IIT is somewhat decreasing overtime based on monetary values. Based on QTY, the extent of the IIT is mostly increasing, while the Time-coefficients also showed similar patterns. Finally, according to the AUV, there is evidence that for all countries, the extent of the HIIT is increasing overtime, while at the same time, the extent of the VIIT is decreasing.

7.4.1.4 INTRA-INDUSTRY TRADE; CATEGORY: 87

Table: 7.5

IIT MEDIAN VALUES AND TRENDS: CATEGORY 87* (March 1990:1 – December 2006:4) - (AUD, mill. constant prices – 1990 & Qty.* '000's – number)									
MEDIAN VALUES									
GLI	**AUD**			**QTY**			**AUD/QTY (AUV)**		
AUSTRALIA -	**1990-1995**	**1996-2001**	**2002-2006**	**1990-1995**	**1996-2001**	**2002-2006**	**1990-1995**	**1996-2001**	**2002-2006**
RoW: -IIT	28.45	40.17	45.59	38.81	53.19	83.09	82.40	76.71	58.96
China: - IIT	11.94	12.74	16.44	0.01	0.25	0.38	0.27	5.23	5.81
France: -IIT	58.04	19.17	3.97	0.15	7.74	18.61	0.15	12.60	34.39
Germany: -IIT	7.65	6.65	2.17	1.46	1.64	9.34	23.55	10.68	35.29
Malaysia: -IIT	49.66	80.65	76.92	41.98	27.70	31.89	22.66	19.96	35.13
Singapore: -IIT	11.62	15.99	35.40	2.74	3.58	48.44	34.30	35.00	58.20
Thailand: -IIT	14.77	17.55	4.96	16.42	63.63	8.58	43.00	21.61	45.51
United Kingdom: -IIT	17.95	12.01	24.47	1.49	7.27	59.94	10.32	40.00	38.60
United States: -IIT	72.73	68.12	60.96	66.26	52.24	78.93	77.89	35.62	40.99
TIME TRENDS									
Time-Coefficients	**AUD**			**QTY**			**AUD/QTY (AUV)**		
AUSTRALIA -	**LT**	**ST**	**Status**	**LT**	**ST**	**Status**	**LT**	**ST**	**Status**
RoW: -IIT	+0.346	-0.4398	↑↓ - **C**	+0.7301	-1.4781	↑↓ - **C**	-0.2902	+1.0747	↓↑ - **A***
China: - IIT	+0.2801	+1.1003	↑↑ - **A**	+0.1709	+0.4665	↑↑ - **A**	+0.103	+0.7926	↑↑ - **A**
France: -IIT	-1.1564	-0.0521	↓↓ - **B***	-0.1334	-0.1334	↓↓ - -	+0.7297	+0.4621	↑↑ - **B**
Germany: -IIT	-0.1673	-0.106	↓↓ - **B***	+0.2373	-1.2739	↑↓ - **C**	+0.1386	+0.1534	↑↑ - **A**
Malaysia: -IIT	+0.4167	-1.7868	↑↓ - **C**	-0.3059	-1.2148	↓↓ - **C***	+0.3538	-0.425	↑↓ - **C**
Singapore: -IIT	+0.5856	+2.1546	↑↑ - **A**	+0.9271	+2.3251	↑↑ - **A**	+0.3135	-0.2287	↑↓ - **C**
Thailand: -IIT	-0.3437	-0.5491	↓↓ - **C***	-0.0802	-2.7994	↓↓ - **C***	-0.0541	+2.4445	↓↑ - **A***
United Kingdom: -IIT	+0.0508	+0.3719	↑↑ - **A**	+1.1222	+0.9669	↑↑ - **B**	+0.4676	-0.2701	↑↓ - **C**
United States: -IIT	-0.095	-1.6194	↓↓ - **C***	-0.0525	+1.0973	↓↑ - **A***	-0.7384	-0.0713	↓↓ - **B***

***Vehicles Other Than Railway or Tramway Rolling-Stock, and Parts and Accessories Thereof**
Source: Compiled from Trade Data International, (2007) and the ABS (2007a; 2007g; 2007f)

According to Table 7.5, the median extent of the IIT in category 87 between Australia and RoW based on monetary is increasing overtime. The median extent of the IIT of 28.45 percent in the period between 1990-1995 has increased to 40.17 percent in the period between 1996-2001 and a further increase is recorded in the period between 2002-2006, reaching 45.59 percent. This increase is also recorded based on QTY, however based on QTY, the increase is more evident, where the extent of the IIT in the period between 2002-2006 reached 83.09 percent. Observing the AUV, the median value is decreasing, which suggests a decrease in the HIIT and increase in the VIIT overtime in this category. The extent of the IIT between Australia and RoW according to Time-coefficients is increasing in the LT, while in the ST, it is decreasing by 0.4398 percent per quarter. These trends are consistent with those based on QTY, while according to the AUV, the trend in the LT is negative and the trend in the ST is positive. This suggests a decrease in the HIIT in the LT and an increase in HIIT in the ST. Furthermore, in the ST, the HIIT trend is increasing by 1.0747 percent per quarter, which suggests that the extent of the IIT between Australia and RoW is increasingly in similar quality of the product in this category.

The overall extent of the median IIT based on monetary values between Australia and the eight selected countries is mixed - for some countries the median extent of the IIT is increasing, while for some it is decreasing. The most pronounced decrease is for France where the median extent of the IIT has decreased from 58.04 percent in the period between 1990-1995, to 3.97 percent in the period between 2002-2006. On the other hand, the most pronounced increase of the median extent of the IIT is for Malaysia and Singapore, which recorded an increase in excess of 25 percent in the periods between 1990-1995 and 2002-2006. Based on QTY for most countries, the median extent of the IIT is increasing overtime, while the most pronounced increases are recorded for The United Kingdom, Singapore and France. Observing the median AUV for all countries except for The United States of America, they are increasing, which suggests an increase in the HIIT overtime with these countries. One of the distinct examples was France, where in the period between 1990-1995, the HIIT accounted for a negligible 0.27 percent, which suggests that almost all the IIT were VIIT; while in the period between 2002-2006, the AUV for France is 34.39 percent. This clearly shows that Australia and France are increasingly X and M to each other within this category products of a similar quality.

Observing the Time-coefficient, the extent of the IIT based on monetary values for China, Singapore and The United Kingdom are positive and are increasing in both the LT and the ST; while the most pronounced increase is for Singapore, which recorded an increase of 2.1546 percent per quarter in the ST. By referring to the IIT trends based on QTY, the extent of the IIT trends are increasing for some countries, while for others it is decreasing. The most pronounced decrease is for Thailand based on QTY in the ST and the most pronounced increase is for Singapore based on monetary values in the ST. According to the AUV, the HIIT in overall is increasing for China, France, Germany and Thailand, while for the rest of the countries, the HIIT is decreasing overtime; while the most pronounced increase is for Thailand, which recorded a quarterly increase in the HIIT of 2.4 percent in the ST.

In summary, the median extent of the IIT is mixed. For some countries it is increasing, while for others it is decreasing. The most pronounced increase is for Singapore, whereas the most pronounced decrease is for France. The extent of the IIT according to the Time-coefficients showed a similar pattern as those based on monetary values. Finally, according to the AUV, the HIIT is increasing for some countries, while for others it is decreasing.

7.4.1.5 INTRA-INDUSTRY TRADE; CATEGORY: 1

Table: 7.6

IIT MEDIAN VALUES AND TRENDS: CATEGORY 1* (March 1990:1 – December 2006:4) - (AUD, mill. constant prices – 1990)			
MEDIAN VALUES			
GLI	**AUD**		
AUSTRALIA -	**1990-1995**	**1996-2001**	**2002-2006**
RoW: -IIT	92.04	89.23	76.52
TIME TRENDS			
Time-Coefficients	**AUD**		
AUSTRALIA -	**LT**	**ST**	**Status**
RoW: -IIT	-0.3098	-0.8155	↓↓ - C*

Transportation Services
Source: Compiled from the ABS (2007h; 2007i; 2007b; 2007c)

Table 7.6 shows the median values of the extent of the IIT and the Time-coefficient in category 1 and unlike the previous categories where QTY, AUV and country analysis were analysed, such statistics were not completed in this category due to data unavailability. According to Table 7.6, the median extent of the IIT in category 1 between Australia and RoW is decreasing overtime. The median extent of the IIT has decreased from 92.04 percent in the period between 1990-1995, to 76.52 percent in the period between 2002-2006. These decreases are also evident according to the Time-coefficients, where the extent of the IIT in the LT is decreasing by 0.3098 percent per quarter, while in the ST, this decrease is more pronounced with a decrease of 0.8155 percent per quarter.

7.4.1.6 SUMMARY – INTRA-INDUSTRY TRADE; HS-2, ANZSIC-1

Now that the extent of the IIT for all four goods and one service category has been established, this section will summarize the major findings. Since the general conclusion for all TD categories and countries cannot be made, due to the unrelated nature of the IIT patterns applicable for most of the countries and the categories, the summaries and specific findings are made individually and they are as follows:

Australia and RoW:

- Highest median IIT (AUD) and corresponding AUV (AUD/QTY)
    - Period 1990-1995; Category 1 (92.04 percent, N/A)
    - Period 1996-2001; Category 1 (89.23 percent, N/A)
    - Period 2002-2006; Category 1 (76.52 percent, N/A)

- Lowest median IIT (AUD) and corresponding AUV (AUD/QTY)
    - Period 1990-1995; Category 87 (28.45 percent, 82.4 percent)
    - Period 1996-2001; Category 87 (40.17 percent, 76.71 percent)
    - Period 2002-2006; Category 85 (27.19 percent, 57.95 percent)
- Highest IIT (AUD) Trend and corresponding AUV (AUD/QTY) Trend
    - Period 1990-2006 (LT); Category 87 (+0.346 percent, -0.29 percent)
    - Period 2000-2006 (ST); Category 30 (-0.215 percent, +0.312 percent)
- Lowest IIT (AUD) Trend and corresponding AUV (AUD/QTY) Trend
    - Period 1990-2006 (LT); Category 1 (-0.31 percent, N/A)
    - Period 2000-2006 (ST); Category 1 (-0.816 percent, N/A)

Australia and China:

- Highest median IIT (AUD) and corresponding AUV (AUD/QTY)
    - Period 1990-1995; Category 84 (78.03 percent, 0.53 percent)
    - Period 1996-2001; Category 30 (69.92 percent, 48.56 percent)
    - Period 2002-2006; Category 30 (73.96 percent, 56.09 percent)
- Lowest median IIT (AUD) and corresponding AUV (AUD/QTY)
    - Period 1990-1995; Category 87 (11.94 percent, 0.27 percent)
    - Period 1996-2001; Category 87 (12.74 percent, 5.23 percent)
    - Period 2002-2006; Category 85 (7.25 percent, 25.31 percent)
- Highest IIT (AUD) Trend and corresponding AUV (AUD/QTY) Trend
    - Period 1990-2006 (LT); Category 30 (+0.415 percent, +0.591 percent)
    - Period 2000-2006 (ST); Category 87 (+1.1 percent, +0.793)
- Lowest IIT (AUD) Trend and corresponding AUV (AUD/QTY) Trend
    - Period 1990-2006 (LT); Category 84 (-0.906 percent, +0.188)
    - Period 2000-2006 (ST); Category 84 (-0.539 percent, +0.311)

Australia and France:

- Highest median IIT (AUD) and corresponding AUV (AUD/QTY)
    - Period 1990-1995; Category 87 (58.04 percent, 0.15 percent)
    - Period 1996-2001; Category 84 (24.13 percent, 12.05 percent)

- Period 2002-2006; Category 84 (24.16 percent, 29.13 percent)

- Lowest median IIT (AUD) and corresponding AUV (AUD/QTY)
  - Period 1990-1995; Category 84 (18.55 percent, 8.79 percent)
  - Period 1996-2001; Category 30 (11.59 percent, 34.36 percent)
  - Period 2002-2006; Category 87 (3.97 percent, 34.39 percent)

- Highest IIT (AUD) Trend and corresponding AUV (AUD/QTY) Trend
  - Period 1990-2006 (LT); Category 84 (+0.099 percent, +0.289 percent)
  - Period 2000-2006 (ST); Category 87 (-0.052 percent, +0.462 percent)

- Lowest IIT (AUD) Trend and corresponding AUV (AUD/QTY) Trend
  - Period 1990-2006 (LT); Category 87 (-1.156 percent, +0.73 percent)
  - Period 2000-2006 (ST); Category 84 (-0.534 percent, +0.23 percent)

Australia and Germany:

- Highest median IIT (AUD) and corresponding AUV (AUD/QTY)
  - Period 1990-1995; Category 84 (27.61 percent, 24.08 percent)
  - Period 1996-2001; Category 85 (56.27 percent, 41.55 percent)
  - Period 2002-2006; Category 85 (50.08 percent, 73.94 percent)

- Lowest median IIT (AUD) and corresponding AUV (AUD/QTY)
  - Period 1990-1995; Category 30 (3.6 percent, 0.5 percent)
  - Period 1996-2001; Category 87 (6.65 percent, 10.68 percent)
  - Period 2002-2006; Category 87 (2.17 percent, 35.29 percent)

- Highest IIT (AUD) Trend and corresponding AUV (AUD/QTY) Trend
  - Period 1990-2006 (LT); Category 85 (+0.677 percent, +0.999 percent)
  - Period 2000-2006 (ST); Category 30 (+0.098 percent, +0.212 percent)

- Lowest IIT (AUD) Trend and corresponding AUV (AUD/QTY) Trend
  - Period 1990-2006 (LT); Category 84 (-0.272 percent, +0.578 percent)
  - Period 2000-2006 (ST); Category 85 (-1.65 percent, +0.136 percent)

Australia and Malaysia:

- Highest median IIT (AUD) and corresponding AUV (AUD/QTY)

- Period 1990-1995; Category 84 (69.67 percent, 6.96 percent)
- Period 1996-2001; Category 87 (80.65 percent, 19.96 percent)
- Period 2002-2006; Category 87 (76.92 percent, 35.13 percent)

- Lowest median IIT (AUD) and corresponding AUV (AUD/QTY)
  - Period 1990-1995; Category 30 (35.48 percent, N/A)
  - Period 1996-2001; Category 30 (7.35 percent, N/A)
  - Period 2002-2006; Category 30 (4.85 percent, N/A)
- Highest IIT (AUD) Trend and corresponding AUV (AUD/QTY) Trend
  - Period 1990-2006 (LT); Category 87 (+0.417 percent, +0.354 percent)
  - Period 2000-2006 (ST); Category 30 (-0.025 percent, N/A)
- Lowest IIT (AUD) Trend and corresponding AUV (AUD/QTY) Trend
  - Period 1990-2006 (LT); Category 84 (-0.843 percent, +1.093 percent)
  - Period 2000-2006 (ST); Category 87 (-1.787 percent, -0.425 percent)

Australia and Singapore:

- Highest median IIT (AUD) and corresponding AUV (AUD/QTY)
  - Period 1990-1995; Category 84 (77.16 percent, 26.47 percent)
  - Period 1996-2001; Category 84 (66.3 percent, 34.67 percent)
  - Period 2002-2006; Category 84 (66.39 percent, 20.71 percent)
- Lowest median IIT (AUD) and corresponding AUV (AUD/QTY)
  - Period 1990-1995; Category 87 (11.62 percent, 34.3 percent)
  - Period 1996-2001; Category 87 (15.99 percent, 35 percent)
  - Period 2002-2006; Category 85 (28.2 percent, 20.11 percent)
- Highest IIT (AUD) Trend and corresponding AUV (AUD/QTY) Trend
  - Period 1990-2006 (LT); Category 30 (+0.681 percent, +0.215 percent)
  - Period 2000-2006 (ST); Category 87 (+2.155 percent, -0.229 percent)
- Lowest IIT (AUD) Trend and corresponding AUV (AUD/QTY) Trend
  - Period 1990-2006 (LT); Category 85 (-0.738 percent, +0.243 percent)
  - Period 2000-2006 (ST); Category 30 (-0.503 percent, +1.12 percent)

Australia and Thailand:

- Highest median IIT (AUD) and corresponding AUV (AUD/QTY)
    - Period 1990-1995; Category 85 (84.76 percent, 45.88 percent)
    - Period 1996-2001; Category 85 (52.34 percent, 30.15 percent)
    - Period 2002-2006; Category 84 (46.5 percent, 31.07 percent)
- Lowest median IIT (AUD) and corresponding AUV (AUD/QTY)
    - Period 1990-1995; Category 87 (14.77 percent, 43 percent)
    - Period 1996-2001; Category 30 (15.5 percent, N/A)
    - Period 2002-2006; Category 30 (3.66 percent, N/A)
- Highest IIT (AUD) Trend and corresponding AUV (AUD/QTY) Trend
    - Period 1990-2006 (LT); Category 84 (-0.31 percent, +0.576 percent)
    - Period 2000-2006 (ST); Category 84 (-0.259 percent, -0.119 percent)
- Lowest IIT (AUD) Trend and corresponding AUV (AUD/QTY) Trend
    - Period 1990-2006 (LT); Category 85 (-1.166 percent, +0.251 percent)
    - Period 2000-2006 (ST); Category 85 (-1.543 percent, +0.85 percent)

Australia and United Kingdom:

- Highest median IIT (AUD) and corresponding AUV (AUD/QTY)
    - Period 1990-1995; Category 84 (54.03 percent, 32.15 percent)
    - Period 1996-2001; Category 84 (52.81 percent, 34.73 percent)
    - Period 2002-2006; Category 84 (57.85 percent, 38.79 percent)
- Lowest median IIT (AUD) and corresponding AUV (AUD/QTY)
    - Period 1990-1995; Category 87 (17.95 percent, 10.32 percent)
    - Period 1996-2001; Category 87 (12.01 percent, 40 percent)
    - Period 2002-2006; Category 87 (24.47 percent, 38.6 percent)
- Highest IIT (AUD) Trend and corresponding AUV (AUD/QTY) Trend
    - Period 1990-2006 (LT); Category 85 (+0.167 percent, +0.264 percent)
    - Period 2000-2006 (ST); Category 85 (+0.633 percent, +0.787 percent)
- Lowest IIT (AUD) Trend and corresponding AUV (AUD/QTY) Trend
    - Period 1990-2006 (LT); Category 30 (+0.011 percent, +0.095 percent)

- Period 2000-2006 (ST); Category 84 (-0.243 percent, +1.454 percent)

Australia and United States of America:

- Highest median IIT (AUD) and corresponding AUV (AUD/QTY)
  - Period 1990-1995; Category 87 (72.73 percent, 77.89 percent)
  - Period 1996-2001; Category 87 (68.12 percent, 35.62 percent)
  - Period 2002-2006; Category 87 (60.96 percent, 40.99 percent)
- Lowest median IIT (AUD) and corresponding AUV (AUD/QTY)
  - Period 1990-1995; Category 85 (17.7 percent, 11.72 percent)
  - Period 1996-2001; Category 85 (25.23 percent, 31.98 percent)
  - Period 2002-2006; Category 85 (25.92 percent, 40.43 percent)
- Highest IIT (AUD) Trend and corresponding AUV (AUD/QTY) Trend
  - Period 1990-2006 (LT); Category 30 (+0.444 percent, +0.71 percent)
  - Period 2000-2006 (ST); Category 85 (-0.245 percent, +0.05 percent)
- Lowest IIT (AUD) Trend and corresponding AUV (AUD/QTY) Trend
  - Period 1990-2006 (LT); Category 87 (-0.095 percent, -0.738 percent)
  - Period 2000-2006 (ST); Category 87 (-1.619 percent, -0.071 percent)

Now that the analysis for the selected TD goods categories based on HS-2 and the selected TD service category based on ANZSIC-1 level of aggregation are summarized, the next section will precede with the analyses of the selected TD categories based on a lower level of aggregation.

7.4.2 INTRA-INDUSTRY TRADE; HS-4, ANZSIC-2

The analysis in this section consists of a similar examination as in the previous section; the only difference is that the analyses are at a lower level of aggregation. The categories analyzed are 5 goods categories based on HS-4 level of aggregation and 1 service category based on ANZSIC-2 level of aggregation, while all GLI indices calculated for both the LT and the ST are presented in Appendix Tables 7.10-7.27 Furthermore, as in the previous section analysis of the selected TD goods categories, they consist of both multilateral and bilateral trade analysis between

Australia and the selected TD countries, while the service category is analyzed only on a multilateral basis, due to data unavailability.

7.4.2.1 INTRA-INDUSTRY TRADE; CATEGORY: 3004

***Table:* 7.7**

IIT MEDIAN VALUES AND TRENDS: CATEGORY 3004* (March 1990:1 – December 2006:4) - (AUD, mill. constant prices – 1990 & Qty.* '000's – grams)									
MEDIAN VALUES									
GLI	**AUD**			**QTY**			**AUD/QTY (AUV)**		
AUSTRALIA -	**1990-1995**	**1996-2001**	**2002-2006**	**1990-1995**	**1996-2001**	**2002-2006**	**1990-1995**	**1996-2001**	**2002-2006**
RoW: -IIT	67.51	72.45	69.17	14.27	11.74	21.46	27.62	8.11	11.76
China: - IIT	17.11	58.46	56.46	-	-	-	-	-	-
France: -IIT	41.94	10.48	13.06	0.00	2.74	13.12	0.00	26.69	44.61
Germany: -IIT	0.93	7.60	12.01	0.00	14.99	57.46	0.00	28.96	7.28
Malaysia: -IIT	0.07	2.65	1.17	0.00	0.00	0.00	0.00	0.00	0.00
Singapore: -IIT	20.31	44.38	48.94	0.00	0.00	0.00	0.00	0.00	0.00
Thailand: -IIT	0.34	0.01	0.41	-	-	-	-	-	-
United Kingdom: -IIT	40.03	46.52	31.40	0.00	0.70	0.66	0.00	0.20	0.12
United States: -IIT	17.66	27.70	40.81	0.00	0.31	58.36	0.00	0.04	40.91
TIME TRENDS									
Time-Coefficients	**AUD**			**QTY**			**AUD/QTY (AUV)**		
AUSTRALIA -	**LT**	**ST**	**Status**	**LT**	**ST**	**Status**	**LT**	**ST**	**Status**
RoW: -IIT	+0.1237	-0.3114	↑↓ - **C**	+0.0423	+0.4857	↑↑ - **A**	-0.5587	+0.1643	↓↑ - **A***
China: - IIT	+0.7479	-0.5604	↑↓ - **C**	-	-	-	-	-	-
France: -IIT	-0.347	-0.4651	↓↓ - **C***	+0.5847	+2.1531	↑↑ - **A**	+0.9409	+0.2084	↑↑ - **B**
Germany: -IIT	+0.2357	-0.0536	↑↓ - **C**	+1.0629	-0.3943	↑↓ - **C**	+0.2899	-0.3639	↑↓ - **C**
Malaysia: -IIT	+0.0295	-0.0533	↑↓ - **C**	+0.0007	+0.0018	↑↑ - **A**	+0.0543	+0.143	↑↑ - **A**
Singapore: -IIT	+0.5764	-0.2881	↑↓ - **C**	+0.000	+0.000	↑↑ - -	+0.0002	+0.0002	↑↑ - -
Thailand: -IIT	-0.0433	+0.0128	↓↑ - **A***	-	-	-	-	-	-
United Kingdom: -IIT	-0.0227	-0.5469	↓↓ - **C***	-0.0238	-0.5072	↓↓ - **C***	+0.0159	-0.793	↑↓ - **C**
United States: -IIT	+0.5988	-1.0673	↑↓ - **C**	+0.9781	+2.5714	↑↑ - **A**	+0.0000	-0.0000	↑↓ - -

Medicaments (Excluding Goods of 3002, 3005 or 3006) Consisting of Mixed or Unmixed Products for Therapeutic or Prophylactic Uses, Put Up in Measured Doses or in Forms or Packagings for Retail Sale
Source: Compiled from Trade Data International, (2007) and the ABS (2007a; 2007g; 2007f)

According to Table 7.7, the median extent of the IIT in category 3004 between Australia and RoW based on monetary values the median value is high and is slightly fluctuating. The median extent of the IIT has increased from 67.51 percent in the period between 1990-1995 to 72.45 percent in the period between 1996-2001 and subsequently, it has slightly decreased in the period between 2002-2006 to 69.17 percent. This increase is also recorded based on QTY; however, based on QTY, the volume of the IIT is significantly lower. By observing the AUV, the median value in overall is decreasing which suggests a decrease in the HIIT and an increase in the VIIT overtime in this category between Australia and the RoW.

The extent of the IIT between Australia and RoW according to Time-coefficients is increasing in the LT, while in the ST, it is decreasing by 0.3114 percent per quarter; while based on QTY, it is increasing in both the LT and the ST. According to the AUV, the trend in the LT is negative which suggests a decrease in the HIIT, while the trend in the ST is positive which suggests an increase in HIIT overtime. In the ST, the HIIT trend is increasing by 0.1643 percent per quarter, which suggests that the extent of the HIIT between Australia and the RoW is increasing in similar quality of the product in this category.

The overall median extent of the IIT based on monetary values between Australia and the eight selected countries is mixed; for some countries the median extent of the IIT is increasing, while for some it is decreasing. The most pronounced decrease is for France, where the median extent of the IIT has decreased from 41.94 to 13.06 percent in the period between 1990-1995 and 2002-2006. On the contrary, the most pronounced increase of the median extent of the IIT is for China; China's IIT is 17.11 percent in the period between 1990-1995, while in the period between 2002-2006, the median extent of IIT has increased to 56.46 percent. Based on QTY for most of the countries' median extent of the IIT has increased considerably overtime. Furthermore, the median AUV for most of countries has increased, which suggests an increase in HIIT overtime. One of the distinct examples is France and The United States of America, where in the period between 1990-1995, all IIT are VIIT, while in the period between 2002-2006, the HIIT is in excess of 40 percent for these two countries. This signifies the fact that the X and M between Australia and these two countries is increasing in similar quality of the product in this category.

Observing the Time-coefficient extent of the IIT based on monetary values in the LT, almost all coefficients are positive, while in the ST, all except for Thailand, they are negative. This suggests that the extent of the IIT in this category is decreasing overtime; while the most pronounced decrease is for The United States of America where the extent of the IIT is decreasing in the ST by 1.0673 percent per quarter. By referring to the IIT trends based on QTY, the extent of the IIT trends are increasing for most of countries for which data is available, while this increase is more pronounced in the LT. According to AUV, the increases in the HIIT for all countries in the LT is evident, while in the ST, these trends are mixed and for some countries the HIIT is increasing, while for others, it is decreasing.

In summary, the median extent of the IIT is mixed - for most countries it is increasing, while for the remaining countries, it is decreasing. The most pronounced increase is for China, whereas the most pronounced decrease is for France. The extent of the IIT according to Time-coefficients are mostly positive in the LT, however, in the ST, all except for Thailand, they are negative which shows a decrease in the extent of the IIT overtime. These decreases were less pronounced based on QTY, however, a similarity between monetary values and QTY Time-coefficients' exists. Finally, according to the AUV, the HIIT is increasing in the LT for all countries, while in the ST, for half of the countries the HIIT is decreasing.

7.4.2.2 INTRA-INDUSTRY TRADE; CATEGORY: 8471

Table: 7.8

IIT MEDIAN VALUES AND TRENDS: CATEGORY 8471*
(March 1990:1 – December 2006:4) - (AUD, mill. constant prices – 1990 & Qty.* '000's – number)

MEDIAN VALUES

GLI	AUD			QTY			AUD/QTY (AUV)		
AUSTRALIA -	1990-1995	1996-2001	2002-2006	1990-1995	1996-2001	2002-2006	1990-1995	1996-2001	2002-2006
RoW: -IIT	23.39	22.43	32.14	9.62	7.23	23.12	50.90	43.86	67.29
China: - IIT	7.30	3.91	1.94	1.43	0.27	0.53	10.24	21.99	44.05
France: -IIT	8.51	11.06	32.93	5.38	7.71	17.06	46.56	64.42	39.25
Germany: -IIT	18.40	17.16	36.78	16.10	4.55	25.53	79.32	47.09	45.98
Malaysia: -IIT	35.73	4.17	3.88	3.94	0.86	9.84	12.89	40.20	57.93
Singapore: -IIT	14.23	14.85	25.37	4.49	4.68	14.68	42.68	47.31	67.40
Thailand: -IIT	64.31	6.93	6.81	15.27	0.53	1.48	8.98	15.34	35.58
United Kingdom: -IIT	15.13	25.39	63.57	12.98	19.36	69.27	69.79	62.77	63.76
United States: -IIT	4.14	12.05	30.64	-	-	-	-	-	-

TIME TRENDS

Time-Coefficients	AUD			QTY			AUD/QTY (AUV)		
AUSTRALIA -	LT	ST	Status	LT	ST	Status	LT	ST	Status
RoW: -IIT	+0.1234	+0.5086	↑↑ - A	+0.3622	+1.0528	↑↑ - A	+0.3817	+0.5687	↑↑ - A
China: - IIT	-0.3796	-0.0531	↓↓ - B*	-0.2345	+0.0707	↓↑ - A*	+0.5929	+1.5003	↑↑ - A
France: -IIT	+0.2329	+0.783	↑↑ - A	+0.297	+1.248	↑↑ - A	-0.0372	+0.4239	↓↑ - A*
Germany: -IIT	+0.4298	-0.0046	↑↓ - C	+0.0997	+0.8369	↑↑ - A	-0.4887	+0.6845	↓↑ - A*
Malaysia: -IIT	-0.6143	-0.0207	↓↓ - B*	-0.083	+0.6406	↓↑ - A*	+0.8242	-1.2408	↑↓ - C
Singapore: -IIT	+0.1527	+0.6652	↑↑ - A	+0.2136	+0.582	↑↑ - A	+0.5057	+0.0707	↑↑ - B
Thailand: -IIT	-0.9448	-0.2411	↓↓ - B*	-0.5996	-0.0159	↓↓ - B*	+0.5558	-0.5533	↑↓ - C
United Kingdom: -IIT	+0.84	+1.0355	↑↑ - A	+0.6407	-0.5954	↑↓ - C	-0.1486	-0.3668	↓↓ - C*
United States: -IIT	+0.5794	-0.1083	↑↓ - C	-	-	-	-	-	-

****Automatic Data Processing Machines and Units Thereof; Magnetic or Optical Readers, Machines for Transcribing Data onto Data Media in Coded Form and Machines for Processing Such Data, Not Elsewhere Specified or Included***
Source: Compiled from Trade Data International, (2007) and the ABS (2007a; 2007g; 2007f)

According to Table 7.8, the median values of the IIT in category 8471 between Australia and the RoW based on monetary and QTY values, is increasing overtime, despite small decreases in the period between 1996-2001. These movements are consistent with the movements in the AUV, where the HIIT has increased from 50.9 percent in the period between 1990-1995 to 67.29 percent in the period between 2002-2006; while a slight decrease in the HIIT is recorded in the period between 1996-2001. Observing the trends, the extent of the IIT in this category is increasing in both the LT and the ST based on monetary values and QTY, while these increases are more pronounced based on QTY. Finally, by observing the AUV trends, it shows increases in the HIIT, in both the LT and the ST with a quarterly increase in the HIIT of 0.3817 and 0.5687 percent in the LT and the ST respectively.

In overall, the median extent of the IIT based on monetary values between Australia and the eight selected countries is mixed - for some it is increasing, while for some it is decreasing. The highest percentage of IIT is in the period between 1990-1995 is for Thailand, which recorded 64.31 percent. The highest in the periods between 1996-2001 and 2002-2006 is for The United Kingdom, which recorded 25.39 and 63.57 percent respectively. While the highest decrease in the median extent of the IIT is for Thailand and the highest increase is for The United Kingdom. The extent of the IIT based on QTY shows an increase in the median extent of IIT for most of the countries overtime. Observing the median values for AUV, the results are mixed, however, for most of the countries, the rise in the HIIT is evident. The highest median value of HIIT is in the period between 2002-2006 for Singapore, which accounts for 67.4 percent and the lowest for the same period is for Thailand, which accounts for 35.58 percent.

The Time-coefficient shows that the extent of the IIT based on monetary values in the LT is mostly increasing, while in the ST it is mostly decreasing. The highest increase in the LT is for The United States of America, which accounts for 0.5794 percent increase per quarter and the highest decrease in the ST, is for Thailand, which accounts for 0.2411 percent decrease per quarter. By referring to the IIT trends based on QTY, the situation is somewhat different and for most of the countries' trends, they are positive which shows an increase in the IIT overtime in both the LT and the ST, while these increases are more pronounced in the ST. The Time-coefficients for AUV are mixed - for some countries the extent of the HIIT is increasing, while for some it is decreasing. The most constant increases in the extent of the HIIT over the both periods are for China and the most constant decreases over both periods are for The United Kingdom.

In summary, the median extent of the IIT in this category is mixed - they are increasing for some countries, while decreasing for others. Based on QTY, the extent of the IIT is increasing overtime for most of the countries. Furthermore, the overall patterns identified based on median monetary values and QTY are consistent with movements in the Time-coefficients. Finally, according to the AUV, both the median values and the Time-coefficients shows mixed results, and the extent of the HIIT is increasing for some countries, while for others it is decreasing.

7.4.2.3 INTRA-INDUSTRY TRADE; CATEGORY: 8473

Table: 7.9

IIT MEDIAN VALUES AND TRENDS: CATEGORY 8473* (March 1990:1 – December 2006:4) - (AUD, mill. constant prices – 1990 & Qty.* '000's – number)									
MEDIAN VALUES									
GLI	**AUD**			**QTY**			**AUD/QTY (AUV)**		
AUSTRALIA -	**1990-1995**	**1996-2001**	**2002-2006**	**1990-1995**	**1996-2001**	**2002-2006**	**1990-1995**	**1996-2001**	**2002-2006**
RoW: -IIT	76.20	94.54	64.44	17.62	14.10	11.09	25.83	16.29	18.56
China: - IIT	29.16	17.69	10.35	-	-	-	-	-	-
France: -IIT	77.28	60.44	51.53	-	-	-	-	-	-
Germany: -IIT	80.36	53.83	60.59	-	-	-	-	-	-
Malaysia: -IIT	51.48	75.07	35.64	-	-	-	-	-	-
Singapore: -IIT	81.43	78.57	57.44	-	-	-	-	-	-
Thailand: -IIT	61.27	76.71	58.61	-	-	-	-	-	-
United Kingdom: -IIT	87.32	89.48	68.80	-	-	-	-	-	-
United States: -IIT	57.04	72.50	60.34	-	-	-	-	-	-
TIME TRENDS									
Time-Coefficients	**AUD**			**QTY**			**AUD/QTY (AUV)**		
AUSTRALIA -	**LT**	**ST**	**Status**	**LT**	**ST**	**Status**	**LT**	**ST**	**Status**
RoW: -IIT	-0.0853	-1.8238	**↓↓ - C***	+0.0422	-0.2746	**↑↓ - C**	+0.0973	+0.8293	**↑↑ - A**
China: - IIT	-0.5205	-0.7472	**↓↓ - C***	-	-	-	-	-	-
France: -IIT	-0.4271	-0.2353	**↓↓ - B***	-	-	-	-	-	-
Germany: -IIT	-0.2185	-0.9882	**↓↓ - C***	-	-	-	-	-	-
Malaysia: -IIT	-0.1266	-2.5456	**↓↓ - C***	-	-	-	-	-	-
Singapore: -IIT	-0.4378	-1.0139	**↓↓ - C***	-	-	-	-	-	-
Thailand: -IIT	+0.0326	-1.6583	**↑↓ - C**	-	-	-	-	-	-
United Kingdom: -IIT	-0.3386	+0.3095	**↓↑ - A***	-	-	-	-	-	-
United States: -IIT	+0.3118	-1.5275	**↑↓- C**	-	-	-	-	-	-

***Parts and Accessories (Other Than Covers, Carrying Cases and the Like) Suitable for Use Solely or Principally with Office Machines**
Source: Compiled from Trade Data International, (2007) and the ABS (2007a; 2007g; 2007f)

According to Table 7.9, the median extent of the IIT in category 8473 between Australia and the RoW based on monetary values, are increasing in the periods between 1990-1995 and 1996-2001, however, they are decreasing in periods between 1996-2001 and 2002-2006. Observing these values based on QTY, the median extent of the IIT is steadily decreasing overtime. According to the AUV, it is evident that the extent of the HIIT is somewhat decreasing overtime, which suggests that the percentage in VIIT is increasing overtime in this category. By observing the Time-coefficients based on monetary values in both the LT and the ST they are decreasing, while this decrease is more pronounced in the ST, whereas the extent of the IIT is decreasing by 0.0853 and 1.8238 percent in the LT and the ST respectively. Based on QTY, the extent of the IIT is increasing in the LT, however, it is decreasing in the ST. Finally, according to the AUV, the Time-coefficient suggests that the HIIT is increasing in both the LT and the ST, while this increase is more pronounced in the ST, which recorded a 0.8293 percent increase per quarter in this period.

The overall median extent of the IIT and the Time-coefficients between Australia and the eight selected countries in this category are analysed based on monetary values only, because QTY is not available on a country level for this category. By observing the median extent of the IIT based on monetary values, it is decreasing overtime for all countries except for The United States of America. Furthermore, for some countries, the median extent of the IIT has increased between the periods 1990-1995 and 1996-2001, however, when comparing the periods 1990-1995 and 2002-2006, the extent of the IIT has decreased for all countries except for The United States of America.

The Time-coefficient showed similar movements as the median values of the extent of the IIT. For most of the countries in both the LT and the ST, the trends are negative, which showed a decrease in the extent of the IIT overtime. The most distinct decreases are recorded for Malaysia and The United States of America. The Malaysian Time-coefficients shows a decrease in the IIT in this category in the LT of 0.1266 percent per quarter, while in the ST, this decrease accounts for 2.5456 percent per quarter. Observing the Time-coefficient for The United States of America, it is positive in the LT, however, in the ST, it is negative which shows a decrease in the extent of the IIT by 1.5275 percent per quarter in this category.

In summary, the median extent of the IIT in this category is decreasing for almost all countries, while these decreases are confirmed observing the Time-coefficients in both the LT and the ST. Finally, according to the AUV between Australia and the RoW, the median values shows mixed results, however according to the Time-coefficients, a moderate rise in the HIIT overtime in this category is evident.

7.4.2.4 INTRA-INDUSTRY TRADE; CATEGORY: 8517

Table: 7.10

IIT MEDIAN VALUES AND TRENDS: CATEGORY 8517* (March 1990:1 – December 2006:4) - (AUD, mill. constant prices – 1990 & Qty.* '000's – number)									
MEDIAN VALUES									
GLI	**AUD**			**QTY**			**AUD/QTY (AUV)**		
AUSTRALIA -	**1990-1995**	**1996-2001**	**2002-2006**	**1990-1995**	**1996-2001**	**2002-2006**	**1990-1995**	**1996-2001**	**2002-2006**
RoW: -IIT	60.50	60.25	26.10	40.67	12.92	14.89	66.56	29.41	65.73
China: - IIT	47.41	31.71	6.82	0.03	0.21	0.31	0.03	0.73	6.30
France: -IIT	4.43	18.67	8.25	23.99	2.01	0.06	12.29	15.23	0.56
Germany: -IIT	41.50	43.17	19.34	30.71	11.81	0.24	30.31	11.45	0.99
Malaysia: -IIT	67.86	39.86	4.15	1.47	0.28	0.02	0.92	1.53	0.81
Singapore: -IIT	58.21	46.03	76.73	30.33	20.91	45.23	52.47	18.51	39.65
Thailand: -IIT	33.92	16.25	4.66	0.70	0.13	0.41	4.83	2.21	21.47
United Kingdom: -IIT	73.58	13.71	18.20	27.52	6.36	27.51	40.84	42.21	58.35
United States: -IIT	26.37	28.19	24.82	-	-	-	-	-	-
TIME TRENDS									
Time-Coefficients	**AUD**			**QTY**			**AUD/QTY (AUV)**		
AUSTRALIA -	**LT**	**ST**	**Status**	**LT**	**ST**	**Status**	**LT**	**ST**	**Status**
RoW: -IIT	-0.7414	-1.5307	↓↓ - **C***	-0.5699	-0.118	↓↓ - **B***	+0.0442	+1.3581	↑↑ - **A**
China: - IIT	-0.7048	-1.7292	↓↓ - **C***	-0.0058	-0.0995	↓↓ - **C***	+0.1775	+0.2275	↑↑ - **A**
France: -IIT	+0.0647	-0.7163	↑↓ - **C**	-0.4127	-1.4065	↓↓ - **C***	-0.0221	-1.7199	↓↓ - **C***
Germany: -IIT	-0.18	-2.4106	↓↓ - **C***	-0.553	+0.4937	↓↑ - **A***	-0.4211	+0.2479	↓↑ - **A***
Malaysia: -IIT	-1.3559	-1.3335	↓↓ - **B***	-0.1847	-0.0947	↓↓ - **B***	+0.1138	+0.3581	↑↑ - **A**
Singapore: -IIT	+0.2756	+1.8983	↑↑ - **A**	+0.2939	-1.4324	↑↓ - **C**	+0.0545	-1.0448	↑↓ - **C**
Thailand: -IIT	-0.5799	-0.4169	↓↓ - **B***	-0.1081	-0.131	↓↓ - **C***	+0.155	+0.4231	↑↑ - **A**
United Kingdom: -IIT	-0.8914	+0.626	↓↑ - **A***	-0.1507	+0.6968	↓↑ - **A***	+0.2495	+0.1554	↑↑ - **B**
United States: -IIT	-0.2757	-0.4802	↓↓ - **C***	-	-	-	-	-	-

Electrical Apparatus for Line Telephony or Line Telegraphy, Including Line Telephone Sets with Cordless Handsets and Telecommunication Apparatus for Carrier-Current Line Systems or for Digital Line Systems; Videophones
Source: Compiled from Trade Data International, (2007) and the ABS (2007a; 2007g; 2007f)

According to Table 7.10, the median extent of the IIT in category 8517 between Australia and the RoW based on monetary values is decreasing overtime. The most noticeable decrease is between the periods 1996-2001 and 2002-2006, which decreased from 60.25 to 26.1 percent. This sharp decrease is also evident based on QTY in the periods between 1990-1995 and 1996-2001. However, in the periods between 1996-2001 and 2002-2006 based on QTY, the extent of the IIT has slightly increased. Observing the AUV, the median values in overall are fluctuating which reflects the fluctuation in the HIIT overtime in this category between Australia and the RoW. The extent of the IIT between Australia and the RoW according to Time-coefficients is decreasing in both the LT and the ST, based on both monetary values and QTY, while this decrease is more evident based on monetary values. According to AUV, both trends in the LT and in the ST are positive which suggests an increase in HIIT in this category between Australia and the RoW.

In overall, the extent of the median IIT based on monetary values between Australia and the eight selected countries is decreasing overtime for most of the countries and similar movements are also observed based on QTY. By observing the median AUV, the results are mixed for some countries - the HIIT is increasing overtime, while for others they are decreasing. The most notable decrease in the HIIT is that for Germany, while the most notable increases in HIIT are for Thailand and China.

Observing the Time-coefficient extent of IIT based on monetary values, most of the Time-coefficients are negative in both the LT and the ST. This suggests that the extent of IIT in this category are decreasing overtime, whilst the most pronounced decrease is that for Germany, where the extent of the IIT is decreasing in the ST by 2.4106 percent per quarter. By referring to the IIT trends based on QTY, the extent of IIT trends is also decreasing for most of the countries. Furthermore, according to AUV, the HIIT is increasing for some countries, while for others they are decreasing, while these increases and decreases are more pronounced in the ST compared with the LT.

In summary, the median extent of the IIT is decreasing between Australia and the RoW and for the most of the selected countries. These movements are observable based on all the monetary values, QTY and Time-coefficients. Finally, according to AUV, the results are mixed - for some countries the HIIT is increasing overtime, while for others is decreasing.

7.4.2.5 INTRA-INDUSTRY TRADE; CATEGORY: 8703

Table: 7.11

IIT MEDIAN VALUES AND TRENDS: CATEGORY 8703* (March 1990:1 – December 2006:4) - (AUD, mill. constant prices – 1990 & Qty.* '000's – number)									
MEDIAN VALUES									
GLI	**AUD**			**QTY**			**AUD/QTY (AUV)**		
AUSTRALIA -	**1990-1995**	**1996-2001**	**2002-2006**	**1990-1995**	**1996-2001**	**2002-2006**	**1990-1995**	**1996-2001**	**2002-2006**
RoW: -IIT	29.78	46.64	51.92	14.11	19.37	34.13	55.92	51.72	78.74
China: - IIT	0.00	0.00	18.59	0.00	0.00	2.23	0.00	0.00	3.97
France: -IIT	0.00	0.05	0.03	0.00	0.06	0.05	0.00	5.92	30.61
Germany: -IIT	1.59	0.17	0.22	0.42	0.07	0.14	68.65	50.53	51.88
Malaysia: -IIT	0.00	49.94	33.93	0.00	2.16	8.60	0.00	1.87	21.11
Singapore: -IIT	0.09	3.36	18.57	0.00	26.67	53.33	0.00	10.17	56.50
Thailand: -IIT	0.02	19.48	1.18	0.21	1.01	0.46	0.21	1.70	54.53
United Kingdom: -IIT	10.80	5.16	16.54	2.04	1.39	7.79	44.16	50.84	44.35
United States: -IIT	9.92	64.71	79.32	28.85	69.23	69.60	40.46	52.33	73.34
TIME TRENDS									
Time-Coefficients	**AUD**			**QTY**			**AUD/QTY (AUV)**		
AUSTRALIA -	**LT**	**ST**	**Status**	**LT**	**ST**	**Status**	**LT**	**ST**	**Status**
RoW: -IIT	+0.4474	-0.4139	↑↓ - **C**	+0.4839	+0.6954	↑↑ - **A**	+0.3839	+1.4058	↑↑ - **A**
China: - IIT	+0.4971	-0.7729	↑↓ - **C**	+0.3758	-0.2527	↑↓ - **C**	+0.1675	-1.0969	↑↓ - **C**
France: -IIT	-0.0152	-0.0567	↓↓ - **C***	-0.0014	-0.0085	↓↓ - **C***	+0.5839	+1.7995	↑↑ - **A**
Germany: -IIT	-0.1325	-0.0028	↓↓ - **B***	-0.0238	+0.1418	↓↑ - **A***	-0.0578	+1.0136	↓↑ - **A***
Malaysia: -IIT	+0.6267	-2.3652	↑↓ - **C**	+0.2408	+0.3602	↑↑ - **A**	+0.2987	+1.3985	↑↑ - **A**
Singapore: -IIT	+0.5071	+1.8651	↑↑ - **A**	+0.8041	+2.272	↑↑ - **A**	+0.7951	+1.6066	↑↑ - **A**
Thailand: -IIT	+0.1777	-2.9049	↑↓ - **C**	-0.4318	+0.0588	↓↑ - **A***	+0.8655	+2.9079	↑↑ - **A**
United Kingdom: -IIT	-0.0051	+0.6293	↓↑ - **A***	+0.3331	+0.6784	↑↑ - **A**	+0.1261	+0.9098	↑↑ - **A**
United States: -IIT	+0.9895	-0.4777	↑↓ - **C**	+0.7079	-0.8479	↑↓ - **C**	+0.7663	+1.0496	↑↑ - **A**

Motor Cars and Other Motor Vehicles Principally Designed for the Transport of Persons (Other Than Public Transport Type), Including Station Wagons and Racing Cars
Source: Compiled from Trade Data International, (2007) and the ABS (2007a; 2007g; 2007f)

According to Table 7.11, the median extent of the IIT in category 8703 between Australia and the RoW based on monetary is increasing overtime. The median extent of the IIT in this category has increased from 29.78 percent in the period between 1990-1995 to 46.64 percent in the period between 1996-2001. It has further increased in the period between 2002-2006 to 51.92 percent, while a similar pattern is also recorded based on QTY. Observing the AUV, the median value has decreased from 55.92 to 51.72 percent in the period between 1990-1995 and 1996-2001, however, in the period between 2002-2006, it has significantly increased to 78.74 percent, which suggests an increase in the HIIT and a decrease in VIIT overtime in this category between Australia and the RoW. The extent of the IIT between Australia and RoW according to Time-coefficients is increasing in the LT, while in the ST, it is decreasing by 0.4139 percent per quarter, while based on QTY, it is increasing in both the LT and the ST. According to AUV, the Time-coefficients are positive both in the LT and the ST, which suggests an increase in the HIIT, while this increase is more pronounced in the ST. In the ST, the HIIT is increasing by 1.4058 percent per quarter which suggests that the extent of IIT between Australia and the RoW is increasing in a similar quality of the product in this category.

The overall median extent of the IIT based on monetary values between Australia and the eight selected countries are mixed - for some countries the median extent of the IIT is increasing, while for others is decreasing, however, recorded decreases are negligible. The most pronounced increase is in the median extent of the IIT is for The United States of America, were the median extent of the IIT has increased from 9.92 to 64.71 percent in the period between 1990-1995 and 1996-2001; while in the period between 2002-2006, the median extent of the IIT has increased further to reach 79.32 percent. Furthermore, based on QTY, the median extent of the IIT is increasing overtime for most countries. Observing the median AUV, it has also increased for most of the countries, which suggests an increase in HIIT overtime. One of the distinct examples of these increases are Singapore, Thailand and France where in the period between 1990-1995, almost all of the IIT with these countries were VIIT, while in the period between 2002-2006, the HIIT is in excess of 50 percent for Singapore and Thailand and in excess of 30 percent for France.

Observing the Time-coefficient, the extent of the IIT based on monetary values, the majority of the coefficients are positive in the LT, while in the ST, the majority of the coefficients are negative. This suggests that the extent of the IIT in this category are decreasing overtime, whilst the most pronounced decrease is that for Thailand and Malaysia, where the extent of the IIT with these countries are decreasing in the ST by 2.9049 and 2.3652 percent per quarter respectively. By referring to the IIT trends based on QTY, the extent of the IIT for the majority of the countries in both the LT and the ST, are increasing. Furthermore, according to the AUV, increases in the HIIT for all countries except for China is evident, which suggests that Australia is increasingly exporting and importing products within this category which are in similar quality.

In summary, the median extent of IIT for the eight selected TD countries is mixed - for some countries they are increasing, while for others they are decreasing, whereas the decreases are less pronounced when weighted against the increases. The most pronounced median increase of the extent of the IIT is for The United States of America. The extent of the IIT according to Time-coefficients is mostly positive in the LT, however in the ST, they are mostly negative which suggests a decrease in the extent of IIT overtime. Finally, according to the AUV, the HIIT is increasing in overall for most of the countries, according to both the median values and the Time-coefficients.

7.4.2.6 INTRA-INDUSTRY TRADE; CATEGORY: 1.2

Table: 7.12

IIT MEDIAN VALUES AND TRENDS: CATEGORY 1.2* (March 1990:1 – December 2006:4) - (AUD, mill. constant prices – 1990)			
MEDIAN VALUES			
GLI	**AUD**		
AUSTRALIA -	**1990-1995**	**1996-2001**	**2002-2006**
RoW: -IIT	40.68	43.97	20.46
TIME TRENDS			
Time-Coefficients	**AUD**		
AUSTRALIA -	**LT**	**ST**	**Status**
RoW: -IIT	-0.441	-1.0006	**↓↓ - C***

****Freight Transports***
Source: Compiled from the ABS (2007h; 2007i; 2007b; 2007c)

The final Table 7.12 in this chapter, shows the median values of the extent of the IIT and Time-coefficient in category 1.2, where the analysis are performed based on monetary values only, because QTY for service categories are not available. According to Table 7.12, the median extent of the IIT in category 1.2 between Australia and RoW is decreasing overtime. The median extent of the IIT has increased from 40.68 to 43.97 percent between the periods 1990-1995 and 1996-2001, however, it has plummeted to 20.46 percent in the period between 2002-2006. These decreases are also evident according to Time-coefficients, were the extent of the IIT in the LT is decreasing by 0.441 percent per quarter, while in the ST, this decrease is more pronounced with 1.0006 percent per quarter.

7.4.2.7 SUMMARY – INTRA-INDUSTRY TRADE; HS-4, ANZSIC-2

Now that the extent of the IIT for all five goods and one service category has been established, the major findings are as follows:

Australia and RoW:

- Highest median IIT (AUD) and corresponding AUV (AUD/QTY)
    - Period 1990-1995; Category 3004 (67.51 percent, 27.62 percent)
    - Period 1996-2001; Category 8473 (94.54 percent, 16.29 percent)
    - Period 2002-2006; Category 3004 (69.17 percent, 11.76 percent)
- Lowest median IIT (AUD) and corresponding AUV (AUD/QTY)

- Period 1990-1995; Category 8471 (23.39 percent, 50.9 percent)
- Period 1996-2001; Category 8471 (22.43 percent, 43.86 percent)
- Period 2002-2006; Category 8517 (26.1 percent, 65.73 percent)

- Highest IIT (AUD) Trend and corresponding AUV (AUD/QTY) Trend
  - Period 1990-2006 (LT); Category 3004 (+0.12 percent, -0.56 percent)
  - Period 2000-2006 (ST); Category 8471 (+0.51 percent, +0.57 percent)
- Lowest IIT (AUD) Trend and corresponding AUV (AUD/QTY) Trend
  - Period 1990-2006 (LT); Category 8517 (-0.74 percent, +0.04 percent)
  - Period 2000-2006 (ST); Category 8473 (-1.824 percent, N/A)

Australia and China:

- Highest median IIT (AUD) and corresponding AUV (AUD/QTY)
  - Period 1990-1995; Category 8517 (47.41 percent, 0.03 percent)
  - Period 1996-2001; Category 3004 (58.46 percent, N/A)
  - Period 2002-2006; Category 3004 (56.46 percent, N/A)
- Lowest median IIT (AUD) and corresponding AUV (AUD/QTY)
  - Period 1990-1995; Category 8703 (0.0 percent, 0.0 percent)
  - Period 1996-2001; Category 8703 (0.0 percent, 0.0 percent)
  - Period 2002-2006; Category 8471 (1.94 percent, 44.05 percent)
- Highest IIT (AUD) Trend and corresponding AUV (AUD/QTY) Trend
  - Period 1990-2006 (LT); Category 3004 (+0.748 percent, N/A)
  - Period 2000-2006 (ST); Category 8471 (-0.053 percent, +1.5 percent)
- Lowest IIT (AUD) Trend and corresponding AUV (AUD/QTY) Trend
  - Period 1990-2006 (LT); Category 8517 (-0.71 percent, +0.18 percent)
  - Period 2000-2006 (ST); Category 8517 (-1.73 percent, +0.23 percent)

Australia and France:

- Highest median IIT (AUD) and corresponding AUV (AUD/QTY)
  - Period 1990-1995; Category 8473 (77.28 percent, N/A)
  - Period 1996-2001; Category 8473 (60.44 percent, N/A)
  - Period 2002-2006; Category 8473 (51.53 percent, N/A)

- Lowest median IIT (AUD) and corresponding AUV (AUD/QTY)
    - Period 1990-1995; Category 8703 (0.0 percent, 0.0 percent)
    - Period 1996-2001; Category 8703 (0.05 percent, 5.92 percent)
    - Period 2002-2006; Category 8703 (0.03 percent, 30.61 percent)
- Highest IIT (AUD) Trend and corresponding AUV (AUD/QTY) Trend
    - Period 1990-2006 (LT); Category 8471 (+0.23 percent, -0.04 percent)
    - Period 2000-2006 (ST); Category 8471 (+0.78 percent, +0.42 percent)
- Lowest IIT (AUD) Trend and corresponding AUV (AUD/QTY) Trend
    - Period 1990-2006 (LT); Category 8473 (-0.427 percent, N/A)
    - Period 2000-2006 (ST); Category 8517 (-0.716 percent, -1.72 percent)

Australia and Germany:

- Highest median IIT (AUD) and corresponding AUV (AUD/QTY)
    - Period 1990-1995; Category 8473 (80.36 percent, N/A)
    - Period 1996-2001; Category 8473 (53.83 percent, N/A)
    - Period 2002-2006; Category 8473 (60.59 percent, N/A)
- Lowest median IIT (AUD) and corresponding AUV (AUD/QTY)
    - Period 1990-1995; Category 3004 (0.93 percent, 0.0 percent)
    - Period 1996-2001; Category 8703 (0.17 percent, 50.53 percent)
    - Period 2002-2006; Category 8703 (0.22 percent, 51.88 percent)
- Highest IIT (AUD) Trend and corresponding AUV (AUD/QTY) Trend
    - Period 1990-2006 (LT); Category 8471 (+0.43 percent, -0.49 percent)
    - Period 2000-2006 (ST); Category 8471 (-0.005 percent, +0.7 percent)
- Lowest IIT (AUD) Trend and corresponding AUV (AUD/QTY) Trend
    - Period 1990-2006 (LT); Category 8473 (-0.219 percent, N/A)
    - Period 2000-2006 (ST); Category 8517 (-2.4 percent, +0.248 percent)

Australia and Malaysia:

- Highest median IIT (AUD) and corresponding AUV (AUD/QTY)
    - Period 1990-1995; Category 8517 (67.86 percent, 0.92 percent)
    - Period 1996-2001; Category 8473 (75.07 percent, N/A)

- Period 2002-2006; Category 8473 (35.64 percent, N/A)

- Lowest median IIT (AUD) and corresponding AUV (AUD/QTY)
    - Period 1990-1995; Category 8703 (0.0 percent, 0.0 percent)
    - Period 1996-2001; Category 3004 (2.65 percent, 0.0 percent)
    - Period 2002-2006; Category 3004 (1.17 percent, 0.0 percent)

- Highest IIT (AUD) Trend and corresponding AUV (AUD/QTY) Trend
    - Period 1990-2006 (LT); Category 8703 (+0.63 percent, +0.29 percent)
    - Period 2000-2006 (ST); Category 8471 (-0.021 percent, -1.24 percent)

- Lowest IIT (AUD) Trend and corresponding AUV (AUD/QTY) Trend
    - Period 1990-2006 (LT); Category 8517 (-1.36 percent, +0.11 percent)
    - Period 2000-2006 (ST); Category 8703 (-2.546 percent, N/A)

Australia and Singapore:

- Highest median IIT (AUD) and corresponding AUV (AUD/QTY)
    - Period 1990-1995; Category 8473 (81.43 percent, N/A)
    - Period 1996-2001; Category 8473 (78.57 percent, N/A)
    - Period 2002-2006; Category 8517 (76.73 percent, 39.65 percent)

- Lowest median IIT (AUD) and corresponding AUV (AUD/QTY)
    - Period 1990-1995; Category 8703 (0.09 percent, 0.0 percent)
    - Period 1996-2001; Category 8703 (3.36 percent, 10.17 percent)
    - Period 2002-2006; Category 8703 (18.57 percent, 56.5 percent)

- Highest IIT (AUD) Trend and corresponding AUV (AUD/QTY) Trend
    - Period 1990-2006 (LT); Category 3004 (+0.58 percent, +0.00 percent)
    - Period 2000-2006 (ST); Category 8517 (+1.89 percent, -1.05 percent)

- Lowest IIT (AUD) Trend and corresponding AUV (AUD/QTY) Trend
    - Period 1990-2006 (LT); Category 8473 (-0.438 percent, N/A)
    - Period 2000-2006 (ST); Category 8473 (-1.014 percent, N/A)

Australia and Thailand:

- Highest median IIT (AUD) and corresponding AUV (AUD/QTY)

- Period 1990-1995; Category 8471 (64.31 percent, 8.98 percent)
- Period 1996-2001; Category 8473 (76.71 percent, N/A)
- Period 2002-2006; Category 8473 (58.61 percent, N/A)

- Lowest median IIT (AUD) and corresponding AUV (AUD/QTY)
  - Period 1990-1995; Category 8703 (0.02 percent, 0.21 percent)
  - Period 1996-2001; Category 3004 (0.01 percent, N/A)
  - Period 2002-2006; Category 3004 (0.41 percent, N/A)
- Highest IIT (AUD) Trend and corresponding AUV (AUD/QTY) Trend
  - Period 1990-2006 (LT); Category 8703 (+0.18 percent, +0.87 percent)
  - Period 2000-2006 (ST); Category 3004 (+0.013 percent, N/A)
- Lowest IIT (AUD) Trend and corresponding AUV (AUD/QTY) Trend
  - Period 1990-2006 (LT); Category 8471 (-0.95 percent, +0.56 percent)
  - Period 2000-2006 (ST); Category 8703 (-2.91 percent, +2.91 percent)

Australia and United Kingdom:

- Highest median IIT (AUD) and corresponding AUV (AUD/QTY)
  - Period 1990-1995; Category 8473 (87.32 percent, N/A)
  - Period 1996-2001; Category 8473 (89.48 percent, N/A)
  - Period 2002-2006; Category 8473 (68.8 percent, N/A)
- Lowest median IIT (AUD) and corresponding AUV (AUD/QTY)
  - Period 1990-1995; Category 8703 (10.8 percent, 44.16 percent)
  - Period 1996-2001; Category 8703 (5.16 percent, 50.84 percent)
  - Period 2002-2006; Category 8703 (16.54 percent, 44.35 percent)
- Highest IIT (AUD) Trend and corresponding AUV (AUD/QTY) Trend
  - Period 1990-2006 (LT); Category 8471 (+0.84 percent, -0.15 percent)
  - Period 2000-2006 (ST); Category 8471 (+1.04 percent, -0.37 percent)
- Lowest IIT (AUD) Trend and corresponding AUV (AUD/QTY) Trend
  - Period 1990-2006 (LT); Category 8517 (-0.89 percent, +0.25 percent)
  - Period 2000-2006 (ST); Category 3004 (-0.547 percent, -0.79 percent)

Australia and United States of America:

- Highest median IIT (AUD) and corresponding AUV (AUD/QTY)
  - o Period 1990-1995; Category 8473 (57.04 percent, N/A)
  - o Period 1996-2001; Category 8473 (72.5 percent, N/A)
  - o Period 2002-2006; Category 8703 (79.32 percent, 73.34 percent)
- Lowest median IIT (AUD) and corresponding AUV (AUD/QTY)
  - o Period 1990-1995; Category 8471 (4.14 percent, N/A)
  - o Period 1996-2001; Category 8471 (12.05 percent, N/A)
  - o Period 2002-2006; Category 8517 (24.82 percent, N/A)
- Highest IIT (AUD) Trend and corresponding AUV (AUD/QTY) Trend
  - o Period 1990-2006 (LT); Category 8703 (+0.99 percent, +0.77 percent)
  - o Period 2000-2006 (ST); Category 8471 (-0.108 percent, N/A)
- Lowest IIT (AUD) Trend and corresponding AUV (AUD/QTY) Trend
  - o Period 1990-2006 (LT); Category 8517 (-0.276 percent, N/A)
  - o Period 2000-2006 (ST); Category 8473 (-1.528 percent, N/A)

7.5 EMPIRICAL FINDINGS

Now that the IIT for all TD categories based on (HS-2, ANZSIC-1) and (HS-4, ANZSIC-2) between Australia and the selected TD countries have been analysed, this section will summarise the major findings. Since Sections 7.4.1.6 and 7.4.2.7 provide detailed findings both for the (HS-2, ANZSIC-1) and (HS-4, ANZSIC-2) level of aggregation, this section will only comment in respect to the overall trends in the selected TD categories between Australia and RoW and the selected TD countries. The major findings according to IIT Time-coefficient trends based on AUD and AUV are as follows:

Australia and RoW:

- IIT (AUD), Categories with Positive Trends
  - o HS-2, ANZSIC-1;
    - ▪ Period 1990-2006 (LT); 30, 84, 87
    - ▪ Period 2000-2006 (ST); None
  - o HS-4, ANZSIC-2;

        - Period 1990-2006 (LT); 3004, 8471, 8703
        - Period 2000-2006 (ST); 8471
- AUV (AUD/QTY), Categories with Positive Trends
    - HS-2, ANZSIC-1;
        - Period 1990-2006 (LT); 85
        - Period 2000-2006 (ST); All
    - HS-4, ANZSIC-2;
        - Period 1990-2006 (LT); 8471, 8473, 8517, 8703
        - Period 2000-2006 (ST); All

Australia and China:

- IIT (AUD), Categories with Positive Trends
    - HS-2;
        - Period 1990-2006 (LT); 30, 87
        - Period 2000-2006 (ST); 87
    - HS-4;
        - Period 1990-2006 (LT); 3004, 8703
        - Period 2000-2006 (ST); None
- AUV (AUD/QTY), Categories with Positive Trends
    - HS-2
        - Period 1990-2006 (LT); All
        - Period 2000-2006 (ST); All
    - HS-4
        - Period 1990-2006 (LT); All
        - Period 2000-2006 (ST); 8471, 8517

Australia and France:

- IIT (AUD), Categories with Positive Trends
    - HS-2;
        - Period 1990-2006 (LT); 84
        - Period 2000-2006 (ST); None
    - HS-4;
        - Period 1990-2006 (LT); 8471, 8517
        - Period 2000-2006 (ST); 8471

- AUV (AUD/QTY), Categories with Positive Trends
  - HS-2
    - Period 1990-2006 (LT); All
    - Period 2000-2006 (ST); All
  - HS-4
    - Period 1990-2006 (LT); 3004, 8703
    - Period 2000-2006 (ST); 3004, 8471, 8703

Australia and Germany:

- IIT (AUD), Categories with Positive Trends
  - HS-2;
    - Period 1990-2006 (LT); 30, 85
    - Period 2000-2006 (ST); 30
  - HS-4;
    - Period 1990-2006 (LT); 3004, 8471
    - Period 2000-2006 (ST); None
- AUV (AUD/QTY), Categories with Positive Trends
  - HS-2
    - Period 1990-2006 (LT); 84, 85, 87
    - Period 2000-2006 (ST); All
  - HS-4
    - Period 1990-2006 (LT); 3004
    - Period 2000-2006 (ST); 8471, 8517, 8703

Australia and Malaysia:

- IIT (AUD), Categories with Positive Trends
  - HS-2;
    - Period 1990-2006 (LT); 87
    - Period 2000-2006 (ST); None
  - HS-4;
    - Period 1990-2006 (LT); 3004, 8703
    - Period 2000-2006 (ST); None
- AUV (AUD/QTY), Categories with Positive Trends
  - HS-2

- Period 1990-2006 (LT); 84, 87
- Period 2000-2006 (ST); 84, 85

- HS-4
  - Period 1990-2006 (LT); All
  - Period 2000-2006 (ST); 3004, 8517, 8703

Australia and Singapore:

- IIT (AUD), Categories with Positive Trends
  - HS-2;
    - Period 1990-2006 (LT); 30, 87
    - Period 2000-2006 (ST); 84, 87
  - HS-4;
    - Period 1990-2006 (LT); 3004, 8471, 8517, 8703
    - Period 2000-2006 (ST); 8471, 8517, 8703
- AUV (AUD/QTY), Categories with Positive Trends
  - HS-2
    - Period 1990-2006 (LT); 30, 85, 87
    - Period 2000-2006 (ST); 30, 85
  - HS-4
    - Period 1990-2006 (LT); All
    - Period 2000-2006 (ST); 3004, 8471, 8703

Australia and Thailand:

- IIT (AUD), Categories with Positive Trends
  - HS-2;
    - Period 1990-2006 (LT); None
    - Period 2000-2006 (ST); None
  - HS-4;
    - Period 1990-2006 (LT); 8473, 8703
    - Period 2000-2006 (ST); 3004
- AUV (AUD/QTY), Categories with Positive Trends
  - HS-2
    - Period 1990-2006 (LT); 84, 85

        - Period 2000-2006 (ST); 85, 87
    - HS-4
        - Period 1990-2006 (LT); All
        - Period 2000-2006 (ST); 8517, 8703

Australia and United Kingdom:

- IIT (AUD), Categories with Positive Trends
    - HS-2;
        - Period 1990-2006 (LT); All
        - Period 2000-2006 (ST); 85, 87
    - HS-4;
        - Period 1990-2006 (LT); 8471
        - Period 2000-2006 (ST); 8471, 8473, 8517, 8703
- AUV (AUD/QTY), Categories with Positive Trends
    - HS-2
        - Period 1990-2006 (LT); All
        - Period 2000-2006 (ST); 84, 85
    - HS-4
        - Period 1990-2006 (LT); 3004, 8517, 8703
        - Period 2000-2006 (ST); 8471, 8517, 8703

Australia and United States of America:

- IIT (AUD), Categories with Positive Trends
    - HS-2;
        - Period 1990-2006 (LT); 30, 84, 85
        - Period 2000-2006 (ST); None
    - HS-4;
        - Period 1990-2006 (LT); 3004, 8471, 8473, 8703
        - Period 2000-2006 (ST); None
- AUV (AUD/QTY), Categories with Positive Trends
    - HS-2
        - Period 1990-2006 (LT); 30, 85
        - Period 2000-2006 (ST); 30, 84, 85
    - HS-4
        - Period 1990-2006 (LT); All

- Period 2000-2006 (ST); All

Observing these trends, it is evident that the extent of the IIT is decreasing overtime between Australia and the selected TD countries in most of the categories and countries. The most pronounced decreases in the extent of the IIT is for The United States of America and Malaysia, however, the rest of the countries follow a similar downward trend in the majority of the categories. Although the IIT trends in monetary values are mostly negative, the AUV trends are mostly positive for the majority of countries in both the LT and the ST. In overall, this suggests that the HIIT is increasing, while the extent of the IIT is decreasing, between Australia and the selected TD countries in the selected TD categories.

7.6 CONCLUSION

In this chapter, the theoretical development of the simultaneous X and M between countries known as IIT has been reviewed. A comprehensive review of the existing empirical literature has identified numerous measurements of the extent of the IIT. Furthermore, it has established that all existing measurements posses some advantages and limitations when compared to one another. One such measurement of the extent of the IIT is the unadjusted GLI, which also has been criticised for its failure to adjust to the trade imbalances and for being a static measure of the extent of IIT. Despite these criticisms, an unadjusted GLI as a measure of the extent of IIT has been widely utilized in most of the existing studies which measure the extent of the IIT between various countries.

Furthermore, some researchers like Vona (1991) explicitly recommend the usage of an unadjusted GLI for measuring the extent of the IIT, while some other well-known researchers such as Hamilton & Kniest (1991), Ballance *et al*. (1992), Evenett & Keller (2001) and Brülhart & Elliott (2002), have used the unadjusted GLI in their studies. Hence, the adopted measure for the extent of the IIT in the selected TD categories between Australia and the selected TD countries in this study has been an unadjusted GLI.

The unadjusted GLI in this study has been used to calculate the extent of the IIT based on both monetary and QTY values, and to the best of my knowledge, calculating the index based on QTY has not been calculated previously in other studies. In addition, all calculated indices in this chapter are based on quarterly time intervals to avoid

„time interval bias', as greater time intervals are likely to lead to a greater extent of the IIT.

Once an unadjusted GLI has been calculated, which are based on monetary values, QTY and the AUV, the median values of these indices was calculated for the three time periods (1990-1995, 1996-2001 and 2001-2006) in order to observe the changes in the extent of the GLI over these sequential periods. In addition to median values, the GLI Time-coefficient was estimated based on monetary values, QTY and the AUV, to establish the LT and ST trends in the extent of the IIT and the HIIT overtime. Furthermore, due to data unavailability, an unadjusted GLI median values and Time-coefficients in the selected TD service categories are analysed only for Australia and the RoW.

These calculated median values infer that the extent of the IIT in all selected TD categories between Australia and the selected TD countries is relatively high[128], based on both (HS-2, ANZSIC-1) and (HS-4, ANZSIC-2) level of aggregation. However, despite the high levels of the extent of the IIT in the selected TD categories, this extent has been significantly decreasing overtime for almost all of the selected TD categories and countries at both levels of aggregation. These decreasing trends are more pronounced in the ST than in the LT. The exception to this finding is The United Kingdom, where the extent of the IIT based on HS-4 level of aggregation is moderately increasing.

While the extent of the IIT is decreasing overtime for most of the TD countries, the HIIT is in overall increasing for all countries. This finding suggests that the simultaneous X and M between Australia and the selected TD countries is increasing in the products of similar quality. Hence, we can infer that the selected TD categories and corresponding industries are becoming more internationally competitive, which is consistent with the findings in Chapter 5, where the Import Penetration Index (MPI) revealed evidence of an increase in international competition faced by Australian producers in these selected TD categories.

Finally, the extent of the IIT and HIIT calculated and analysed in this chapter in the selected categories and countries is merely the outcome of the X and M patterns

[128] This finding was highly expected, due to the selection protocol criteria for TD categories and countries developed in Chapter 4, where one of the central criteria was that a significant X and M volumes exists in the selected TD categories between Australia and selected TD countries.

within particular categories between Australia and the selected countries. Although these findings are significant, the reasons for these outcomes are not identified due to scope of this research, and thus would require further research. Now that the extent of the IIT is established, Chapter 8 will estimate the NX in these selected TD categories between Australia and the selected countries.

CHAPTER 8

8. NET EXPORT ANALYSIS

8.1 INTRODUCTION

Unlike in Chapter 6, where both multilateral and bilateral Export (X) supply and Import (M) demand have been estimated, in this chapter only the bilateral Net Export (NX) models between Australia and the selected Trade Deficit (TD) countries and categories are estimated. In comparison to multilateral trade analysis, bilateral trade analysis is likely to divulge additional information that is distinctive for each TD country analysed and as a result, it is likely to provide supplementary information to policy makers. Furthermore, this approach is likely to provide an insight as to what economic variables are significantly influencing the trade flows between Australia and the selected TD countries on a country-by-country basis. Once this is accomplished, it is expected to reveal the key determinants of the NX between Australia and the selected TD countries in the selected TD categories.

The structure of this chapter is divided into 5 sections; - Section 8.2, data and data sources, Section 8.3, econometric methodology, Section 8.4, the NX theoretical framework, which includes the NX models estimation, followed by Section 8.5, a summary of empirical findings and finally, Section 8.6 presents the concluding remarks. Section 8.2 defines the data and the data sources, while Section 8.3 briefly comments on the econometric methodology that will be used in this chapter. The models estimated are presented in Section 8.4 which are estimated based on HS-2[129] and HS-4[130] level of aggregation, while an overall summary of the empirical findings are presented in Section 8.5

8.2 DATA AND DATA SOURCES

In this chapter, the Australian X and M trade data for all the selected TD countries and categories are obtained from the Trade Data International (TDI). The Australian Gross Domestic Product (GDP) (ABS, 2008 d) and Savings Rates (SVR) (ABS, 2008a) data are obtained from the Australian Bureau of Statistics (ABS). The Australian Exchange Rate (EXR[131]) for all the selected TD countries except for

[129] Harmonized Commodity Description and Coding System - Second Level of aggregation (HS-2).
[130] Harmonized Commodity Description and Coding System - Forth Level of aggregation (HS-4).
[131] The EXR data from the RBA are originally in monthly time-intervals and for the purpose of this analysis converted to quarterly time-series by taking an average of the corresponding 3 monthly EXR's, while the EXR for Thailand are originally in

Thailand (RBA, 2009a), Money Supply (MS) (RBA, 2009c) and Interest Rates (IR) (RBA, 2009d) are obtained from the Reserve Bank of Australia (RBA).

The units of the X and M between Australia and the selected TD countries and categories in the monetary values are recorded in Australian Dollar Currency (AUD) - AUD, mill. in both the Harmonized Commodity Description and Coding System (HS) - the Second Level of Aggregation (HS-2) and the Fourth Level of Aggregation (HS-4). Furthermore, the units of the X and M values based on Quantity (QTY) in all estimated models between Australia and the selected TD countries are in single units[132]. Finally, the Australian GDP and SVR[133] are expressed in AUD, mill., MS is expressed in AUD, bill. and the IR[134] are expressed in percentage per annum.

The data for China is obtained from the Organization for Economic Cooperation and Development (OECD), RBA and The People's Bank of China. The GDP data is obtained from OECD (2008d), the EXR are obtained from the RBA (2009a), the MS, IR data are obtained from OECD (2008e), and the SVR data is obtained from The People's Bank of China (2009). The GDP[135] and MS[136] are expressed in Chinese Yuan bill., the SVR[137] data is expressed in 100s of Yuan, mill. and the IR is expressed in percentage per annum.

The data for France and Germany are obtained from the Bank of France (BOF), Deutsche Bundesbank, OECD and RBA. The GDP data for France and Germany are obtained from the OECD (2008d), the EXR[138] is obtained from the RBA (2009a), and the MS data for France and Germany are obtained from the BOF (2008a) and Deutsche Bundesbank (2009) respectively. Furthermore, the IR data for France and Germany are obtained from the OECD (2008e) and the SVR data for France and Germany are obtained from BOF (2008b) and OECD (2008e) respectively. The

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quarterly time intervals. Furthermore, all EXR (except for the TWI) are expressed as value of one unit of foreign currency in terms of the Australian currency.

[132] Detailed procedure of the conversion of the X and M trade data from nominal to real values, conversion from monthly to quarterly time-series data and all other relevant information is explained in detail in Chapter 4.

[133] The Australian SVR originally is expressed in AUD mill., however, these figures are converted to AUD bill. in order to be consistent with most of the other TD countries data.

[134] The lending standard variable rates.

[135]The Chinese GDP data is only available from 1995:Q1 and is expressed in Yuan, bill., while these data are converted to AUD, mill. in order to be consistent with the Australian GDP data.

[136] The Chinese MS (M3) data is converted to AUD, bill. in order to be consistent with the Australian MS data.

[137] The Chinese SVR refers to net savings data and is only available from 2000:Q1. The net savings data is originally expressed in monthly intervals and in 100s Yuan, mill. These data are converted to quarterly time intervals (as the values at the end of the period) and to AUD, bill. in order to be consistent with the Australian SVR data.

[138] The structural break in the EXR for France and Germany exists, due to the introduction of the Euro currency on January 1, 1999, when France's Franc and Germans' Mark were replaced by the common European currency Euro. Consequently, the EXR for these 2 countries is proxy by the Trade-Weighted Index (TWI). This proxy can be considered reliable, since according to the RBA (2009b), the European Euro is on the third highest position in the TWI table, where the total Australian trade weight with the European countries (which includes France and Germany) accounts for 11.65 percent of the total Australian trade.

GDP[139] data for both France and Germany are expressed in the European Currency Euro (EUR), EUR, bill., the MS[140] is expressed in EUR, mill. and the IR[141] for France and Germany are expressed in percentage per annum. The SVR[142] for France is expressed in EUR, mill., while the SVR[143] for Germany is expressed in EUR, bill.

The data for Malaysia is obtained from the Department of Statistics Malaysia (DOSM) and the RBA. The GDP data is obtained from the DOSM (2009) and the EXR is obtained from the RBA (2009a), while the Malaysian GDP[144] is expressed in the Malaysian Ringgit, mill.

The data for Singapore is obtained from the Monetary Authority of Singapore (MAS), the RBA and the Singapore Department of Statistics. The GDP data is obtained from the Singapore Department of Statistics (2009), the EXR is obtained from RBA (2009a), while the MS (MAS, 2008a), IR (MAS, 2008b) and SVR (MAS, 2008c) data are obtained from the MAS. The GDP[145], MS[146] and SVR[147] are expressed in Singaporean Dollars mill. and the IR[148] is expressed in percentage per annum.

The data for Thailand is obtained from the Bank of Thailand (BOT) and the Thailand National Economic and Social Development Board (NESDB). The GDP data is obtained from the NESDB (2008), while the EXR (BOT, 2008a), the MS (BOT, 2008b), the IR (BOT, 2007a) and the SVR (BOT, 2007b) data are all obtained from

[139] The GDP data for France and Germany is converted to AUD, mill. in order to be consistent with the Australian GDP. Furthermore, as the EXR for Euro is not available before January 1999, the period between 1990:Q1 and 1998:Q4 is the EXR estimate only, while these EXR data has been used for conversion of the France and German GDP to AUD mill. for this period.

[140] The original MS data (M3) for France and Germany are expressed in EUR, mill. and are in monthly intervals. These data are converted to AUD, bill. and to the quarterly time-series (as the values at the end of the period) in order to be consistent with the Australian MS data. Additionally, the MS data for these 2 countries correspond to the MS for the whole Euro Area and are available only from 1997:Q3, consequently the MS for period between 1990:Q1 and 1997:Q2, are again estimates only. The main reason why the whole Euro Area MS data for these 2 countries is used is due to the nature of the MS data for individual European countries (individual European countries MS is available only as a contribution by each country to the total MS for the whole Euro Area). However, since such contribution can be negative (for any individual country contribution), such data are considered not suitable since the log values cannot be taken from negative values. Due to this, the MS data for France and Germany used in this study are those for the whole Euro Area.

[141] The IR data for France and Germany due to breakdowns in series, which are associated with the European Union integration, are proxy by the 10-year government bonds yield.

[142] The France SVR are originally expressed in monthly intervals and in EUR, mill.; these data are converted to quarterly time intervals (as the values at the end of the period) and are converted to AUD, bill. in order to be consistent with the Australian SVR data.

[143] The Germany SVR are originally expressed in quarterly intervals and in EUR, bill.; these data are converted to AUD, bill. in order to be consistent with the Australian SVR data.

[144] The Malaysian GDP data is obtained from the DOSM on special request. This data is originally expressed in Malaysian Ringgit, mill. which is converted to AUD, mill. in order to be consistent with the Australian GDP data.

[145] The GDP data for Singapore is converted to AUD, mill. in order to be consistent with the Australian GDP.

[146] The original MS data (M3) for Singapore is expressed in Singaporean Dollars, mill., in monthly intervals and are available from 1991:Q1 This data is converted to AUD, bill. and to the quarterly time-series (as the values at the end of the period) in order to be consistent with the Australian MS data.

[147] The Singaporean SVR is originally expressed in Singaporean Dollars, mill., in monthly intervals and are available from 1991:Q1 This data is converted to the quarterly time-series (as the values at the end of the period) and to AUD, bill. in order to be consistent with the Australian SVR data.

[148] The IR data for Singapore is originally in monthly time-intervals, which are converted to quarterly time-series (as the values at the end of the period) in order to be consistent with the Australian IR data.

the BOT. The GDP[149], MS[150] and SVR[151] are expressed in Thailand's Bath mill. and the IR[152] are expressed in percentage per annum.

The data for The United Kingdom is obtained from the Bank of England (BOE), the OECD and the RBA. The GDP data is obtained from the OECD (2008d), the EXR from the RBA (2009a), the MS from the OECD (2008e), whilst the IR (BOE, 2009a) and SVR (BOE, 2009b) are obtained from the BOE. The GDP[153], MS[154] are expressed in Pound Sterling, bill. and SVR[155] is expressed in Pound Sterling, mill., while the IR is expressed in percentage per annum.

The data for The United States of America is obtained from the OECD, the RBA and the U.S. Board of Governors of the Federal Reserve System. The GDP data is obtained from the OECD (2008d), the EXR from the RBA (2009a), the MS from the OECD (2008e), whilst the IR (The U.S. Board of Governors of the Federal Reserve System, 2008a) and the SVR (The U.S. Board of Governors of the Federal Reserve System, 2008b) are obtained from the U.S. Board of Governors of the Federal Reserve System. The GDP[156], MS[157] are expressed in The United States of America Dollar Currency (USD), mill. and SVR[158] are expressed in USD, bill., while the IR[159] are expressed in percentage per annum.

Finally, all the X and M data used in this chapter are in the quarterly time-series intervals based on HS-2 (Appendix Tables 6.1-6.19) and HS-4 (Appendix Tables 6.20-6.46) level of aggregation, while the Australian GDP data is presented in Appendix Table 6.46. In addition, the models estimated are only for the selected

[149] The GDP data for Thailand is converted to AUD, mill. in order to be consistent with the Australian GDP, while Thailand's GDP data is available from 1993:Q1.
[150] The original MS data (M3) for Thailand is expressed in Thailand Bath, mill. and are in monthly intervals. This data is converted to AUD, bill. and to the quarterly time-series (as the values at the end of the period) in order to be consistent with the Australian MS data.
[151] Thailand's SVR is originally expressed in Thailand Bath, mill., in quarterly time intervals and are available from 1992:Q4. This data is converted to AUD, bill. in order to be consistent with the Australian SVR data.
[152] The IR data for Thailand is originally in monthly time-intervals, which are converted to quarterly time-series (as the values at the end of the period) in order to be consistent with the Australian IR data.
[153] The GDP data for the United Kingdom is converted to AUD, mill. in order to be consistent with the Australian GDP.
[154] The original MS data (M3) for the United Kingdom is converted to AUD, bill. in order to be consistent with the Australian MS data.
[155] The United Kingdom's SVR is converted to AUD, bill. in order to be consistent with the Australian SVR data.
[156] The GDP data for the United States of America is converted to AUD, mill. in order to be consistent with the Australian GDP.
[157] The original MS data (M3) for The United States of America is converted to AUD, bill. in order to be consistent with the Australian MS data. Furthermore, this data is only available until 2005:Q4 as the Board of Federal Reserve System has ceased the publication of the „M3' and its components for The United States of America on March 23, 2006. For more information visit: http://www.federalreserve.gov/releases/h6/discm3.htm
[158] The United States of America's SVR is originally in monthly time-intervals, which are converted to quarterly time-series (as an average of the corresponding 3 months period) and to AUD, bill. in order to be consistent with the Australian SVR data.
[159] The IR data for The United States of America is originally in monthly time-intervals, which is converted to quarterly time-series (as the values at the end of the period) in order to be consistent with the Australian IR data.

goods categories, as for the selected TD service categories, the QTY, the X and M data on a country level are not available.

8.3 ECONOMETRIC METHODOLOGY

The econometric methodology that will be used in this chapter is outlined in detail in Chapter 6 - Section 6.3, as the methodology used in Chapter 6 and this chapter is the same. The aim of the methodology used is to ensure that all NX models estimated are conforming to the 9 classical model assumption (Gujarati, 2003), in order to obtain an unbiased estimates for the population parameters. This is critical since according to Phillips (1986) and Gujarati (2003), if some of these assumptions are violated, the t-tests and F- tests are unlikely to be reliable.

In addition to these classical assumptions, both the dependent and independent variable(s) must be stationary which means that the mean, variances and autocovariances are constant overtime. The failure to ignore non-stationarity problem is likely to result in autocorrelation, a non-normality problem and most importantly to cause spurious regression.

Since the 9 classical assumptions and stationarity are critical, the adopted estimation procedures will commence by testing the variables for the presence of the unit root (non-stationarity). The tests for non-stationarity will include both informal and formal procedures. The informal procedure is by plotting the time-series data and observing the trend (both the linear and non-linear) and any possible relationship and the formal method will include the Dickey-Fuller Test (DFT), Augmented Dickey-Fuller Test (ADFT) (Dickey & Fuller, 1979) and the Phillips-Perron Test (PPT) (Phillips & Perron, 1988).

Once the variables are tested for non-stationarity and if none of the variables have a unit root, the Ordinary Least Squares (OLS) will be applied, followed by the standard diagnostic tests. If some variables have a unit root and some do not, the first difference or second difference (if required) will be taken off the variables which have a unit root. Once these variables (with a unit-root) after differencing becomes stationary, the OLS will be applied followed by the standard diagnostic tests. If all variables have a unit root and such variables are stationary in the first difference form I(1) or in any other form i.e. I(2)[160], I(3), such variables can be potentially

[160] If it is more than 2 „>I(2)', the coefficient(s) estimated can not be meaningfully interpreted.

cointegrated, consequently, the Johansen Maximum Likelihood Procedure (JMLP) test for cointegration will be carried out. If the JMLP reveals one cointegrating equation, the Error Correction Model (ECM) will be applied followed by the standard diagnostic tests, however, if the JMLP reveals more than one cointegrating equation, the Vector Autoregression Model (VARM) will be applied followed by the standard diagnostic tests.

Due to the large number of models which will be estimated in this chapter (98 in total), if the diagnostic tests reveal any of the diagnostic problems such as serial correlation, heteroscedasticity, model misspecification or non-normality of residuals, this will be reported only, without undertaking any specific correction procedures. The only correction procedure (if deemed necessary) which will be undertaken, is for the serial correlation (the same as in chapter 6, where the X supply and the M demand is estimated). If any of the estimated models show evidence of serial correlation problems, an independent variable First-order Autoregressive (AR(1)) variable will be added to such model(s) and the model(s) will be re-estimated. This procedure is known as an iterative Cochrane-Orcutt procedure (Cochrane & Orcutt, 1949), used for the correction for the serial correlation. Finally, the models which will be estimated using the ECM will contain additional independent variable „Residual (-1)', which is a long-run residuals (error term) from the OLS (long-run model), lagged by one period.

8.4 NET EXPORT

The NX in this study refers to the trade balance between Australia and the selected TD countries in the selected TD categories. All NX models that will be estimated in this study are examined on a bilateral basis in order to establish the patterns and determinants of a two-way trade between Australia and the selected TD countries. According to Kyereme (2002), the bilateral trade analyses when compared to the multilateral trade analysis are likely to provide policy makers with more comprehensive trade balance information. This includes „a country specific' variables that are significant in trade flows determination, which in turn can assist policy makers to tailor more effective trade policies.

In order to estimate the NX models between Australia and the selected TD countries, an important question is to establish which explanatory variables should be included in the model. In order to address this question, the next section will examine determinants of the trade flows from the theoretical and empirical perspective and subsequently, it will establish the relevant variables that will be included in the NX models.

8.4.1 THEORETICAL FRAMEWORK AND EMPIRICAL STUDIES

The econometric analysis of the NX in the current literature is limited. The studies that investigate the trade balance and the net trade flows include studies by Bahmani-Oskooee (1992), Martín & Velázquez (2002), Kyereme (2002) and Duasa (2007). Two most relevant empirical studies that have estimated the NX are the studies by Kyereme (2002) and Duasa (2007), while Tang (2008) has comprehensively reviewed the study by Duasa (2007). The study by Kyereme (2002) estimated the NX between the United States of America and Australia, while the study by Duasa (2007) estimated the NX between Malaysia and the Association of Southeast Asian Nations (ASEAN) countries. The dependent variables used in these two studies by Kyereme (2002) and Duasa (2007) are the United States of America's NX over the Australian NX and the ratio of the X over M between Malaysia and ASEAN respectively.

Kyereme (2002) used 4 independent variables which includes the GDP, EXR, MS and IR, while the GDP, MS and IR are all expressed as a ratio of the United States of America's values relative to the Australian values and the EXR is expressed as value of one unit of the AUD in terms of the USD. The major findings in this study suggest that the IR is the most significant variable, followed by the GDP, MS and EXR. Furthermore, all variables except the MS and the EXR are statistically significant at 1 percent level, while the MS is significant at a 5 percent level and the EXR is not statistically significant. Finally, the 3 independent variables (GDP, MS and IR) have a negative relationship with the NX and the IR is having a positive relationship with the NX.

Duasa (2007) used 3 independent variables which includes the Malaysian EXR, GDP and MS. The overall finding in this study shows a weak statistical link between the NX and the EXR, while the links between the NX - GDP and the NX - MS are statistically significant at a 1 percent level of significance. In overall, in the long-run, the independent variables GDP and EXR shows a negative relationship with the NX and the MS shows a positive relationship with the NX. However, the coefficients estimated using the ECM shows a negative relationship between the NX and all these 3 independent variables.

The major difference between these 2 studies is that Kyereme (2002) compared to Duasa (2007) has used in the model an additional independent variable the IR. Furthermore, Kyereme has taken into account the values of both the domestic and foreign macroeconomic variables, while Duasa has included only the Malaysian domestic macroeconomic variables in the model. Tang (2008) has criticized the approach adopted by Duasa (2007), since the independent variables the GDP and MS are only observed for the Malaysian economy, while the foreign GDP and MS are not taken into account. In addition, according to Tang (2008), the IR is an important dependent variable and should be included in the NX model, however, Duasa (2007) has omitted this variable.

Both NX models estimated by Kyereme (2002) and Duasa (2007), has used an aggregated X and M volumes as a dependent variable, without reference to any specific category. This approach is likely to have some downsides, as it can be argued that different trade categories is likely to respond differently to changes in the macroeconomic variables. Hence, the estimation of the NX models with reference to specific trade categories is likely to reveal more specific information on a category-by-category basis. Kyereme (2002) recognized the potential downsides of his model and clearly suggests that further research in this area is required, which includes and is not limited, to model modification and inclusion of an additional variable(s) in order to develop a more robust NX model.

As a result of this review, the dependent variable in this chapter will follow Duasa's (2007) approach and the NX will be expressed as a ratio of the X to M between Australia and the selected TD country, in the selected TD category. This approach as Bahmani-Oskooee (1991) suggested is preferable, since it is not sensitive to the units of measurement and interpretation of such ratio refers to real trade balance. In addition, the usage of the ratio maintains a positive value of the NX, irrespective of whether the trade balance is a positive or negative value; hence, the variables can be expressed in a natural logarithm if required. Due to these advantages, the NX ratio has been used in numerous empirical studies, which includes studies by Bahmani-Oskooee & Brooks (1999), Onafowora (2003) and Duasa (2007).

Furthermore, according to the Keynesian open macroeconomic model, the country's GDP is one of the major determinants of the NX levels, which argues that contractionary fiscal policy reduces the TD, while expansionary fiscal policy increases the TD levels. This method in the current literature is known as the „absorption approach'. The „absorption approach' has been pioneered by Harberger (1950), Meade (1951) and Alexander (1959), which specifies that any trade balance improvements can be achieved only by increasing the domestic aggregate income over aggregate expenditure.

The studies which provide statistical evidence of the relationship between GDP levels and the trade flows includes studies by Balassa (1967), Goldstein & Khan (1978; 1985), Silvapulle & Phillips (1985), Arize (1987), Lawrence 1990, Koshal *et al.* (1992), Carone (1996), Warr & Wollmer (1996), Belessiotis & Giuseppe (1997), Baharumshah (2001), Boyd *et al.* (2001); Chinn (2004), Havrila (2004), Lau *et al.* (2004), Kyereme (2002) and Duasa (2007).

Based on a review of empirical studies, the NX model in this form is presented in Equation 8.1

$$X_{D(i)}{}^{t} / M_{D(i)}{}^{t} = f\left[\left(GDP_D{}^{t} / GDP_j{}^{t}\right)\right] \tag{8.1}$$

where: $'X_D'$ and $'M_D'$ is the Australian (or domestic) X and M respectively, $'i'$ is the industry for the category i, $'j'$ is the foreign country j and $'t'$ is the time period.

Another independent variable that is traditionally used in the analysis of the balance of payment and the trade models is the EXR, where the EXR theoretically determines the relative prices of the X and M volumes, hence the NX levels. This method in the current literature is known as the „elasticity approach' or as „imperfect substitute' model. The „elasticity approach' attempts to establish whether the devaluation of the country currency improves the country's trade balance according to the Marshall-Lerner condition[161]. The studies which have analysed the trade balance using

[161] The Marshall-Lerner condition stipulates that if the sum of the price elasticity of the X and M (in absolute values) exceed unity, the devaluation of the country's currency will improve the trade balance. However, based on empirical evidence, the relative depreciating of the currency in relations to other trading partners currencies will lead to the improvement in trade balance only in the long-run, while in the short-run, the trade balance will deteriorate. This phenomena is know as a „J-curve' (Dornbusch *et al.*, 2002); however, the empirical support for the J-curve phenomena is inconclusive, and some studies show the evidence for the J-curve phenomena (Bahmani-Oskooee, 1985), while others such as Himarios (1989) do not.

elasticities approach includes Frenkel *et al*. (1969), Dornbusch (1975), Johnson (1976) and Boyd *et al*. (2001) and Xu (2008).

From the point of economic theory, the EXR is likely to have a significant impact on the X and M flows and this is supported by a numerous empirical studies which includes studies by Himarios (1989), Bahmani-Oskooee (2001), Kyereme (2002) and Bahmani-Oskooee & Wang (2007). All of these studies have found a significant relationship between the trade balance and the EXR. On the other hand, the studies by Greenwood (1984), Mahdavi & Sohrabian (1993), Rahman *et al*. (1997) and Duasa (2007) have found rather weak statistical evidence of the relationship between the EXR and the X and M flows. Based on these empirical findings, inconclusive evidence exists whether the EXR are statistically significant in determining the X and M flows. In order to shed some light as to whether the EXR are statistically significant in determining the X and M flows between Australia and the selected TD countries and categories, the EXR variable will be included in the NX models estimated in this chapter. The EXR variable has been also used in the studies by Kyereme (2002) and Duasa (2007), which have estimated the NX between The United States of America, Australia, Malaysia and ASEAN countries respectively. The NX model in this form is presented in Equation 8.2

$$X_{D(i)}{}^{t} / M_{D(i)}{}^{t} = f\left[\left(GDP_{D}{}^{t} / GDP_{j}{}^{t}\right), EXR_{D/F}\right] \qquad (8.2)$$

where: '$EXR_{D/F}$' is the EXR of the Australian Dollar per one unit of the foreign currency.

Finally, another method used in the analysis of the balance of payment can be viewed from a „monetary' point of view. This approach puts forward that the MS and demand for money is likely to influence the country's trade balance and the other components of the balance of payment. According to the monetary approach, the excess MS in the economy causes a balance of payment deficit and as a result, the balance of payment dis-equilibrium should be addressed with an appropriate monetary policy. The studies by Polak (1957), Hahn (1959), Prais (1961) and Mundell (1971) argues that the balance of payment should be viewed primarily from a „monetary' point of view. Recent empirical studies, which have included money variables in the trade models, includes studies by Liew *et al*. (2003), Kyereme (2002) and Duasa (2007). As a result, the MS variable will be included in the NX model and the NX model in this form is presented in Equation 8.3

$$X_{D(i)}{}^{t}/M_{D(i)}{}^{t} = f\left[\left(GDP_D{}^{t}/GDP_j{}^{t}\right), EXR_{D/F}{}^{t}, \left(MS_D{}^{t}/MS_j{}^{t}\right)\right] \tag{8.3}$$

where: 'MS_D' and 'MS_j' is the Australian and foreign country MS (M3) respectively.

According to Tang (2008, p.128), the independent variables GDP, EXR and MS presented in Equation 8.3 represents an „open economy' macro equilibrium variables rather than from the „absorption approach' and the „monetary' point of view. Tang (2008) criticised Duasa (2007) for estimating the NX model in this form, and suggested that the IR should be included in the NX model. Following the suggestion by Tang (2008) and the empirical study by Kyereme (2002), the NX model in this study will include the IR variable and the NX model in this form is presented in Equation 8.4

$$X_{D(i)}{}^{t}/M_{D(i)}{}^{t} = f\left[\left(GDP_D{}^{t}/GDP_j{}^{t}\right), EXR_{D/F}{}^{t}, \left(MS_D{}^{t}/MS_j{}^{t}\right), \left(IR_D{}^{t}/IR_j{}^{t}\right)\right] \tag{8.4}$$

where: 'IR_D' and 'IR_j' is the Australian and foreign country IR respectively.

By referring to the Keynesian Investment-Saving and Liquidity Preference-Money Supply Model (IS-LM), the equilibrium in an open economy is achieved when equilibrium in the goods and money market exists. The Saving (S) is likely to play an important part in trade balance determination. Based on the S and Investment (I) framework, the Current Account (CRA) = S – I, which can be also expressed as a Trade Balance = S – I (Griswold, 2007 and Tang, 2008). Based on this S and I framework, there is a strong argument to include the SVR as an additional independent variable in the NX model. Tang (2008) clearly suggests the significant importance of the inclusion of the SVR variable, while Kyereme (2002) suggests that the NX model estimated without a SVR variable should be subject to further model modification and/or inclusion of an additional variable(s). Based on this review, an additional independent variable - the SVR will be included in the NX model and the NX model in this form is presented in Equation 8.5

$$X_{D(i)}{}^{t}/M_{D(i)}{}^{t} = f\left[\left(GDP_D{}^{t}/GDP_j{}^{t}\right), EXR_{D/F}{}^{t}, \left(MS_D{}^{t}/MS_j{}^{t}\right), \left(IR_D{}^{t}/IR_j{}^{t}\right), \left(SVR_D{}^{t}/SVR_j{}^{t}\right)\right] \tag{8.5}$$

where: 'SVR_D' and 'SVR_j' is the Australian and foreign country SVR respectively.

Based on this review, the NX model which will be estimated is presented in Equation 8.6

$$NX_{ij}^{t} = \alpha_0 + \alpha_1 GDP^t + \alpha_2 EXR^t + \alpha_3 MS^t + \alpha_4 IR^t + \alpha_5 SVR^t + \varepsilon^t \qquad (8.6)$$

where: 'α_0' is the intercept, '$\alpha_1,\alpha_2,\alpha_3,\alpha_4,\alpha_5$' are the slope coefficients, 'ε' is a random error, 'NX' is the ratio of the Australian X over the Australian M, 'GDP^t' is the ratio of the Australian GDP level over foreign country GDP level, 'EXR^t' is the EXR of one unit of foreign currency in terms of the Australian Dollar, 'MS^t' is the ratio of the Australian MS (M3) over foreign country MS (M3) levels, 'IR^t' is the ratio of the Australian IR over foreign country IR, 'SVR^t' is the Australian SVR over foreign country SVR, 'i' is the industry for the category i, 'j' is a country j and 't' is a time period.

The expected a priory signs for variables in Equation 8.6 are negative for '$\alpha_1,\alpha_2,\alpha_3$' and positive for'$\alpha_4,\alpha_5$'. For '$\alpha_1$' other things being equal, as the Australian GDP relative to foreign GDP increases by a greater amount, it is expected that the trade balance will worsen (as the M volume tends to increase and as a result the ratio of the Australian X over the Australian M will decrease), hence a negative a priori sign. For 'α_2' other things being equal, as the Australian dollar appreciates against the foreign currency, it is expected that the trade balance will worsen (as an appreciation of the Australian currency is likely to increase the M levels and to decrease the X levels and as a result, the ratio of the Australian X over the Australian M will decrease), hence a negative a priori sign. For 'α_3' other things being equal, as the Australian MS increases by greater amounts than the foreign MS, it is expected that the trade balance will worsen (as the M volume tend to increase and as a result, the ratio of the Australian X over the Australian M will decrease), hence a negative a priori sign. For 'α_4' other things being equal, as the Australian IR increases by a greater amount than a foreign IR, it is expected that the trade balance will improve (as the M volume tends to decrease and as a result, the ratio of the Australian X over the Australian M will increase), hence a positive a priori sign. Finally, for 'α_5' other things being equal, as the Australian SVR increases by a greater amount than a foreign SVR, it is expected that the trade balance will improve (as the M volume tends to decrease and as a result, the ratio of the Australian X over the Australian M will increase), hence a positive a priori sign.

Now that the theoretical NX model is determined, an important aspect to consider is whether to use a linear or non-linear NX model. According to Khan & Ross (1975; 1977) and Salas (1982), when the model estimated is used for forecasting, the linear model is a more suitable form. However, when the purpose of the study is to establish to what degree changes in the explanatory variables affects the dependant variable overtime, the preferred model is the log-log form. Model estimation in log-log form has been adopted in a vast number of studies and such studies include the studies by Kyereme (2002) and Duasa (2007). Hence, the functional form for the NX model, which will be estimated for the selected TD categories and countries, will be in the log-log form[162]. According to Gujarati (2003, p.421), this approach will not only produce elasticities but it is also likely to reduce the problems with heteroscedasticity[163]. The adopted functional form for the NX in the log-log form is presented in Equation 8.7

$$LnNX_{ij}^{\ t} = \alpha_0 + \alpha_1 LnGDP^t + \alpha_2 LnEXR^t + \alpha_3 LnMS^t + \alpha_4 LnIR^t + \alpha_5 LnSVR^t + \varepsilon^t \qquad (8.7)$$

where: '*Ln*' is the natural logarithm for the corresponding variables.

8.4.2 NET EXPORT ESTIMATION

This section consists of 98 estimated NX models[164], using the X and M data presented in Appendix Tables 6.1-6.19 (HS-2 level of aggregation) and Appendix Tables 6.20-6.46 (HS-4 level of aggregation) respectively. Furthermore, the Australian GDP data is presented in Appendix Table 6.46, the GDP data for the 8 selected TD countries are presented in Appendix Table 8.1, while the data for the EXR, MS, IR and SVR for Australia and these 8 selected TD countries are presented in Appendix Tables 8.2, 8.3, 8.4 and 8.5 respectively.

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162 This adopted approach is the same as the approach adopted in Chapter 6, where the X supply and M demand has been estimated.

163 Heteroscedasticity is a common problem when cross-sectional data is used, which is the case in this study.

164 All NX models estimated in this chapter consists of 5 independent variables (GDP, EXR, MS, IR and SVR), except the NX models estimated for Malaysia. The Malaysian NX models are estimated by using only 2 independent variables; the GDP and the EXR as NX=f (GDP, EXR), while the variables MS, IR and the SVR are not used. This is because the time series for Malaysia is very short-time series, where most of the series starts from year 1998 or later.

Table 8.1 and Table 8.2 shows the NX models that will be estimated in this section based on HS-2 and HS-4 level of aggregation respectively.

Table: 8.1

NET EXPORT – ESTIMATED MODELS (AUD & QTY*)					
HS-2 and ANZSIC-1					
AUSTRALIA -	**30[1]**	**84[2]**	**85[3]**	**87[4]**	**1[5]**
China	Yes (n=28)[j]	Yes (n=28)[j]	Yes (n=28)[j]	Yes (n=28)[j]	No
France	Yes (n=68)[a]	Yes (n=68)[a]	Yes (n=68)[a]	Yes (n=42)[g]	No
Germany	Yes (n=68)[a]	Yes (n=68)[a]	Yes (n=68)[a]	Yes (n=68)[a]	No
Malaysia	No	Yes (n=68)[a]	Yes (n=68)[a]	Yes (n=68)[a]	No
Singapore	No	Yes (n=64)[b]	Yes (n=64)[b]	Yes (n=64)[b]	No
Thailand	No	Yes (n=56)[d]	Yes (n=56)[d]	Yes (n=56)[d]	No
United Kingdom	Yes (n=68)[a]	Yes (n=68)[a]	Yes (n=68)[a]	Yes (n=68)[a]	No
United States of	Yes (n=64)[c]	Yes (n=64)[c]	Yes (n=64)[c]	Yes (n=64)[c]	No

[1] *Pharmaceutical Products*
[2] *Nuclear Reactors, Boilers, Machinery and Mechanical Appliances; Parts Thereof*
[3] *Electrical Machinery and Equipment and Parts Thereof; Sound Recorders and Producers, Television Image and Sound Recorders and Reproducers, and Parts and Accessories of Such Articles*
[4] *Vehicles Other Than Railway or Tramway Rolling-Stock, and Parts and Accessories Thereof*
[5] *Transportation Services*

- [a] *1990:Q1 - 2006:Q4*
- [b] *1991:Q1 - 2006:Q4*
- [c] *1990:Q1 - 2005:Q4*
- [d] *1993:Q1 - 2006:Q4*
- [g] *1996:Q3 - 2006:Q4*
- [j] *2000:Q1 - 2006:Q4*
- *The units for QTY in category 30 is grams and for categories 84, 85 and 87, it is a number.

Table: 8.2

NET EXPORT – ESTIMATED MODELS (AUD & QTY*)						
HS-4 and ANZSIC-2						
AUSTRALIA -	**3004[1]**	**8471[2]**	**8473[3]**	**8517[4]**	**8703[5]**	**1.2[6]**
China	No	Yes (n=28)[j]	No	No	No	No
France	Yes (n=39)[h]	Yes (n=68)[a]	No	No	No	No
Germany	Yes (n=43)[f]	Yes (n=68)[a]	No	Yes (n=68)[a]	Yes (n=68)[a]	No
Malaysia	No	Yes (n=68)[a]	No	Yes (n=68)[a]	Yes (n=42)[g]	No
Singapore	No	Yes (n=64)[b]	No	Yes (n=64)[b]	Yes (n=48)[e]	No
Thailand	No	Yes (n=56)[d]	No	No	Yes (n=42)[g]	No
United Kingdom	Yes (n=35)[i]	Yes (n=68)[a]	No	Yes (n=68)[a]	Yes (n=68)[a]	No
United States of	No	No	No	No	Yes (n=64)[c]	No

[1] *Medicaments (Excluding Goods of 3002, 3005 or 3006) Consisting of Mixed or Unmixed Products for Therapeutic or Prophylactic Uses, Put Up in Measured Doses or in Forms or Packagings for Retail Sale*
[2] *Automatic Data Processing Machines and Units Thereof; Magnetic or Optical Readers, Machines for Transcribing Data onto Data Media in Coded Form and Machines for Processing Such Data, Not Elsewhere Specified or Include*
[3] *Parts and Accessories (Other Than Covers, Carrying Cases and the Like) Suitable for Use Solely or Principally with Office Machines*
[4] *Electrical Apparatus for Line Telephony or Line Telegraphy, Including Line Telephone Sets with Cordless Handsets and Telecommunication Apparatus for Carrier-Current Line Systems or for Digital Line Systems; Videophones*
[5] *Motor Cars and Other Motor Vehicles Principally Designed for the Transport of Persons (Other Than Public Transport Type), Including Station Wagons and Racing Cars*
[6] *Freight Transports*

- [a] *1990:Q1 - 2006:Q4*
- [b] *1991:Q1 - 2006:Q4*
- [c] *1990:Q1 - 2005:Q4*
- [e] *1995:Q1 - 2006:Q4*
- [f] *1996:Q2 - 2006:Q4*
- [g] *1996:Q3 - 2006:Q4*
- [h] *1997:Q2 - 2006:Q4*
- [i] *1998:Q2 - 2006:Q4*
- [j] *2000:Q1 - 2006:Q4*

*The units for QTY in category 3004 is grams and for categories 8471, 8473, 8517 and 8703, it is a number.

Note: Due to data unavailability, the NX models for the TD categories 1, 8473 and 1.2 are not estimated.

Tables 8.1-8.2 consists of forty-nine NX models, however, as each of these models are estimated based on AUD and QTY values, the NX models estimated are 98 in total. These 98 models are estimated for the selected TD goods categories only, as the X and M service data are not available for the selected TD service categories.

Due to the econometric procedures, which is the same as in Chapter 6, the variables in the NX models are tested for the unit root prior to models estimation. If the unit root test revealed that all tested variables in the model are non-stationary, further test for cointegration is carried-out. The unit root results are presented in Appendix Tables 8.6-8.41, while Appendix Tables 8.6-8.23 shows the unit root results based on AUD and Appendix Tables 8.24-8.41 shows the unit root results based on QTY values. Finally, the cointegration tests are presented in Appendix Tables 8.42-8.47

Tables 8.3-8.10 in this section shows all ninety-eight NX models estimated, which includes the estimated coefficients, corresponding t-ratios and diagnostic tests results, while Tables 8.3-8.6 and Tables 8.7-8.10 shows the estimated NX models based on HS-2 and HS-4 level of aggregation respectively.

Since the dependant variable (NX) and independent variables (GDP, EXR, MS, IR and SVR) are in log values, the interpretation of these estimated coefficients are in terms of the elasticities. However, if the values of these variables are expressed in the change of the log values, the interpretation of such variables will refer to the growth rates in the elasticities.

Now that the data used and the procedures followed are outlined, the following sections will individually comment on all NX models estimated in this chapter.

8.4.2.1 NET EXPORT MODELS; CATEGORY: 30

Table: 8.3 (Part A)

NET EXPORT MODELS: CATEGORY 30*							
AUSTRALIA - CHINA							
AUD	**DEPENDENT VARIABLE: Δ(LnX/M)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	3.092	0.917	**R^2**	0.107	**LMT F(2,19)**	0.716	-Incorrect sign for GDP; IR.
LnGDP	0.119	0.329	**Adj. R^2**	0.106	**LMT F(Prob.)**	0.502	
Δ(LnEXR)	-8.877	-0.890	**F(5,21)**	0.5***	**BPGT F(5,21)**	1.434	
Δ(LnMS)	-8.004	-0.802	**F(Prob.)**	0.072	**BPGT**	0.253	
Δ(LnIR)	-1.037	-1.052***	**DW**	2.277	**RESET F(1,20)**	0.364	
LnSVR	0.590	1.007***	**AIC**	2.090	**RESET**	0.553	
			SC	2.378	**JBT χ^2 (2)**	0.256	
			LL	-22.22	**JBT χ^2 (Prob.)**	0.880	
QTY	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	8.980	1.525***	**R^2**	0.294	**LMT F(2,19)**	1.302	
Δ(LnGDP)	-0.447	-0.707	**Adj. R^2**	0.126	**LMT F(Prob.)**	0.295	
Δ(LnEXR)	-46.873	-2.691**	**F(5,21)**	1.8***	**BPGT F(5,21)**	1.489	
Δ(LnMS)	-44.979	-2.581**	**F(Prob.)**	0.067	**BPGT F(Prob.)**	0.236	
Δ(LnIR)	2.354	1.368***	**DW**	1.362	**RESET F(1,20)**	0.513	
LnSVR	1.792	1.752***	**AIC**	3.205	**RESET F(Prob.)**	0.482	
			SC	3.492	**JBT χ^2 (2)**	0.151	
			LL	-37.261	**JBT χ^2 (Prob.)**	0.927	
AUSTRALIA - FRANCE							
AUD	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	3.351	0.510	**R^2**	0.555	**LMT F(2,57)**	1.090	-Residuals are not normally distributed. -Incorrect sign for GDP; MS; SVR.
Δ(LnGDP)	1.056	0.940	**Adj. R^2**	0.510	**LMT F(Prob.)**	0.343	
Δ(LnEXR)	-0.768	-0.271	**F(6,59)**	12.28*	**BPGT F(5,60)**	0.679	
LnMS	2.155	0.930	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.641	
Δ(LnIR)	0.219	0.123	**DW**	1.835	**RESET F(1,58)**	0.749	
LnSVR	-0.010	-0.612	**AIC**	2.668	**RESET F(Prob.)**	0.391	
AR(1)	0.726	8.387*	**SC**	2.900	**JBT χ^2 (2)**	19.272*	
			LL	-81.040	**JBT χ^2 (Prob.)**	0.000	
QTY	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	7.104	1.129***	**R^2**	0.356	**LMT F(2,57)**	2.148	-Model is mis-specified. -Incorrect sign for GDP; MS; SVR.
Δ(LnGDP)	16.080	4.611*	**Adj. R^2**	0.291	**LMT F(Prob.)**	0.126	
Δ(LnEXR)	-3.779	-0.466	**F(6,59)**	5.447*	**BPGT F(5,60)**	0.269	
LnMS	3.683	1.663***	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.929	
Δ(LnIR)	4.772	0.998	**DW**	2.137	**RESET F(1,58)**	7.238*	
LnSVR	-0.051	-1.199***	**AIC**	4.521	**RESET F(Prob.)**	0.009	
AR(1)	0.334	2.775*	**SC**	4.753	**JBT χ^2 (2)**	2.673	
			LL	-142.2	**JBT χ^2 (Prob.)**	0.263	

**** Pharmaceutical Products***
DW – Durbin-Watson Statistics
AIS – Akaike Info Criterion
SC – Schwartz Criterion
LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at the 1%, ** significance at 5%, ***significance at 10%***

Table: 8.3 Continued (Part B)

NET EXPORT MODELS: CATEGORY 30*							
AUSTRALIA - GERMANY							
AUD	**DEPENDENT VARIABLE: Δ(LnX/M)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.181	0.236	**R^2**	0.176	**LMT F(2,57)**	2.349	
Δ(LnGDP)	-1.952	-1.359***	**Adj. R^2**	0.093	**LMT F(Prob.)**	0.105	
Δ(LnEXR)	-2.339	-1.121***	**F(6,59)**	2.1***	**BPGT F(5,60)**	0.911	
LnMS	-0.047	-0.171	**F(Prob.)**	0.066	**BPGT F(Prob.)**	0.480	
Δ(LnIR)	0.484	0.452	**DW**	2.177	**RESET F(1,58)**	0.776	
Δ(LnSVR)	0.004	0.479	**AIC**	1.950	**RESET F(Prob.)**	0.382	
AR(1)	-0.359	-2.863*	**SC**	2.182	**JBT χ^2 (2)**	0.246	
			LL	-57.36	**JBT χ^2 (Prob.)**	0.884	
QTY	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	16.455	3.004*	**R^2**	0.288	**LMT F(2,57)**	2.91***	-Residuals are serially correlated. -Residuals are Heteroscedastic. -Incorrect sign for GDP; MS; SVR.
Δ(LnGDP)	3.490	0.842	**Adj. R^2**	0.215	**LMT F(Prob.)**	0.063	
Δ(LnEXR)	-3.052	-0.334	**F(6,59)**	3.973*	**BPGT F(5,60)**	4.104*	
LnMS	5.971	3.050*	**F(Prob.)**	0.002	**BPGT F(Prob.)**	0.003	
Δ(LnIR)	0.502	0.092	**DW**	2.086	**RESET F(1,58)**	0.070	
Δ(LnSVR)	-0.064	-1.693***	**AIC**	4.699	**RESET F(Prob.)**	0.793	
AR(1)	0.227	1.806***	**SC**	4.931	**JBT χ^2 (2)**	0.235	
			LL	-148.18	**JBT χ^2 (Prob.)**	0.889	
AUSTRALIA - UNITED KINGDOM							
AUD	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-1.573	-16.986*	**R^2**	0.455	**LMT F(1,58)**	0.014	-Incorrect sign for GDP; EXR; MS; IR; SVR.
Δ(LnGDP)	0.392	0.875	**Adj. R^2**	0.400	**LMT F(Prob.)**	0.905	
Δ(LnEXR)	0.651	0.407	**F(6,59)**	8.213*	**BPGT F(5,60)**	1.094	
Δ(LnMS)	1.014	0.626	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.373	
Δ(LnIR)	-0.161	-0.324	**DW**	1.908	**RESET F(1,58)**	1.551	
LnSVR	-0.001	-0.184	**AIC**	0.187	**RESET F(Prob.)**	0.218	
AR(1)	0.651	6.569*	**SC**	0.420	**JBT χ^2 (2)**	2.139	
			LL	0.820	**JBT χ^2 (Prob.)**	0.343	
QTY	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	2.676	3.899*	**R^2**	0.303	**LMT F(1,58)**	5.409**	-Residuals are serially correlated. -Model is mis-specified. -Incorrect sign for GDP; EXR; MS; IR; SVR.
Δ(LnGDP)	1.728	0.320	**Adj. R^2**	0.232	**LMT F(Prob.)**	0.024	
Δ(LnEXR)	21.934	1.169***	**F(6,59)**	4.281*	**BPGT F(5,60)**	0.934	
Δ(LnMS)	32.546	1.714***	**F(Prob.)**	0.001	**BPGT F(Prob.)**	0.466	
Δ(LnIR)	-8.476	-1.499***	**DW**	2.176	**RESET F(1,58)**	4.057**	
LnSVR	-0.100	-2.030**	**AIC**	4.946	**RESET F(Prob.)**	0.049	
AR(1)	0.467	4.021*	**SC**	5.178	**JBT χ^2 (2)**	1.351	
			LL	-156.22	**JBT χ^2 (Prob.)**	0.509	

**** Pharmaceutical Products***
DW – Durbin-Watson Statistics
AIS – Akaike Info Criterion
SC – Schwartz Criterion
LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at the 1%, ** significance at 5%, ***significance at 10%***

Table: 8.3 Continued (Part C)

NET EXPORT MODELS: CATEGORY 30*							
AUSTRALIA - UNITED STATES							
AUD	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-1.505	-8.414*	**R^2**	0.501	**LMT F(2,53)**	4.164**	-Residuals are serially correlated. -Model is mis-specified. -Incorrect sign for GDP; EXR; MS.
Δ(LnGDP)	2.068	2.307**	**Adj. R^2**	0.447	**LMT F(Prob.)**	0.021	
Δ(LnEXR)	2.718	0.722	**F(6,55)**	9.220*	**BPGT F(5,56)**	0.416	
Δ(LnMS)	0.014	0.004	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.836	
Δ(LnIR)	0.126	0.120	**DW**	2.390	**RESET F(1,54)**	4.997**	
LnSVR	0.012	1.388***	**AIC**	1.447	**RESET F(Prob.)**	0.030	
AR(1)	0.635	6.135*	**SC**	1.687	**JBT χ^2 (2)**	2.127	
			LL	-37.84	**JBT χ^2 (Prob.)**	0.345	
QTY	**DEPENDENT VARIABLE: Δ(LnX/M)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.010	0.126	**R^2**	0.262	**LMT F(2,55)**	2.311	
Δ(LnGDP)	-4.138	-2.440*	**Adj. R^2**	0.198	**LMT F(Prob.)**	0.109	
Δ(LnEXR)	-12.105	-2.009**	**F(5,57)**	4.053*	**BPGT F(5,57)**	0.578	
Δ(LnMS)	-4.125	-0.731	**F(Prob.)**	0.003	**BPGT F(Prob.)**	0.716	
Δ(LnIR)	0.951	0.742	**DW**	2.409	**RESET F(1,56)**	0.175	
Δ(LnSVR)	0.017	1.730***	**AIC**	1.952	**RESET F(Prob.)**	0.678	
			SC	2.156	**JBT χ^2 (2)**	0.850	
			LL	-55.48	**JBT χ^2 (Prob.)**	0.654	

****** Pharmaceutical Products***
DW – Durbin-Watson Statistics
AIS – Akaike Info Criterion
SC – Schwartz Criterion
LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
****** significant at the 1%, ** significance at 5%, ***significance at 10%***

According to Table 8.3, all ten NX models in Category 30 are significant. Furthermore, in most of the models, the variable SVR is significant, while the variables GDP, EXR, MS and IR are mostly not significant.

The variables GDP and EXR are significant in 4 out of the 10 models, the variables MS and IR are significant in 3 out of the 10 models and the SVR is significant in 7 out of the 10 models. However, an incorrect (positive) sign for the GDP (7 out of the 10 models; 4 based on AUD and 3 on QTY), for the EXR (3 out of the 10 models; 2 based on AUD and 1 based on QTY) and for the MS (6 out of the 10 models; 3 based on AUD and 3 based on QTY) is evident. Furthermore, an incorrect (negative) sign for the IR (3 out of the 10 models; 2 based on AUD and 1 based on QTY) and for the SVR (5 out of the 10 models; 2 based on AUD and 3 based on QTY) are likely to be due to serial correlation, heteroscedasticity, model mis-specification, non-normality of residuals and the presence of collinearity in these models. The correct coefficient signs for all the GDP, EXR, MS, IR and SVR are found in 3 out of the 10 models (1 based on AUD and 2 based on QTY), while for these 3 models, the coefficients range for the GDP, EXR, MS, IR and SVR is between (-0.447 and -4.138), (-2.339 and -46.873), (-0.047 and -44.979), (0.484 and 2.354) and (0.004 and 1.792) respectively. Finally, the Adj. R^2 in overall for all 10 models in this category ranges between 9.3 and 51 percent.

In overall, out of the 10 estimated models in this category, 3 models (the NX with Germany based on AUD; the NX with China and The United States of America based on QTY) have the correct signs and have satisfactory passed all diagnostic tests. The NX model with Germany (based on AUD) shows that a 1 percent growth rate in the GDP and EXR will decrease the NX growth rate by 1.952 and 2.339 percent respectively; a 1 percent increase in MS will decrease the NX growth rate by 0.047 percent, while a 1 percent growth rate in the IR and SVR will increase the NX growth rate by 0.484 and 0.004 percent respectively in average. The NX model with China (based on QTY)shows that a 1 percent growth rate in the GDP, EXR and MS will decrease the NX by 0.447, 46.873 and 44.979 percent respectively; a 1 percent growth rate in the IR will increase the NX by 2.354 percent, while a 1 percent increase in the SVR will increase the NX by 1.792 percent in average. The NX model with The United States of America (based on QTY)shows that a 1 percent growth rate in the GDP, EXR and MS will decrease the NX growth rate by 4.138, 12.105 and 4.125 percent respectively, while 1 percent growth rate in the IR and SVR will increase the NX growth rate by 0.951 and 0.017 percent respectively in average. For all of these 3 models, the variables GDP, EXR and MS are mostly elastic, while the variable IR and MS are mostly inelastic. Finally, the Adj. R^2 for China, The United States of America and Germany is 12.6, 19.8 and 9.3 percent respectively.

8.4.2.2 NET EXPORT MODELS; CATEGORY: 84

Table: 8.4 (Part A)

NET EXPORT MODELS: CATEGORY 84*							
AUSTRALIA - CHINA							
AUD	**DEPENDENT VARIABLE: Δ(LnX/M)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.716	-0.736	**R^2**	0.470	**LMT F(2,17)**	0.469	
LnGDP	-0.030	-0.247	**Adj. R^2**	0.303	**LMT F(Prob.)**	0.634	
Δ(LnEXR)	-2.671	-0.737	**F(6,19)**	2.81**	**BPGT F(5,20)**	0.584	
Δ(LnMS)	-3.570	-1.013***	**F(Prob.)**	0.039	**BPGT F(Prob.)**	0.712	
Δ(LnIR)	0.296	1.052***	**DW**	2.219	**RESET F(1,18)**	0.143	
LnSVR	0.120	0.741	**AIC**	-0.064	**RESET F(Prob.)**	0.710	
AR(1)	-0.553	-3.132*	**SC**	0.275	**JBT χ^2 (2)**	1.880	
			LL	7.828	**JBT χ^2 (Prob.)**	0.391	
QTY	**DEPENDENT VARIABLE: Δ(LnX/M)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-1.860	-0.559	**R^2**	0.404	**LMT F(2,17)**	0.482	
LnGDP	-0.017	-0.040	**Adj. R^2**	0.216	**LMT F(Prob.)**	0.626	
Δ(LnEXR)	-6.353	-0.536	**F(6,19)**	2.2***	**BPGT F(5,20)**	0.947	
Δ(LnMS)	-8.905	-0.757	**F(Prob.)**	0.095	**BPGT F(Prob.)**	0.473	
Δ(LnIR)	0.192	0.193	**DW**	1.639	**RESET F(1,18)**	0.407	
LnSVR	0.368	0.661	**AIC**	2.487	**RESET F(Prob.)**	0.532	
AR(1)	-0.634	-3.185*	**SC**	2.825	**JBT χ^2 (2)**	0.197	
			LL	-25.326	**JBT χ^2 (Prob.)**	0.906	
AUSTRALIA - FRANCE							
AUD	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-2.820	-2.095**	**R^2**	0.187	**LMT F(2,57)**	2.54***	-Residuals are serially correlated. -Model is mis-specified. -Residuals are not normally distributed. -Incorrect sign for GDP; IR; SVR.
Δ(LnGDP)	2.630	3.371*	**Adj. R^2**	0.104	**LMT F(Prob.)**	0.088	
Δ(LnEXR)	-2.417	-1.351***	**F(6,59)**	2.26**	**BPGT F(5,60)**	0.485	
LnMS	-0.263	-0.556	**F(Prob.)**	0.050	**BPGT F(Prob.)**	0.786	
Δ(LnIR)	-0.228	-0.216	**DW**	2.151	**RESET F(1,58)**	5.987**	
LnSVR	-0.002	-0.182	**AIC**	1.497	**RESET F(Prob.)**	0.018	
AR(1)	0.312	2.479**	**SC**	1.729	**JBT χ^2 (2)**	18.570*	
			LL	-42.399	**JBT χ^2 (Prob.)**	0.000	
QTY	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-3.798	-0.797	**R^2**	0.279	**LMT F(2,57)**	1.884	-Model is mis-specified. -Incorrect sign for MS.
Δ(LnGDP)	-0.240	-0.135	**Adj. R^2**	0.205	**LMT F(Prob.)**	0.161	
Δ(LnEXR)	-0.015	-0.003	**F(6,59)**	3.797*	**BPGT F(5,60)**	1.195	
LnMS	0.151	0.090	**F(Prob.)**	0.003	**BPGT F(Prob.)**	0.323	
Δ(LnIR)	0.611	0.230	**DW**	2.211	**RESET F(1,58)**	3.606**	
LnSVR	0.049	2.103**	**AIC**	3.349	**RESET F(Prob.)**	0.063	
AR(1)	0.490	4.327*	**SC**	3.581	**JBT χ^2 (2)**	3.357	
			LL	-103.52	**JBT χ^2 (Prob.)**	0.187	

Nuclear Reactors, Boilers, Machinery and Mechanical Appliances; Parts Thereof
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SC – Schwartz Criterion
LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at the 1%, ** significance at 5%, ***significance at 10%***

Table: 8.4 Continued (Part B)

NET EXPORT MODELS: CATEGORY 84*							
AUSTRALIA - GERMANY							
AUD	**DEPENDENT VARIABLE: Δ(LnX/M)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.166	0.428	**R^2**	0.135	**LMT F(2,57)**	4.369**	-Residuals are serially correlated. -Model is mis-specified. -Residuals are not normally distributed. -Incorrect sign for GDP; EXR; MS; IR. -Model is not significant.
Δ(LnGDP)	0.435	0.629	**Adj. R^2**	0.047	**LMT F(Prob.)**	0.017	
Δ(LnEXR)	0.108	0.103	**F(6,59)**	1.535	**BPGT F(5,60)**	2.28	
LnMS	0.064	0.462	**F(Prob.)**	0.183	**BPGT F(Prob.)**	0.158	
Δ(LnIR)	-0.536	-0.993	**DW**	2.229	**RESET F(1,58)**	2.86***	
Δ(LnSVR)	0.005	1.103***	**AIC**	0.546	**RESET F(Prob.)**	0.097	
AR(1)	-0.325	-2.546**	**SC**	0.778	**JBT χ^2 (2)**	10.672*	
			LL	-11.020	**JBT χ^2 (Prob.)**	0.005	
QTY	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-1.383	-0.437	**R^2**	0.323	**LMT F(2,57)**	3.595**	-Residuals are serially correlated. -Model is mis-specified. - Incorrect sign for GDP; MS; SVR.
Δ(LnGDP)	2.145	1.695***	**Adj. R^2**	0.254	**LMT F(Prob.)**	0.034	
Δ(LnEXR)	-4.486	-1.478***	**F(6,59)**	4.694*	**BPGT F(5,60)**	0.862	
LnMS	0.987	0.874	**F(Prob.)**	0.001	**BPGT F(Prob.)**	0.512	
Δ(LnIR)	0.502	0.267	**DW**	2.277	**RESET F(1,58)**	4.670**	
Δ(LnSVR)	-0.013	-1.083***	**AIC**	2.645	**RESET F(Prob.)**	0.035	
AR(1)	0.501	4.209*	**SC**	2.878	**JBT χ^2 (2)**	2.145	
			LL	-80.300	**JBT χ^2 (Prob.)**	0.342	
AUSTRALIA - MALAYSIA							
AUD	**DEPENDENT VARIABLE: Δ(LnX/M)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.046	-1.427***	**R^2**	0.163	**LMT F(2,61)**	1.343	-Incorrect sign for GDP; EXR.
Δ(LnGDP)	0.250	0.363	**Adj. R^2**	0.123	**LMT F(Prob.)**	0.269	
Δ(LnEXR)	0.442	0.437	**F(3,63)**	4.10**	**BPGT F(3,63)**	0.703	
Residuals (-1)	-0.257	-3.473*	**F(Prob.)**	0.010	**BPGT F(Prob.)**	0.554	
			DW	2.241	**RESET F(1,62)**	0.676	
			AIC	0.150	**RESET F(Prob.)**	0.414	
			SC	0.282	**JBT χ^2 (2)**	0.055	
			LL	-1.029	**JBT χ^2 (Prob.)**	0.973	
QTY	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-2.821	-29.364*	**R^2**	0.064	**LMT F(2,60**	0.348	-Model is not significant.
Δ(LnGDP)	-0.344	-0.252	**Adj. R^2**	0.019	**LMT F(Prob.)**	0.708	
Δ(LnEXR)	-0.365	-0.168	**F(3,62)**	1.416	**BPGT F(2,63)**	1.039	
AR(1)	0.256	2.015**	**F(Prob.)**	0.247	**BPGT F(Prob.)**	0.360	
			DW	1.870	**RESET F(1,61)**	1.517	
			AIC	1.773	**RESET F(Prob.)**	0.223	
			SC	1.906	**JBT χ^2 (2)**	1.480	
			LL	-54.506	**JBT χ^2 (Prob.)**	0.477	

Nuclear Reactors, Boilers, Machinery and Mechanical Appliances; Parts Thereof
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BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at the 1%, ** significance at 5%, ***significance at 10%***

Table: 8.4 Continued (Part C)

NET EXPORT MODELS: CATEGORY 84*							
AUSTRALIA - SINGAPORE							
AUD	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.627	-8.606*	**R^2**	0.298	**LMT F(2,53)**	0.381	-Residuals are Heteroscedastic. -Model is mis-specified. -Incorrect sign for GDP; EXR.
Δ(LnGDP)	0.430	0.823	**Adj. R^2**	0.222	**LMT F(Prob.)**	0.685	
Δ(LnEXR)	0.583	0.523	**F(6,55)**	3.896*	**BPGT F(5,56)**	3.726*	
Δ(LnMS)	-0.371	-0.403	**F(Prob.)**	0.003	**BPGT F(Prob.)**	0.006	
Δ(LnIR)	2.778	3.582*	**DW**	2.121	**RESET F(2,53)**	5.394*	
LnSVR	0.000	0.069	**AIC**	0.459	**RESET F(Prob.)**	0.007	
AR(1)	0.479	4.143*	**SC**	0.700	**JBT χ^2 (2)**	0.073	
			LL	-7.244	**JBT χ^2 (Prob.)**	0.964	
QTY	**DEPENDENT VARIABLE: Δ(LnX/M)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.162	-1.186***	**R^2**	0.395	**LMT F(2,54)**	0.273	-Residuals are Heteroscedastic. -Residuals are not normally distributed. -Incorrect sign for GDP; EXR; MS; SVR.
Δ(LnGDP)	1.547	0.706	**Adj. R^2**	0.330	**LMT F(Prob.)**	0.763	
Δ(LnEXR)	2.404	0.599	**F(6,56)**	6.081*	**BPGT F(6,56)**	5.775*	
Δ(LnMS)	1.584	0.508	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.000	
Δ(LnIR)	0.337	0.150	**DW**	1.925	**RESET F(1,55)**	5.138	
LnSVR	-0.044	-2.638*	**AIC**	2.878	**RESET F(Prob.)**	0.116	
Residuals (-1)	-0.473	-4.020*	**SC**	3.116	**JBT χ^2 (2)**	4.689*	
			LL	-83.65	**JBT χ^2 (Prob.)**	0.000	
AUSTRALIA - THAILAND							
AUD	**DEPENDENT VARIABLE: Δ(LnX/M)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.016	-0.377	**R^2**	0.505	**LMT F(2,46)**	0.426	
Δ(LnGDP)	-1.393	-1.503***	**Adj. R^2**	0.443	**LMT F(Prob.)**	0.656	
Δ(LnEXR)	-2.868	-1.449***	**F(6,48)**	8.156*	**BPGT F(6,48)**	1.210	
Δ(LnMS)	-0.017	-0.009	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.317	
Δ(LnIR)	0.601	1.064***	**DW**	2.081	**RESET F(1,47)**	0.002	
Δ(LnSVR)	0.148	1.415***	**AIC**	0.611	**RESET F(Prob.)**	0.963	
Residuals (-1)	-0.663	-4.651*	**SC**	0.866	**JBT χ^2 (2)**	0.031	
			LL	-9.793	**JBT χ^2 (Prob.)**	0.985	
QTY	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-3.478	-12.451*	**R^2**	0.177	**LMT F(2,45)**	1.478	-Residuals are not normally distributed. -Incorrect sign for SVR. -Model is not significant.
Δ(LnGDP)	-0.034	-0.019	**Adj. R^2**	0.072	**LMT F(Prob.)**	0.239	
Δ(LnEXR)	-2.170	-0.397	**F(6,47)**	1.687	**BPGT F(5,48)**	1.499	
Δ(LnMS)	-2.727	-0.526	**F(Prob.)**	0.145	**BPGT F(Prob.)**	0.208	
Δ(LnIR)	0.542	0.341	**DW**	2.160	**RESET F(1,46**	4.680	
LnSVR	-0.475	-1.647***	**AIC**	2.690	**RESET F(Prob.)**	0.036	
AR(1)	0.390	2.877*	**SC**	2.948	**JBT χ^2 (2)**	58.650*	
			LL	-65.62	**JBT χ^2 (Prob.)**	0.000	

Nuclear Reactors, Boilers, Machinery and Mechanical Appliances; Parts Thereof
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SC – Schwartz Criterion
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BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at the 1%, ** significance at 5%, ***significance at 10%***

Table: 8.4 Continued (Part D)

NET EXPORT MODELS: CATEGORY 84*							
AUSTRALIA - UNITED KINGDOM							
AUD	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.937	-23.220*	**R^2**	0.222	**LMT F(2,57)**	0.147	
Δ(LnGDP)	-1.069	-2.690*	**Adj. R^2**	0.143	**LMT F(Prob.)**	0.864	
Δ(LnEXR)	-1.098	-0.816	**F(6,59)**	2.80**	**BPGT F(5,60)**	0.248	
Δ(LnMS)	-1.711	-1.259***	**F(Prob.)**	0.018	**BPGT F(Prob.)**	0.939	
Δ(LnIR)	0.151	0.385	**DW**	1.961	**RESET F(1,58)**	0.373	
LnSVR	0.003	0.819	**AIC**	-0.409	**RESET F(Prob.)**	0.544	
AR(1)	0.357	3.196*	**SC**	-0.177	**JBT χ^2 (2)**	2.681	
			LL	20.513	**JBT χ^2 (Prob.)**	0.262	
QTY	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-2.329	-14.652*	**R^2**	0.500	**LMT F(2,57)**	0.892	
Δ(LnGDP)	-2.806	-2.903*	**Adj. R^2**	0.449	**LMT F(Prob.)**	0.416	
Δ(LnEXR)	-3.482	-1.020***	**F(6,59)**	9.816*	**BPGT F(5,60)**	0.874	
Δ(LnMS)	-1.372	-0.398	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.504	
Δ(LnIR)	2.381	2.272**	**DW**	2.092	**RESET F(1,58)**	0.404	
LnSVR	0.022	2.264**	**AIC**	1.631	**RESET F(Prob.)**	0.527	
AR(1)	0.575	4.800*	**SC**	1.864	**JBT χ^2 (2)**	1.690	
			LL	-46.832	**JBT χ^2 (Prob.)**	0.430	
AUSTRALIA - UNITED STATES							
AUD	**DEPENDENT VARIABLE: Δ(LnX/M)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.009	0.774	**R^2**	0.441	**LMT F(2,54)**	1.033	
Δ(LnGDP)	0.436	1.727***	**Adj. R^2**	0.381	**LMT F(Prob.)**	0.363	
Δ(LnEXR)	3.158	3.571*	**F(6,56)**	7.367*	**BPGT F(6,56)**	0.726	
Δ(LnMS)	1.643	1.991***	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.631	-Incorrect sign for GDP; EXR; MS; SVR.
Δ(LnIR)	0.004	0.019	**DW**	1.900	**RESET F(1,55)**	0.326	
Δ(LnSVR)	-0.002	-1.597***	**AIC**	-1.881	**RESET F(Prob.)**	0.570	
Residuals (-1)	-0.596	-5.489*	**SC**	-1.643	**JBT χ^2 (2)**	0.732	
			LL	66.240	**JBT χ^2 (Prob.)**	0.693	
QTY	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-3.135	-31.113*	**R^2**	0.348	**LMT F(2,53)**	2.49***	
Δ(LnGDP)	2.774	4.125*	**Adj. R^2**	0.277	**LMT F(Prob.)**	0.093	-Residuals are serially correlated.
Δ(LnEXR)	-0.849	-0.301	**F(6,55)**	4.897*	**BPGT F(5,56)**	0.383	-Model is mis-specified.
Δ(LnMS)	-2.126	-0.783	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.859	-Incorrect sign for GDP; IR; SVR.
Δ(LnIR)	-0.465	-0.619	**DW**	2.107	**RESET F(1,54)**	6.945**	
LnSVR	-0.002	-0.406	**AIC**	0.737	**RESET F(Prob.)**	0.011	
AR(1)	0.517	4.315*	**SC**	0.978	**JBT χ^2 (2)**	3.643	
			LL	-15.861	**JBT χ^2 (Prob.)**	0.162	

Nuclear Reactors, Boilers, Machinery and Mechanical Appliances; Parts Thereof
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SC – Schwartz Criterion
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BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at the 1%, ** significance at 5%, ***significance at 10%***

According to Table 8.4, out of the sixteen NX models in Category 84, 13 models are significant and three NX models with Germany based on AUD; and Malaysia and Thailand based on QTY are not significant, while in most of the models, the majority of the variables are not significant.

The variables GDP, EXR, MS, IR are significant in 7, 5, 3 and 4 out of the 16 models respectively, while the variable SVR is significant in 8 out of the 16 models. However, an incorrect (positive) sign for the GDP (8 out of the 16 models; 5 based on AUD and 4 on QTY), for the EXR (5 out of the 16 models; 4 based on AUD and 1 based on QTY) and for the MS (5 out of the 16 models; 2 based on AUD and 3 based on QTY) is evident. Furthermore, an incorrect (negative) sign for the IR (3 out of the 16 models; 2 based on AUD and 1 based on QTY) and for the SVR (6 out of the 16 models; 2 based on AUD and 4 based on QTY) is evident. The correct coefficient signs for all the GDP, EXR, MS, IR and SVR are found in 6 out of the 16 models (3 based on AUD and 3 based on QTY), while for these 6 models, the coefficients range for the GDP, EXR, MS, IR and SVR is between (-0.017 and -2.806), (-0.365 and -6.353), (-0.017 and -8.905), (0.151 and 2.381) and (0.003 and 0.368) respectively. Finally, the Adj. R^2 in overall for all 16 models in this category ranges between 1.9 and 44.9 percent.

In overall, out of the 16 estimated models in this category, 5 models (the NX with China, Thailand and The United Kingdom based on AUD; the NX with China and The United Kingdom based on QTY) have the correct signs and have satisfactory passed all diagnostic tests. The NX model with China (based on AUD) shows that a 1 percent increase in the GDP will decrease the NX growth rate by 0.03 percent, a 1 percent growth rate in the EXR and MS will decrease the NX growth rate by 2.671 and 3.57 percent respectively, a 1 percent growth rate in the IR will increase the NX growth rate by 0.296 percent, while 1 percent increase in SVR will increase the NX growth rate by 0.12 percent in average. The NX model with Thailand (based on AUD) shows that a 1 percent growth rate in the GDP, EXR and MS will decrease the NX growth rate by 1.393, 2.868 and 0.017 percent respectively, while 1 percent growth rate in the IR and SVR will increase the NX growth rate by 0.601 and 0.148 percent respectively in average. The NX model with The United Kingdom (based on AUD) shows that a 1 percent growth rate in the GDP, EXR and MS will decrease the NX by 1.069, 1.098 and 1.711 percent respectively, a 1 percent growth rate in IR will increase the NX by 0.151 percent, while a 1 percent increase in the SVR will increase the NX by 0.003 percent in average. The NX model with China (based on QTY) shows that a 1 percent increase in the GDP will decrease the NX growth rate by 0.017 percent, a 1 percent growth rate in the EXR and MS will decrease the NX growth rate by 6.353 and 8.905 percent respectively, a 1 percent growth rate in the IR will increase the NX growth rate by 0.192 percent, while 1 percent increase in SVR will increase the NX growth rate by 0.368 percent in average. The NX model with The United Kingdom (based on QTY) shows that a 1 percent growth rate in the GDP, EXR and MS will decrease the NX by 2.806, 3.482 and 1.372 percent respectively, a 1 percent growth rate in IR will increase the NX by 2.381 percent, while a 1 percent increase in the SVR will increase the NX by 0.022 percent in average. For all of these 5 models, the variables GDP, EXR and MS are mostly elastic, while the variable IR and SVR are mostly inelastic. Finally, the Adj. R^2 for China, Thailand and The United Kingdom based on AUD values is 30.3, 44.3 and 14.3 percent respectively and for China and The United Kingdom based on QTY, the values are 21.6 and 44.9 percent respectively.

8.4.2.3 NET EXPORT MODELS; CATEGORY: 85

Table: 8.5 (Part A)

NET EXPORT MODELS: CATEGORY 85*							
AUSTRALIA - CHINA							
AUD	**DEPENDENT VARIABLE: Δ(LnX/M)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-3.977	-2.427**	**R^2**	0.434	**LMT F(2,19)**	0.740	
LnGDP	-0.240	-1.366***	**Adj. R^2**	0.299	**LMT F(Prob.)**	0.490	
Δ(LnEXR)	-1.442	-0.297	**F(5,21)**	3.22**	**BPGT F(5,21)**	0.689	
Δ(LnMS)	-4.025	-0.830	**F(Prob.)**	0.026	**BPGT F(Prob.)**	0.637	
Δ(LnIR)	0.873	-1.822***	**DW**	2.115	**RESET F(1,20)**	0.273	
LnSVR	0.704	-2.472**	**AIC**	0.647	**RESET F(Prob.)**	0.607	
			SC	0.935	**JBT χ^2 (2)**	3.912	
			LL	-2.738	**JBT χ^2 (Prob.)**	0.141	
QTY	**DEPENDENT VARIABLE: Δ(LnX/M)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	7.125	1.519***	**R^2**	0.264	**LMT F(2,19)**	1.839	-Incorrect sign for GDP; IR.
LnGDP	0.041	0.081	**Adj. R^2**	0.089	**LMT F(Prob.)**	0.186	
Δ(LnEXR)	-9.296	-0.670	**F(5,21)**	1.5***	**BPGT F(5,21)**	0.356	
Δ(LnMS)	-13.617	-0.981	**F(Prob.)**	0.093	**BPGT F(Prob.)**	0.873	
Δ(LnIR)	-0.537	-0.392	**DW**	1.637	**RESET F(1,20)**	1.928	
LnSVR	1.438	1.766***	**AIC**	2.750	**RESET F(Prob.)**	0.180	
			SC	3.038	**JBT χ^2 (2)**	0.227	
			LL	-31.120	**JBT χ^2 (Prob.)**	0.893	
AUSTRALIA - FRANCE							
AUD	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-3.929	-2.575**	**R^2**	0.215	**LMT F(2,57)**	2.343	-Model is mis-specified. -Residuals are not normally distributed. -Incorrect sign for GDP; EXR; SVR.
Δ(LnGDP)	0.858	1.224***	**Adj. R^2**	0.136	**LMT F(Prob.)**	0.105	
Δ(LnEXR)	0.550	0.327	**F(6,59)**	2.70**	**BPGT F(5,60)**	2.30	
LnMS	-0.390	-0.725	**F(Prob.)**	0.022	**BPGT F(Prob.)**	0.116	
Δ(LnIR)	0.054	0.053	**DW**	2.205	**RESET F(1,58)**	7.050**	
LnSVR	-0.010	-1.173***	**AIC**	1.414	**RESET F(Prob.)**	0.010	
AR(1)	0.421	3.523*	**SC**	1.646	**JBT χ^2 (2)**	6.566**	
			LL	-39.649	**JBT χ^2 (Prob.)**	0.038	
QTY	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-2.170	-0.826	**R^2**	0.164	**LMT F(2,57)**	0.141	-Incorrect sign for GDP; EXR; MS; IR.
Δ(LnGDP)	0.173	0.102	**Adj. R^2**	0.079	**LMT F(Prob.)**	0.868	
Δ(LnEXR)	4.327	1.143	**F(6,59)**	1.9***	**BPGT F(5,60)**	0.576	
LnMS	1.153	1.251	**F(Prob.)**	0.090	**BPGT F(Prob.)**	0.718	
Δ(LnIR)	-4.045	-1.817***	**DW**	1.997	**RESET F(1,58)**	0.374	
LnSVR	0.009	0.464	**AIC**	2.980	**RESET F(Prob.)**	0.544	
AR(1)	0.260	2.026**	**SC**	3.212	**JBT χ^2 (2)**	3.814	
			LL	-91.336	**JBT χ^2 (Prob.)**	0.149	

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BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at the 1%, ** significance at 5%, ***significance at 10%***

Table: 8.5 Continued (Part B)

NET EXPORT MODELS: CATEGORY 85*							
AUSTRALIA - GERMANY							
AUD	**DEPENDENT VARIABLE: Δ(LnX/M)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.453	0.946	**R^2**	0.046	**LMT F(2,59)**	0.271	-Residuals are not normally distributed. -Incorrect sign for GDP; MS; IR; SVR. -Model is not significant.
Δ(LnGDP)	0.009	0.016	**Adj. R^2**	0.043	**LMT F(Prob.)**	0.764	
Δ(LnEXR)	-0.566	-0.501	**F(5,61)**	0.451	**BPGT F(5,61)**	0.630	
LnMS	0.152	0.883	**F(Prob.)**	0.811	**BPGT F(Prob.)**	0.678	
Δ(LnIR)	-0.426	-0.681	**DW**	2.116	**RESET F(1,60)**	0.137	
Δ(LnSVR)	-0.001	-0.115	**AIC**	0.558	**RESET F(Prob.)**	0.713	
			SC	0.755	**JBT χ^2 (2)**	5.77***	
			LL	-12.686	**JBT χ^2 (Prob.)**	0.056	
QTY	**DEPENDENT VARIABLE: Δ(LnX/M)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.512	-0.547	**R^2**	0.256	**LMT F(2,57)**	1.253	-Residuals are not normally distributed. -Incorrect sign for GDP; IR; SVR.
Δ(LnGDP)	3.580	2.217**	**Adj. R^2**	0.181	**LMT F(Prob.)**	0.293	
Δ(LnEXR)	-1.172	-0.475	**F(6,59)**	3.392*	**BPGT F(5,60)**	0.648	
LnMS	-0.200	-0.596	**F(Prob.)**	0.006	**BPGT F(Prob.)**	0.664	
Δ(LnIR)	-1.985	-1.541***	**DW**	1.852	**RESET F(1,58)**	1.449	
Δ(LnSVR)	-0.022	-2.025**	**AIC**	2.256	**RESET F(Prob.)**	0.234	
AR(1)	-0.300	-2.494**	**SC**	2.488	**JBT χ^2 (2)**	234.62*	
			LL	-67.443	**JBT χ^2 (Prob.)**	0.000	
AUSTRALIA - MALAYSIA							
AUD	**DEPENDENT VARIABLE: Δ(LnX/M)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.019	-0.584	**R^2**	0.029	**LMT F(2,62)**	0.397	-Incorrect sign for GDP; EXR. -Model is not significant.
Δ(LnGDP)	0.845	1.218	**Adj. R^2**	0.002	**LMT F(Prob.)**	0.674	
Δ(LnEXR)	1.372	1.334	**F(2,64)**	0.950	**BPGT F(2,64)**	0.203	
			F(Prob.)	0.392	**BPGT F(Prob.)**	0.817	
			DW	2.085	**RESET F(1,63**	0.101	
			AIC	0.190	**RESET F(Prob.)**	0.752	
			SC	0.289	**JBT χ^2 (2)**	0.364	
			LL	-3.367	**JBT χ^2 (Prob.)**	0.834	
QTY	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-4.023	-6.460*	**R^2**	0.728	**LMT F(2,60**	0.737	-Residuals are Heteroscedastic. -Model is mis-specified. -Incorrect sign for GDP; EXR.
Δ(LnGDP)	2.648	1.318***	**Adj. R^2**	0.715	**LMT F(Prob.)**	0.483	
Δ(LnEXR)	3.937	1.130***	**F(3,62)**	55.34*	**BPGT F(2,63)**	4.419**	
AR(1)	0.771	12.892*	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.016	
			DW	2.114	**RESET F(2,60)**	9.665*	
			AIC	3.114	**RESET F(Prob.)**	0.000	
			SC	3.246	**JBT χ^2 (2)**	0.611	
			LL	-98.751	**JBT χ^2 (Prob.)**	0.737	

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JBT – Jarques-Bera Test for normality of the residuals
**** significant at the 1%, ** significance at 5%, ***significance at 10%***

Table: 8.5 Continued (Part C)

NET EXPORT MODELS: CATEGORY 85*							
AUSTRALIA - SINGAPORE							
AUD	**DEPENDENT VARIABLE: Δ(LnX/M)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.017	-0.623	**R^2**	0.119	**LMT F(2,54)**	0.906	-Model is mis-specified. -Incorrect sign for GDP; EXR; IR. -Model is not significant.
Δ(LnGDP)	0.332	0.671	**Adj. R^2**	0.025	**LMT F(Prob.)**	0.410	
Δ(LnEXR)	0.328	0.366	**F(6,56)**	1.266	**BPGT F(6,56)**	0.247	
Δ(LnMS)	-0.368	-0.506	**F(Prob.)**	0.288	**BPGT F(Prob.)**	0.959	
Δ(LnIR)	-0.144	-0.271	**DW**	2.224	**RESET F(1,55)**	0.430	
Δ(LnSVR)	0.002	0.623	**AIC**	-0.089	**RESET F(Prob.)**	0.515	
Residuals (-1)	-0.188	-2.396**	**SC**	0.149	**JBT χ^2 (2)**	2.439	
			LL	9.799	**JBT χ^2 (Prob.)**	0.295	
QTY	**DEPENDENT VARIABLE: Δ(LnX/M)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.011	0.119	**R^2**	0.366	**LMT F(2,54)**	1.889	
Δ(LnGDP)	-1.811	-1.125***	**Adj. R^2**	0.298	**LMT F(Prob.)**	0.161	
Δ(LnEXR)	-4.963	-1.705**	**F(6,56)**	5.376*	**BPGT F(6,56)**	0.801	
Δ(LnMS)	-2.854	-1.282***	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.574	
Δ(LnIR)	1.248	0.723	**DW**	2.229	**RESET F(1,55)**	1.292	
Δ(LnSVR)	0.009	0.718	**AIC**	2.260	**RESET F(Prob.)**	0.261	
Residuals (-1)	-0.585	-4.925*	**SC**	2.499	**JBT χ^2 (2)**	2.449	
			LL	-64.206	**JBT χ^2 (Prob.)**	0.294	
AUSTRALIA - THAILAND							
AUD	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-1.735	-3.033*	**R^2**	0.744	**LMT F(3,44)**	2.115	-Model is mis-specified. -Incorrect sign for EXR; MS; IR; SVR.
Δ(LnGDP)	-1.096	-1.380***	**Adj. R^2**	0.711	**LMT F(Prob.)**	0.112	
Δ(LnEXR)	3.137	1.207***	**F(6,47)**	22.72*	**BPGT F(5,48)**	1.686	
Δ(LnMS)	4.052	1.633***	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.156	
Δ(LnIR)	-1.058	-1.302***	**DW**	2.551	**RESET F(2,45**	5.698*	
LnSVR	-0.108	-0.734	**AIC**	1.568	**RESET F(Prob.)**	0.006	
AR(1)	0.868	11.244*	**SC**	1.825	**JBT χ^2 (2)**	3.248	
			LL	-35.324	**JBT χ^2 (Prob.)**	0.197	
QTY	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-2.759	-10.486*	**R^2**	0.305	**LMT F(2,45)**	0.339	-Residuals are not normally distributed. -Incorrect sign for MS; IR; SVR.
Δ(LnGDP)	-2.784	-1.659***	**Adj. R^2**	0.216	**LMT F(Prob.)**	0.714	
Δ(LnEXR)	-3.398	-0.676	**F(6,47)**	3.434*	**BPGT F(5,48)**	0.328	
Δ(LnMS)	0.734	0.153	**F(Prob.)**	0.007	**BPGT F(Prob.)**	0.894	
Δ(LnIR)	-3.196	-2.173**	**DW**	1.937	**RESET F(1,46**	0.843	
LnSVR	-0.111	-0.417	**AIC**	2.540	**RESET F(Prob.)**	0.363	
AR(1)	0.408	2.969*	**SC**	2.798	**JBT χ^2 (2)**	10.462*	
			LL	-61.573	**JBT χ^2 (Prob.)**	0.005	

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**** significant at the 1%, ** significance at 5%, ***significance at 10%***

Table: 8.5 Continued (Part D)

NET EXPORT MODELS: CATEGORY 85*							
AUSTRALIA - UNITED KINGDOM							
AUD	**DEPENDENT VARIABLE: Δ(LnX/M)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.010	0.326	**R^2**	0.346	**LMT F(2,58)**	0.354	-Residuals are not normally distributed. -Incorrect sign for GDP; EXR; MS.
Δ(LnGDP)	0.803	1.264***	**Adj. R^2**	0.281	**LMT F(Prob.)**	0.704	
Δ(LnEXR)	1.484	0.798	**F(6,60)**	5.295*	**BPGT F(6,60)**	0.446	
Δ(LnMS)	1.466	0.778	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.845	
Δ(LnIR)	0.466	0.949	**DW**	1.903	**RESET F(1,59)**	0.013	
Δ(LnSVR)	0.003	0.835	**AIC**	0.072	**RESET F(Prob.)**	0.909	
Residuals (-1)	-0.569	-5.117*	**SC**	0.302	**JBT χ^2 (2)**	8.330**	
			LL	4.588	**JBT χ^2 (Prob.)**	0.016	
QTY	**DEPENDENT VARIABLE: Δ(LnX/M)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.021	0.257	**R^2**	0.359	**LMT F(2,58)**	0.600	-Residuals are not normally distributed. -Incorrect sign for GDP.
Δ(LnGDP)	4.824	2.763*	**Adj. R^2**	0.295	**LMT F(Prob.)**	0.552	
Δ(LnEXR)	-3.340	-0.665	**F(6,60)**	5.608*	**BPGT F(6,60)**	0.551	
Δ(LnMS)	-5.372	-1.054	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.768	
Δ(LnIR)	0.465	0.338	**DW**	2.117	**RESET F(1,59)**	0.763	
Δ(LnSVR)	0.012	1.114***	**AIC**	2.070	**RESET F(Prob.)**	0.386	
Residuals (-1)	-0.586	-5.074*	**SC**	2.300	**JBT χ^2 (2)**	22.386*	
			LL	-62.348	**JBT χ^2 (Prob.)**	0.000	
AUSTRALIA - UNITED STATES							
AUD	**DEPENDENT VARIABLE: Δ(LnX/M)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.016	0.652	**R^2**	0.397	**LMT F(2,54)**	1.720	-Model is mis-specified. -Incorrect sign for GDP; EXR; IR; SVR.
Δ(LnGDP)	1.575	3.077*	**Adj. R^2**	0.333	**LMT F(Prob.)**	0.189	
Δ(LnEXR)	0.252	0.138	**F(6,56)**	6.153*	**BPGT F(6,56)**	0.657	
Δ(LnMS)	-1.468	-0.860	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.684	
Δ(LnIR)	-0.229	-0.575	**DW**	2.145	**RESET F(1,55)**	3.14***	
Δ(LnSVR)	-0.002	-0.557	**AIC**	-0.431	**RESET F(Prob.)**	0.082	
Residuals (-1)	-0.567	-4.843*	**SC**	-0.193	**JBT χ^2 (2)**	1.495	
			LL	20.580	**JBT χ^2 (Prob.)**	0.474	
QTY	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-3.958	-7.086*	**R^2**	0.676	**LMT F(2,53)**	4.157**	-Residuals are serially correlated. -Model is mis-specified. -Incorrect sign for EXR; MS; IR.
Δ(LnGDP)	-1.915	-1.542***	**Adj. R^2**	0.640	**LMT F(Prob.)**	0.021	
Δ(LnEXR)	0.491	0.093	**F(6,55)**	19.09*	**BPGT F(5,56)**	0.552	
Δ(LnMS)	1.773	0.344	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.736	
Δ(LnIR)	-2.124	-1.417***	**DW**	2.503	**RESET F(1,54)**	8.934*	
LnSVR	0.002	0.138	**AIC**	2.308	**RESET F(Prob.)**	0.004	
AR(1)	0.830	11.306*	**SC**	2.548	**JBT χ^2 (2)**	5.785	
			LL	-64.535	**JBT χ^2 (Prob.)**	0.134	

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RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at the 1%, ** significance at 5%, ***significance at 10%***

According to Table 8.5, out of the sixteen NX models in Category 85, 13 models are significant and 3 NX models with Germany, Malaysia and Singapore all based on AUD, are not significant. Furthermore, in most of the models, the variable GDP is significant, while the variables EXR, MS, IR and SVR are not significant.

The variables EXR, MS, IR and SVR are significant in 3, 2, 6 and 5 out of the 16 models respectively, while the variable GDP is significant in 11 out of the 16 models. However, an incorrect (positive) sign for the GDP (11 out of the 16 models; 6 based on AUD and 5 on QTY), for the EXR (9 out of the 16 models; 6 based on AUD and 3 based on QTY) and for the MS (6 out of the 16 models; 3 based on AUD and 3 based on QTY) is evident. Furthermore, an incorrect (negative) sign for the IR (9 out of the 16 models; 4 based on AUD and 5 based on QTY) and for the SVR (6 out of the 16 models; 4 based on AUD and 2 based on QTY) is evident. The correct coefficient signs for all the GDP, EXR, MS, IR and SVR are found in 2 out of the 16 models (1 based on AUD and 1 based on QTY), while for these 2 models, the coefficient range for the GDP, EXR, MS, IR and SVR is between (-0.240 and -1.811), (-1.442 and -4.963), (-2.854 and -4.025), (0.873 and 1.248) and (0.009 and 0.704) respectively. Finally, the Adj. R^2 in overall for all 16 models in this category ranges between 0.2 and 71.5 percent.

In overall, out of 16 estimated models in this category, only 2 models (the NX with China based on AUD; the NX with Singapore based on QTY) have the correct signs and have satisfactory passed all diagnostic tests. The NX model with China (based on AUD) shows that a 1 percent increase in the GDP will decrease the NX growth rate by 0.240 percent, a 1 percent growth rate in the EXR and MS will decrease the NX growth rate by 1.442 and 4.025 percent respectively, a 1 percent growth rate in the IR will increase the NX growth rate by 0.873 percent, while a 1 percent increase in SVR will increase the NX growth rate by 0.704 percent in average. The NX model with Singapore (based on QTY) shows that a 1 percent growth rate in the GDP, EXR and MS will decrease the NX growth rate by 1.811, 4.963 and 2.854 percent respectively, while a 1 percent growth rate in the IR and SVR will increase the NX growth rate by 1.248 and 0.009 percent respectively in average. In these 2 models, the variables EXR and MS are elastic, the variables GDP and IR are mixed, while the variable SVR is inelastic. Finally, the Adj. R^2 for China based on AUD values is 29.9 percent and for Singapore based on QTY, the value is 29.8 percent.

8.4.2.4 NET EXPORT MODELS; CATEGORY: 87

Table: 8.6 (Part A)

NET EXPORT MODELS: CATEGORY 87*							
AUSTRALIA - CHINA							
AUD	**DEPENDENT VARIABLE: Δ(LnX/M)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-2.508	-0.566	**R^2**	0.224	**LMT F(2,19)**	0.294	-Residuals are Heteroscedastic. -Incorrect sign for GDP; EXR; MS. -Model is not significant.
LnGDP	0.085	0.179	**Adj. R^2**	0.039	**LMT F(Prob.)**	0.748	
Δ(LnEXR)	6.277	0.478	**F(5,21)**	1.210	**BPGT F(5,21)**	2.57***	
Δ(LnMS)	10.684	0.814	**F(Prob.)**	0.339	**BPGT F(Prob.)**	0.058	
Δ(LnIR)	2.425	1.871***	**DW**	1.947	**RESET F(1,20)**	0.000	
LnSVR	0.552	0.716	**AIC**	2.638	**RESET F(Prob.)**	0.992	
			SC	2.926	**JBT χ^2 (2)**	1.857	
			LL	-29.609	**JBT χ^2 (Prob.)**	0.395	
QTY	**DEPENDENT VARIABLE: Δ(LnX/M)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-35.649	-3.198*	**R^2**	0.565	**LMT F(2,17)**	2.096	
LnGDP	-2.264	-1.613***	**Adj. R^2**	0.428	**LMT F(Prob.)**	0.154	
Δ(LnEXR)	-3.837	-0.098	**F(6,19)**	4.120*	**BPGT F(5,20)**	0.486	
Δ(LnMS)	-2.105	-0.054	**F(Prob.)**	0.008	**BPGT F(Prob.)**	0.783	
Δ(LnIR)	8.250	2.560**	**DW**	2.024	**RESET F(1,18)**	0.676	
LnSVR	6.292	3.377*	**AIC**	4.965	**RESET F(Prob.)**	0.422	
AR(1)	-0.701	-4.135*	**SC**	5.303	**JBT χ^2 (2)**	1.336	
			LL	-57.542	**JBT χ^2 (Prob.)**	0.513	
AUSTRALIA - FRANCE							
AUD	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	2.295	0.310	**R^2**	0.787	**LMT F(2,33)**	1.970	-Model is mis-specified. -Incorrect sign for GDP; MS.
Δ(LnGDP)	0.787	0.940	**Adj. R^2**	0.748	**LMT F(Prob.)**	0.157	
Δ(LnEXR)	-1.047	-0.422	**F(6,34)**	20.27*	**BPGT F(5,35)**	1.691	
LnMS	1.284	0.506	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.163	
Δ(LnIR)	4.738	3.472*	**DW**	2.257	**RESET F(2,31)**	5.065**	
LnSVR	0.545	2.552**	**AIC**	1.700	**RESET F(Prob.)**	0.013	
AR(1)	0.847	10.285*	**SC**	1.995	**JBT χ^2 (2)**	1.563	
			LL	-26.997	**JBT χ^2 (Prob.)**	0.458	
QTY	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	27.182	1.924***	**R^2**	0.155	**LMT F(2,33)**	1.250	-Incorrect sign for GDP; EXR. -Model is not significant.
Δ(LnGDP)	3.978	0.802	**Adj. R^2**	0.034	**LMT F(Prob.)**	0.300	
Δ(LnEXR)	0.523	0.048	**F(6,34)**	1.283	**BPGT F(5,35)**	1.950	
LnMS	-11.769	-2.184**	**F(Prob.)**	0.293	**BPGT F(Prob.)**	0.111	
Δ(LnIR)	4.933	0.938	**DW**	2.130	**RESET F(1,34)**	0.507	
LnSVR	0.880	0.815	**AIC**	4.434	**RESET F(Prob.)**	0.481	
			SC	4.685	**JBT χ^2 (2)**	2.371	
			LL	-84.898	**JBT χ^2 (Prob.)**	0.306	

Vehicles Other Than Railway or Tramway Rolling-Stock, and Parts and Accessories Thereof
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BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at the 1%, ** significance at 5%, ***significance at 10%***

Table: 8.6 Continued (Part B)

NET EXPORT MODELS: CATEGORY 87*

AUSTRALIA - GERMANY

AUD	DEPENDENT VARIABLE: LnX/M						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-6.012	-1.180***	**R^2**	0.626	**LMT F(2,57)**	2.246	-Residuals are not normally distributed.
Δ(LnGDP)	-0.873	-1.342***	**Adj. R^2**	0.588	**LMT F(Prob.)**	0.115	
Δ(LnEXR)	-0.552	-0.347	**F(6,59)**	16.47*	**BPGT F(5,60)**	0.968	
LnMS	-0.812	-0.453	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.445	
Δ(LnIR)	1.078	1.068***	**DW**	2.147	**RESET F(1,58)**	1.622	
Δ(LnSVR)	0.002	0.236	**AIC**	1.597	**RESET F(Prob.)**	0.208	
AR(1)	0.809	10.454*	**SC**	1.829	**JBT χ^2 (2)**	18.010*	
			LL	-45.703	**JBT χ^2 (Prob.)**	0.000	

QTY	DEPENDENT VARIABLE: LnX/M						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-10.718	-1.032***	**R^2**	0.466	**LMT F(2,57)**	0.489	
Δ(LnGDP)	-1.358	-0.561	**Adj. R^2**	0.411	**LMT F(Prob.)**	0.616	
Δ(LnEXR)	-11.403	-1.897***	**F(6,59)**	8.568*	**BPGT F(5,60)**	1.046	
LnMS	-2.361	-0.640	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.399	
Δ(LnIR)	1.050	0.279	**DW**	1.839	**RESET F(1,58)**	1.762	
Δ(LnSVR)	0.002	0.096	**AIC**	4.118	**RESET F(Prob.)**	0.190	
AR(1)	0.667	6.757*	**SC**	4.350	**JBT χ^2 (2)**	0.538	
			LL	-	**JBT χ^2 (Prob.)**	0.764	

AUSTRALIA - MALAYSIA

AUD	DEPENDENT VARIABLE: Δ(LnX/M)						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.026	-0.349	**R^2**	0.237	**LMT F(2,61)**	1.598	-Incorrect sign for GDP; EXR.
Δ(LnGDP)	0.810	0.512	**Adj. R^2**	0.201	**LMT F(Prob.)**	0.211	
Δ(LnEXR)	1.618	0.688	**F(3,63)**	6.540*	**BPGT F(3,63)**	0.479	
Residuals (-1)	-0.441	-4.322*	**F(Prob.)**	0.001	**BPGT F(Prob.)**	0.698	
			DW	1.723	**RESET F(1,62)**	2.224	
			AIC	1.854	**RESET F(Prob.)**	0.141	
			SC	1.986	**JBT χ^2 (2)**	4.272	
			LL	-58.123	**JBT χ^2 (Prob.)**	0.118	

QTY	DEPENDENT VARIABLE: LnX/M						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-1.287	-3.096*	**R^2**	0.253	**LMT F(2,60)**	0.640	-Model is mis-specified.
Δ(LnGDP)	-2.664	-0.813	**Adj. R^2**	0.217	**LMT F(Prob.)**	0.531	
Δ(LnEXR)	-2.516	-0.448	**F(3,62)**	7.018*	**BPGT F(2,63)**	1.871	
AR(1)	0.526	4.639*	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.162	
			DW	2.109	**RESET F(1,61)**	2.87***	
			AIC	3.823	**RESET F(Prob.)**	0.096	
			SC	3.955	**JBT χ^2 (2)**	0.901	
			LL	-	**JBT χ^2 (Prob.)**	0.637	

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RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at the 1%, ** significance at 5%, ***significance at 10%***

Table: 8.6 Continued (Part C)

NET EXPORT MODELS: CATEGORY 87*							
AUSTRALIA - SINGAPORE							
AUD	**DEPENDENT VARIABLE: Δ(LnX/M)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.031	-0.669	R^2	0.463	**LMT F(2,52)**	2.330	-Residuals are not normally distributed. -Incorrect sign for IR; SVR.
Δ(LnGDP)	-0.038	-0.032	**Adj. R^2**	0.394	**LMT F(Prob.)**	0.107	
Δ(LnEXR)	-2.329	-1.209***	**F(7,54)**	6.656*	**BPGT F(6,55)**	0.243	
Δ(LnMS)	-1.817	-1.349***	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.960	
Δ(LnIR)	-1.713	-1.543***	**DW**	2.139	**RESET F(1,53)**	0.631	
Δ(LnSVR)	-0.002	-0.223	**AIC**	1.486	**RESET F(Prob.)**	0.430	
Residuals (-1)	-0.554	-4.356*	**SC**	1.760	**JBT χ^2 (2)**	59.248*	
AR(1)	-0.332	-2.017**	**LL**	-38.058	**JBT χ^2 (Prob.)**	0.000	
QTY	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	2.873	3.835*	R^2	0.614	**LMT F(2,53)**	1.064	-Model is mis-specified. -Incorrect sign for IR; SVR.
Δ(LnGDP)	-2.073	-1.068***	**Adj. R^2**	0.572	**LMT F(Prob.)**	0.352	
Δ(LnEXR)	-5.232	-1.208***	**F(6,55)**	14.61*	**BPGT F(5,56)**	0.682	
Δ(LnMS)	-0.740	-0.210	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.639	
Δ(LnIR)	-2.794	-0.908	**DW**	2.273	**RESET F(2,53)**	2.77***	
LnSVR	-0.033	-1.262***	**AIC**	3.405	**RESET F(Prob.)**	0.072	
AR(1)	0.784	8.656*	**SC**	3.646	**JBT χ^2 (2)**	1.614	
			LL	-98.568	**JBT χ^2 (Prob.)**	0.446	
AUSTRALIA - THAILAND							
AUD	**DEPENDENT VARIABLE: Δ(LnX/M)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.053	-0.536	R^2	0.176	**LMT F(2,46)**	1.914	-Incorrect sign for EXR; IR; SVR. -Model is not significant.
Δ(LnGDP)	-1.555	-0.752	**Adj. R^2**	0.073	**LMT F(Prob.)**	0.159	
Δ(LnEXR)	1.611	0.336	**F(6,48)**	1.712	**BPGT F(6,48)**	0.512	
Δ(LnMS)	-2.296	-0.511	**F(Prob.)**	0.139	**BPGT F(Prob.)**	0.796	
Δ(LnIR)	-1.811	-1.530***	**DW**	1.881	**RESET F(1,47)**	0.896	
Δ(LnSVR)	0.039	0.174	**AIC**	2.264	**RESET F(Prob.)**	0.349	
Residuals (-1)	-0.171	-1.779***	**SC**	2.519	**JBT χ^2 (2)**	2.404	
			LL	-55.247	**JBT χ^2 (Prob.)**	0.301	
QTY	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-1.609	-1.205***	R^2	0.764	**LMT F(2,45)**	1.559	-Incorrect sign for GDP; IR; SVR.
Δ(LnGDP)	0.360	0.186	**Adj. R^2**	0.734	**LMT F(Prob.)**	0.222	
Δ(LnEXR)	-4.354	-0.688	**F(6,47)**	25.42*	**BPGT F(5,48)**	0.283	
Δ(LnMS)	-5.852	-0.969	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.920	
Δ(LnIR)	-1.611	-0.814	**DW**	2.305	**RESET F(1,46**	2.732	
LnSVR	-0.765	-2.135**	**AIC**	3.343	**RESET F(Prob.)**	0.105	
AR(1)	0.863	10.423*	**SC**	3.601	**JBT χ^2 (2)**	0.237	
			LL	-83.269	**JBT χ^2 (Prob.)**	0.888	

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**** significant at the 1%, ** significance at 5%, ***significance at 10%***

Table: 8.6 Continued (Part D)

NET EXPORT MODELS: CATEGORY 87*							
AUSTRALIA - UNITED KINGDOM							
AUD	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-2.463	-13.987*	**R^2**	0.553	**LMT F(2,57)**	3.972**	-Residuals are serially correlated. -Model is mis-specified. -Residuals are not normally distributed.
Δ(LnGDP)	-0.982	-1.415***	**Adj. R^2**	0.508	**LMT F(Prob.)**	0.024	
Δ(LnEXR)	-0.321	-0.129	**F(6,59)**	12.18*	**BPGT F(5,60)**	1.199	
Δ(LnMS)	-0.971	-0.385	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.321	
Δ(LnIR)	0.313	0.399	**DW**	2.400	**RESET F(1,58)**	10.496*	
LnSVR	0.016	2.258**	**AIC**	1.130	**RESET F(Prob.)**	0.002	
AR(1)	0.710	7.620*	**SC**	1.362	**JBT χ^2 (2)**	6.666**	
			LL	-30.291	**JBT χ^2 (Prob.)**	0.036	
QTY	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-3.170	-4.058*	**R^2**	0.596	**LMT F(2,57)**	3.787**	-Residuals are serially correlated. -Incorrect sign for GDP; MS; IR
Δ(LnGDP)	1.586	0.650	**Adj. R^2**	0.555	**LMT F(Prob.)**	0.029	
Δ(LnEXR)	-12.349	-1.402***	**F(6,59)**	14.51*	**BPGT F(5,60)**	0.418	
Δ(LnMS)	7.167	0.804	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.834	
Δ(LnIR)	-3.625	-1.303***	**DW**	2.482	**RESET F(1,58)**	0.150	
LnSVR	0.008	0.330	**AIC**	3.707	**RESET F(Prob.)**	0.700	
AR(1)	0.765	8.931*	**SC**	3.939	**JBT χ^2 (2)**	0.404	
			LL	-115.37	**JBT χ^2 (Prob.)**	0.817	
AUSTRALIA - UNITED STATES							
AUD	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.858	-4.239*	**R^2**	0.633	**LMT F(2,53)**	0.148	-Model is mis-specified.
Δ(LnGDP)	-2.784	-4.065*	**Adj. R^2**	0.593	**LMT F(Prob.)**	0.863	
Δ(LnEXR)	-0.947	-0.326	**F(6,55)**	15.84*	**BPGT F(5,56)**	0.966	
Δ(LnMS)	-3.556	-1.252***	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.446	
Δ(LnIR)	1.093	1.339***	**DW**	1.932	**RESET F(1,54)**	5.446**	
LnSVR	0.013	1.852**	**AIC**	1.032	**RESET F(Prob.)**	0.023	
AR(1)	0.749	8.365*	**SC**	1.272	**JBT χ^2 (2)**	0.514	
			LL	-24.995	**JBT χ^2 (Prob.)**	0.773	
QTY	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.079	0.234	**R^2**	0.482	**LMT F(2,53)**	2.81***	-Residuals are serially correlated. -Residuals are not normally distributed. -Incorrect sign for GDP; EXR; MS; IR; SVR.
Δ(LnGDP)	1.014	0.742	**Adj. R^2**	0.425	**LMT F(Prob.)**	0.069	
Δ(LnEXR)	3.220	0.557	**F(6,55)**	8.517*	**BPGT F(5,56)**	1.566	
Δ(LnMS)	0.310	0.055	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.185	
Δ(LnIR)	-0.713	-0.444	**DW**	2.009	**RESET F(1,54)**	1.223	
LnSVR	-0.005	-0.397	**AIC**	2.353	**RESET F(Prob.)**	0.274	
AR(1)	0.703	7.268*	**SC**	2.593	**JBT χ^2 (2)**	6.819**	
			LL	-65.952	**JBT χ^2 (Prob.)**	0.033	

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DW – Durbin-Watson Statistics
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BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at the 1%, ** significance at 5%, ***significance at 10%***

According to Table 8.6, out of the sixteen NX models in Category 87, 13 models are significant and 3 NX models with China and Thailand based on AUD; and France based on QTY, are not significant, while in most of the models, the majority of the variables are not significant.

The variables GDP, EXR, MS, and SVR are significant in 5, 4, 3 and 3 out of the 16 models respectively, while the variable IR is significant in 8 out of the 16 models. However, an incorrect (positive) sign for the GDP (7 out of the 16 models; 3 based on AUD and 4 on QTY), for the EXR (5 out of the 16 models; 3 based on AUD and 2 based on QTY) and for the MS (4 out of the 16 models; 2 based on AUD and 2 based on QTY) is evident. Furthermore, an incorrect (negative) sign for the IR (6 out of the 16 models; 2 based on AUD and 4 based on QTY) and for the SVR (5 out of the 16 models; 2 based on AUD and 3 based on QTY) is evident. The correct coefficient signs for all the GDP, EXR, MS, IR and SVR are found in 6 out of the 16 models (3 based on AUD and 3 based on QTY), while for these 6 models, the coefficient range for the GDP, EXR, MS, IR and SVR is between (-0.873 and -2.784), (-0.321 and -11.403), (-0.812 and -3.556), (0.313 and 8.250) and (0.002 and 6.292) respectively. Finally, the Adj. R^2 in overall for all 16 models in this category ranges between 3.4 and 74.8 percent.

In overall, out of the 16 estimated models in this category, only 2 models (the NX with China and Germany both based on QTY) have the correct signs and have satisfactory passed all diagnostic tests. The NX model with China (based on QTY) shows that a 1 percent increase in the GDP will decrease the NX growth rate by 2.264 percent, a 1 percent growth rate in the EXR and MS will decrease the NX growth rate by 3.837 and 2.105 percent respectively, a 1 percent growth rate in the IR will increase the NX growth rate by 8.25 percent, while a 1 percent increase in SVR will increase the NX growth rate by 6.292 percent in average. The NX model with Germany (based on QTY) shows that a 1 percent growth rate in the GDP and EXR will decrease the NX by 1.358 and 11.403 percent respectively, a 1 percent increase in the MS will decrease the NX by 2.361 percent, while a 1 percent growth rate in the IR and SVR will increase the NX by 1.05 and 0.002 percent respectively in average. The variables GDP, EXR, MS and IR in these 2 models are all elastic and the variables SVR is mixed. Finally, the Adj. R^2 for China and Germany in these 2 models is 42.8 and 41.1 respectively.

8.4.2.5 NET EXPORT MODELS; CATEGORY: 3004

Table: 8.7 (Part A)

NET EXPORT MODELS: CATEGORY 3004*							
AUSTRALIA - FRANCE							
AUD	**DEPENDENT VARIABLE: Δ(LnX/M)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	7.922	0.655	**R^2**	0.078	**LMT F(2,30)**	0.759	-Model is mis-specified. -Residuals are not normally distributed. -Incorrect sign for GDP; EXR; MS; SVR. -Model is not significant.
Δ(LnGDP)	0.983	0.223	**Adj. R^2**	0.067	**LMT F(Prob.)**	0.477	
Δ(LnEXR)	4.157	0.437	**F(5,32)**	0.538	**BPGT F(5,32)**	0.781	
LnMS	4.644	1.003	**F(Prob.)**	0.746	**BPGT F(Prob.)**	0.571	
Δ(LnIR)	0.198	0.043	**DW**	2.012	**RESET F(1,31)**	3.39***	
LnSVR	-1.358	-1.428***	**AIC**	4.128	**RESET F(Prob.)**	0.075	
			SC	4.387	**JBT χ^2 (2)**	167.81*	
			LL	-72.433	**JBT χ^2 (Prob.)**	0.000	
QTY	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	38.780	2.266**	**R^2**	0.468	**LMT F(2,28)**	4.394**	-Residuals are serially correlated. -Incorrect sign for GDP; MS; IR
Δ(LnGDP)	2.098	0.562	**Adj. R^2**	0.361	**LMT F(Prob.)**	0.022	
Δ(LnEXR)	-4.954	-0.496	**F(6,30)**	4.390*	**BPGT F(5,31)**	1.219	
LnMS	12.262	2.015**	**F(Prob.)**	0.003	**BPGT F(Prob.)**	0.324	
Δ(LnIR)	-0.128	-0.025	**DW**	1.440	**RESET F(1,29)**	2.011	
LnSVR	1.649	1.837***	**AIC**	4.169	**RESET F(Prob.)**	0.167	
AR(1)	0.346	1.966***	**SC**	4.473	**JBT χ^2 (2)**	4.554	
			LL	-70.118	**JBT χ^2 (Prob.)**	0.103	
AUSTRALIA - GERMANY							
AUD	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	5.281	0.702	**R^2**	0.509	**LMT F(1,33)**	2.406	-Residuals are Heteroscedastic. -Model is mis-specified. -Incorrect sign for EXR; MS; IR.
Δ(LnGDP)	-3.427	-2.431**	**Adj. R^2**	0.423	**LMT F(Prob.)**	0.130	
Δ(LnEXR)	11.950	3.188*	**F(6,34)**	5.881*	**BPGT F(5,35)**	2.579**	
LnMS	2.853	1.098***	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.044	
Δ(LnIR)	-1.207	-0.625	**DW**	2.302	**RESET F(1,33)**	5.445**	
Δ(LnSVR)	0.024	0.112	**AIC**	2.283	**RESET F(Prob.)**	0.026	
AR(1)	0.503	4.725*	**SC**	2.576	**JBT χ^2 (2)**	1.734	
			LL	-39.804	**JBT χ^2 (Prob.)**	0.420	
QTY	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	26.023	1.162***	**R^2**	0.372	**LMT F(2,32)**	3.623**	-Residuals are serially correlated. -Incorrect sign for MS; IR; SVR.
Δ(LnGDP)	-3.162	-0.776	**Adj. R^2**	0.261	**LMT F(Prob.)**	0.038	
Δ(LnEXR)	-3.902	-0.354	**F(6,34)**	3.36**	**BPGT F(5,35)**	1.025	
LnMS	9.240	1.194***	**F(Prob.)**	0.010	**BPGT F(Prob.)**	0.418	
Δ(LnIR)	-4.015	-0.710	**DW**	2.260	**RESET F(1,33)**	0.749	
Δ(LnSVR)	-0.182	-0.291	**AIC**	4.423	**RESET F(Prob.)**	0.393	
AR(1)	0.520	3.525*	**SC**	4.716	**JBT χ^2 (2)**	1.824	
			LL	-83.676	**JBT χ^2 (Prob.)**	0.402	

Medicaments (Excluding Goods of 3002, 3005 or 3006) Consisting of Mixed or Unmixed Products for Therapeutic or Prophylactic Uses, Put Up in Measured Doses or in Forms or Packagings for Retail Sale
DW – Durbin-Watson Statistics
AIS – Akaike Info Criterion
SC – Schwartz Criterion
LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at the 1%, ** significance at 5%, ***significance at 10%***

Table: 8.7 Continued (Part B)

NET EXPORT MODELS: CATEGORY 3004*							
AUSTRALIA - UNITED KINGDOM							
AUD	**DEPENDENT VARIABLE: Δ(LnX/M)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.003	-0.087	**R^2**	0.493	**LMT F(1,26)**	1.692	
Δ(LnGDP)	-0.321	-0.248	**Adj. R^2**	0.381	**LMT F(Prob.)**	0.205	
Δ(LnEXR)	-1.963	-0.678	**F(6,27)**	4.381*	**BPGT F(6,27)**	0.390	
Δ(LnMS)	-1.548	-0.728	**F(Prob.)**	0.003	**BPGT F(Prob.)**	0.879	
Δ(LnIR)	0.389	0.541	**DW**	2.171	**RESET F(1,26)**	0.526	
Δ(LnSVR)	0.118	0.916	**AIC**	-0.156	**RESET F(Prob.)**	0.475	
Residuals (-1)	-0.842	-4.411*	**SC**	0.158	**JBT χ^2 (2)**	0.483	
			LL	9.654	**JBT χ^2 (Prob.)**	0.785	
QTY	**DEPENDENT VARIABLE: Δ(LnX/M)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.041	0.118	**R^2**	0.517	**LMT F(1,26)**	0.467	-Incorrect sign for GDP; EXR; MS; IR; SVR.
Δ(LnGDP)	8.433	0.722	**Adj. R^2**	0.409	**LMT F(Prob.)**	0.500	
Δ(LnEXR)	4.499	0.168	**F(6,27)**	4.809*	**BPGT F(6,27)**	0.564	
Δ(LnMS)	5.370	0.275	**F(Prob.)**	0.002	**BPGT F(Prob.)**	0.755	
Δ(LnIR)	-2.078	-0.311	**DW**	1.875	**RESET F(1,26)**	0.001	
Δ(LnSVR)	-1.036	-0.867	**AIC**	4.265	**RESET F(Prob.)**	0.975	
Residuals (-1)	-0.918	-4.929*	**SC**	4.579	**JBT χ^2 (2)**	0.981	
			LL	-65.499	**JBT χ^2 (Prob.)**	0.612	

***Medicaments (Excluding Goods of 3002, 3005 or 3006) Consisting of Mixed or Unmixed Products for Therapeutic or Prophylactic Uses, Put Up in Measured Doses or in Forms or Packagings for Retail Sale**
DW – Durbin-Watson Statistics
AIS – Akaike Info Criterion
SC – Schwartz Criterion
LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at the 1%, ** significance at 5%, ***significance at 10%***

According to Table 8.7, out of the six NX models in Category 3004, 5 models are significant and one NX models with France based on AUD is not significant, while in all of the models, the majority of the variables are not significant.

The variables GDP, EXR, MS, and SVR are significant in 1, 1, 3 and 2 out of the 6 models respectively, while the variable IR is not significant in none out of the 6 models. However, an incorrect (positive) sign for the GDP (3 out of the 6 models; 1 based on AUD and 2 on QTY), for the EXR (3 out of the 6 models; 2 based on AUD and 1 based on QTY) and for the MS (5 out of the 6 models; 2 based on AUD and 3 based on QTY) is evident. Furthermore, an incorrect (negative) sign for the IR (4 out of the 6 models; 1 based on AUD and 3 based on QTY) and for the SVR (3 out of the 6 models; 1 based on AUD and 2 based on QTY) is evident. The correct coefficient signs for all the GDP, EXR, MS, IR and SVR are found in 1 out of the 6 models (based on AUD), while for this model, the coefficients values for the GDP, EXR, MS, IR and SVR are -0.321, -1.963, -1.548, 0.389 and 0.118 respectively. Finally, the Adj. R^2 in overall for all 6 models in this category ranges between 6.7 and 42.3 percent.

In overall, out of the 6 estimated models in this category, only 1 model (the NX with The United Kingdom based on AUD) has the correct signs and has satisfactory passed all diagnostic tests. The NX model with The United Kingdom (based n AUD) shows that a 1 percent growth rate in the GDP, EXR and MS will decrease the NX growth rate by 0.321, 1.963 and 1.548 percent respectively and a 1 percent growth rate in the IR and SVR will increase the NX growth rate by 0.389 and 0.118 percent respectively in average. The variables EXR and MS in this model are elastic, while the variables GDP, IR and SVR are inelastic. Finally, the Adj. R^2 for this model is 38.1 percent.

8.4.2.6 NET EXPORT MODELS; CATEGORY: 8471

Table: 8.8 (Part A)

NET EXPORT MODELS: CATEGORY 8471*							
AUSTRALIA - CHINA							
AUD	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-7.176	-1.989***	**R^2**	0.451	**LMT F(2,17)**	0.598	
LnGDP	-0.584	-1.701***	**Adj. R^2**	0.277	**LMT F(Prob.)**	0.561	
Δ(LnEXR)	-18.592	-1.898***	**F(6,19)**	2.6***	**BPGT F(5,20)**	0.820	
Δ(LnMS)	-14.727	-1.496***	**F(Prob.)**	0.052	**BPGT F(Prob.)**	0.550	
Δ(LnIR)	0.495	0.487	**DW**	2.214	**RESET F(1,18)**	2.160	
LnSVR	0.395	0.620	**AIC**	2.328	**RESET F(Prob.)**	0.159	
AR(1)	0.605	3.693*	**SC**	2.666	**JBT χ^2 (2)**	0.182	
			LL	-23.259	**JBT χ^2 (Prob.)**	0.913	
QTY	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-12.203	-1.969***	**R^2**	0.112	**LMT F(2,19)**	0.744	-Incorrect sign for IR; SVR.
LnGDP	-0.411	-0.618	**Adj. R^2**	0.100	**LMT F(Prob.)**	0.489	
Δ(LnEXR)	-23.202	-1.266***	**F(5,21)**	0.5***	**BPGT F(5,21)**	0.299	
Δ(LnMS)	-23.432	-1.278***	**F(Prob.)**	0.092	**BPGT F(Prob.)**	0.908	
Δ(LnIR)	-0.423	-0.234	**DW**	1.744	**RESET F(1,20)**	0.314	
LnSVR	-1.148	-1.066***	**AIC**	3.307	**RESET F(Prob.)**	0.582	
			SC	3.595	**JBT χ^2 (2)**	1.559	
			LL	-38.646	**JBT χ^2 (Prob.)**	0.459	
AUSTRALIA - FRANCE							
AUD	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-3.982	-0.673	**R^2**	0.250	**LMT F(2,57)**	1.008	-Model is mis-specified. -Residuals are not normally distributed. -Incorrect sign for GDP; SVR.
Δ(LnGDP)	1.678	0.676	**Adj. R^2**	0.174	**LMT F(Prob.)**	0.372	
Δ(LnEXR)	-1.288	-0.213	**F(6,59)**	3.278*	**BPGT F(5,60)**	0.846	
LnMS	-0.381	-0.182	**F(Prob.)**	0.008	**BPGT F(Prob.)**	0.523	
Δ(LnIR)	4.347	1.196***	**DW**	2.115	**RESET F(1,58)**	4.356**	
LnSVR	-0.048	-1.505***	**AIC**	3.980	**RESET F(Prob.)**	0.041	
AR(1)	0.458	3.929*	**SC**	4.213	**JBT χ^2 (2)**	4.98***	
			LL	-124.43	**JBT χ^2 (Prob.)**	0.083	
QTY	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-5.406	-0.931	**R^2**	0.138	**LMT F(2,57)**	0.384	
Δ(LnGDP)	-2.788	-0.861	**Adj. R^2**	0.050	**LMT F(Prob.)**	0.683	
Δ(LnEXR)	-3.698	-0.488	**F(6,59)**	1.6***	**BPGT F(5,60)**	1.323	
LnMS	-0.802	-0.393	**F(Prob.)**	0.071	**BPGT F(Prob.)**	0.267	
Δ(LnIR)	7.770	1.768***	**DW**	2.034	**RESET F(1,58)**	0.568	
LnSVR	0.022	0.561	**AIC**	4.351	**RESET F(Prob.)**	0.454	
AR(1)	0.319	2.588**	**SC**	4.584	**JBT χ^2 (2)**	4.005	
			LL	-136.6	**JBT χ^2 (Prob.)**	0.135	

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RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at the 1%, ** significance at 5%, ***significance at 10%***

Table: 8.8 Continued (Part B)

NET EXPORT MODELS: CATEGORY 8471*							
AUSTRALIA - GERMANY							
AUD	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-5.523	-2.381**	**R^2**	0.256	**LMT F(2,57)**	0.849	
Δ(LnGDP)	-2.681	-2.041**	**Adj. R^2**	0.180	**LMT F(Prob.)**	0.433	
Δ(LnEXR)	-3.948	-1.302***	**F(6,59)**	3.375*	**BPGT F(5,60)**	1.445	
LnMS	-1.227	-1.481***	**F(Prob.)**	0.006	**BPGT F(Prob.)**	0.222	
Δ(LnIR)	1.131	0.629	**DW**	2.086	**RESET F(2,57)**	1.091	
Δ(LnSVR)	0.003	0.232	**AIC**	2.547	**RESET F(Prob.)**	0.343	
AR(1)	0.352	2.935*	**SC**	2.779	**JBT χ^2 (2)**	0.069	
			LL	-77.058	**JBT χ^2 (Prob.)**	0.966	
QTY	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	1.456	0.647	**R^2**	0.097	**LMT F(2,59)**	0.656	-Residuals are not normally distributed. -Incorrect sign for EXR; MS; SVR.
Δ(LnGDP)	-2.984	-1.061***	**Adj. R^2**	0.023	**LMT F(Prob.)**	0.523	
Δ(LnEXR)	6.786	1.279***	**F(5,61)**	1.3***	**BPGT F(5,61)**	1.014	
LnMS	1.503	1.859***	**F(Prob.)**	0.070	**BPGT F(Prob.)**	0.417	
Δ(LnIR)	2.989	1.017	**DW**	2.012	**RESET F(1,60)**	0.796	
Δ(LnSVR)	-0.011	-0.471	**AIC**	3.650	**RESET F(Prob.)**	0.376	
			SC	3.848	**JBT χ^2 (2)**	10.143*	
			LL	-116.34	**JBT χ^2 (Prob.)**	0.006	
AUSTRALIA - MALAYSIA							
AUD	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-3.682	-6.800*	**R^2**	0.913	**LMT F(2,60)**	6.963*	-Residuals are serially correlated. -Residuals are Heteroscedastic. -Model is mis-specified.
Δ(LnGDP)	-0.851	-0.780	**Adj. R^2**	0.909	**LMT F(Prob.)**	0.002	
Δ(LnEXR)	-3.832	-2.010**	**F(3,62)**	218.0*	**BPGT F(2,63)**	2.58***	
AR(1)	0.844	25.514*	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.084	
			DW	2.714	**RESET F(1,61)**	3.69***	
			AIC	1.977	**RESET F(Prob.)**	0.060	
			SC	2.110	**JBT χ^2 (2)**	1.769	
			LL	-61.240	**JBT χ^2 (Prob.)**	0.413	
QTY	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-4.188	-7.351*	**R^2**	0.699	**LMT F(2,60)**	5.678*	-Residuals are serially correlated. -Model is mis-specified.
Δ(LnGDP)	-2.511	-1.243***	**Adj. R^2**	0.685	**LMT F(Prob.)**	0.006	
Δ(LnEXR)	-5.470	-1.554***	**F(3,62)**	48.04*	**BPGT F(2,63)**	0.447	
AR(1)	0.754	11.851*	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.642	
			DW	2.421	**RESET F(1,61)**	6.429**	
			AIC	3.116	**RESET F(Prob.)**	0.014	
			SC	3.248	**JBT χ^2 (2)**	4.254	
			LL	-98.819	**JBT χ^2 (Prob.)**	0.119	

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RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at the 1%, ** significance at 5%, ***significance at 10%***

Table: 8.8 Continued (Part C)

NET EXPORT MODELS: CATEGORY 8471*							
AUSTRALIA - SINGAPORE							
AUD	**DEPENDENT VARIABLE: Δ(LnX/M)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.012	-0.386	**R^2**	0.546	**LMT F(2,52)**	1.708	
Δ(LnGDP)	-0.232	-0.699	**Adj. R^2**	0.487	**LMT F(Prob.)**	0.191	
Δ(LnEXR)	-0.418	-0.665	**F(7,54)**	9.284*	**BPGT F(6,55)**	1.543	
Δ(LnMS)	-0.857	-1.751***	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.182	
Δ(LnIR)	0.239	0.586	**DW**	1.823	**RESET F(1,53)**	0.033	
Δ(LnSVR)	0.007	2.770*	**AIC**	-0.827	**RESET F(Prob.)**	0.856	
Residuals (-1)	-1.033	-6.280*	**SC**	-0.553	**JBT χ^2 (2)**	0.277	
AR(1)	0.370	2.091**	**LL**	33.646	**JBT χ^2 (Prob.)**	0.871	
QTY	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-3.111	-12.480*	**R^2**	0.411	**LMT F(2,53)**	4.663**	-Residuals are serially correlated. -Residuals are Heteroscedastic. -Model is mis-specified. -Incorrect sign for GDP; EXR.
Δ(LnGDP)	1.433	1.261***	**Adj. R^2**	0.347	**LMT F(Prob.)**	0.014	
Δ(LnEXR)	1.920	0.769	**F(6,55)**	6.403*	**BPGT F(5,56)**	2.867**	
Δ(LnMS)	-3.110	-1.543***	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.023	
Δ(LnIR)	0.530	0.301	**DW**	2.398	**RESET F(1,54)**	7.911*	
LnSVR	0.023	1.507***	**AIC**	2.187	**RESET F(Prob.)**	0.007	
AR(1)	0.646	6.050*	**SC**	2.427	**JBT χ^2 (2)**	0.932	
			LL	-60.802	**JBT χ^2 (Prob.)**	0.628	
AUSTRALIA - THAILAND							
AUD	**DEPENDENT VARIABLE: Δ(LnX/M)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.028	-0.382	**R^2**	0.412	**LMT F(2,44)**	1.330	
Δ(LnGDP)	-1.746	-0.848	**Adj. R^2**	0.323	**LMT F(Prob.)**	0.275	
Δ(LnEXR)	-0.992	-0.237	**F(7,46)**	4.609*	**BPGT F(6,47)**	1.050	
Δ(LnMS)	-2.192	-0.519	**F(Prob.)**	0.001	**BPGT F(Prob.)**	0.406	
Δ(LnIR)	0.422	0.423	**DW**	2.087	**RESET F(1,45)**	2.035	
Δ(LnSVR)	0.234	1.083***	**AIC**	2.152	**RESET F(Prob.)**	0.161	
Residuals (-1)	-0.508	-2.768*	**SC**	2.446	**JBT χ^2 (2)**	3.728	
AR(1)	-0.282	-1.311***	**LL**	-50.099	**JBT χ^2 (Prob.)**	0.155	
QTY	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-5.426	-9.375*	**R^2**	0.352	**LMT F(2,45)**	0.771	-Residuals are not normally distributed.
Δ(LnGDP)	-2.556	-0.844	**Adj. R^2**	0.269	**LMT F(Prob.)**	0.469	
Δ(LnEXR)	-0.586	-0.061	**F(6,47)**	4.254*	**BPGT F(5,48)**	1.278	
Δ(LnMS)	-0.167	-0.018	**F(Prob.)**	0.002	**BPGT F(Prob.)**	0.289	
Δ(LnIR)	1.183	0.415	**DW**	2.063	**RESET F(1,46**	0.678	
LnSVR	0.812	1.571***	**AIC**	3.879	**RESET F(Prob.)**	0.414	
AR(1)	0.530	4.262*	**SC**	4.137	**JBT χ^2 (2)**	12.070*	
			LL	-97.734	**JBT χ^2 (Prob.)**	0.002	

Automatic Data Processing Machines and Units Thereof; Magnetic or Optical Readers, Machines for Transcribing Data onto Data Media in Coded Form and Machines for Processing Such Data, Not Elsewhere Specified or Included

DW – Durbin-Watson Statistics
AIS – Akaike Info Criterion
SC – Schwartz Criterion
LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at the 1%, ** significance at 5%, ***significance at 10%***

Table: 8.8 Continued (Part D)

NET EXPORT MODELS: CATEGORY 8471*							
AUSTRALIA - UNITED KINGDOM							
AUD	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-1.502	-5.051*	**R^2**	0.379	**LMT F(2,57)**	1.641	-Model is mis-specified.
Δ(LnGDP)	-1.593	-0.919	**Adj. R^2**	0.316	**LMT F(Prob.)**	0.203	
Δ(LnEXR)	-2.939	-0.477	**F(6,59)**	5.997*	**BPGT F(5,60)**	1.204	
Δ(LnMS)	-6.091	-0.979	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.318	
Δ(LnIR)	0.973	0.514	**DW**	2.231	**RESET F(2,57)**	2.67***	
LnSVR	0.036	2.074**	**AIC**	2.821	**RESET F(Prob.)**	0.078	
AR(1)	0.587	5.420*	**SC**	3.053	**JBT χ^2 (2)**	0.052	
			LL	-86.082	**JBT χ^2 (Prob.)**	0.974	
QTY	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-1.192	-2.553**	**R^2**	0.364	**LMT F(2,57)**	2.263	
Δ(LnGDP)	-0.982	-0.310	**Adj. R^2**	0.299	**LMT F(Prob.)**	0.113	
Δ(LnEXR)	-11.480	-1.032***	**F(6,59)**	5.631*	**BPGT F(5,60)**	0.312	
Δ(LnMS)	-2.511	-0.223	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.904	
Δ(LnIR)	6.869	2.025**	**DW**	2.034	**RESET F(1,58)**	1.885	
LnSVR	0.057	1.899***	**AIC**	3.959	**RESET F(Prob.)**	0.175	
AR(1)	0.532	4.738*	**SC**	4.192	**JBT χ^2 (2)**	2.640	
			LL	-123.66	**JBT χ^2 (Prob.)**	0.267	

****Automatic Data Processing Machines and Units Thereof; Magnetic or Optical Readers, Machines for Transcribing Data onto Data Media in Coded Form and Machines for Processing Such Data, Not Elsewhere Specified or Included***
DW – Durbin-Watson Statistics
AIS – Akaike Info Criterion
SC – Schwartz Criterion
LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at the 1%, ** significance at 5%, ***significance at 10%***

According to Table 8.8, out of the fourteen NX models in Category 8471, all 14 models are significant, while in most of the models, the majority of the variables are significant.

The variables GDP, EXR, MS, and IR are significant in 5, 7, 6 and 3 out of the 14 models respectively, while the variable SVR is significant in 8 out of the 14 models. However, an incorrect (positive) sign for the GDP (2 out of the 14 models; 1 based on AUD and 1 on QTY), for the EXR (2 out of the 14 models; 2 based on QTY) and for the MS (1 out of the 14 models; based on QTY) is evident. Furthermore, an incorrect (negative) sign for the IR (1 out of the 14 models; based on QTY) and for the SVR (3 out of the 14 models; 1 based on AUD and 2 based on QTY) is evident. The correct coefficient signs for all the GDP, EXR, MS, IR and SVR are found in 10 out of the 14 models (6 based on AUD and 4 based on QTY), while for these 10 models, the coefficient range for the GDP, EXR, MS, IR and SVR is between (-0.232 and -2.788),

(-0.418 and -18.592), (-0.167 and -14.727), (0.239 and 7.770) and (0.003 and 0.812) respectively. Finally, the Adj. R^2 in overall for all 14 models in this category ranges between 2.3 and 90.9 percent.

In overall, out of the 14 estimated models in this category, 6 models (the NX with China, Germany, Singapore and Thailand based on AUD; France and The United Kingdom based on QTY) have the correct signs and have satisfactory passed all diagnostic tests. The NX model with China (based on AUD) shows that a 1 percent increase in the GDP will decrease the NX by 0.584 percent, a 1 percent growth rate in the EXR and MS will decrease the NX by 18.592 and 14.727 percent respectively, a 1 percent growth rate in the IR will increase the NX by 0.495 percent, while a 1 percent increase in the SVR will increase the NX by 0.395 percent in average. The NX model with Germany (based on AUD) shows that a 1 percent growth rate in the GDP and EXR will decrease the NX by 2.681 and 3.948 percent respectively, a 1 percent increase in the MS will decrease the NX by 1.227 percent, while a 1 percent growth rate in the IR and SVR will increase the NX by 1.131 and 0.003 percent respectively in average. The NX model with Singapore (based on AUD) shows that a 1 percent growth rate in the GDP, EXR and MS will decrease the NX growth rate by 0.232, 0.418 and 0.857 percent respectively, while a 1 percent growth rate in the IR and SVR will increase the NX growth rate by 0.239 and 0.007 percent respectively in average. The NX model with Thailand (based on AUD) shows that a 1 percent growth rate in the GDP, EXR and MS will decrease the NX growth rate by 1.746, 0.992 and 2.192 percent respectively, while a 1 percent growth rate in the IR and SVR will increase the NX growth rate by 0.422 and 0.234 percent respectively in average. The NX model with France (based on QTY) shows that a 1 percent growth rate in the GDP and EXR will decrease the NX by 2.788 and 3.698 percent respectively, a 1 percent increase in the MS will decrease the NX by 0.802 percent, a 1 percent growth rate in the IR will increase the NX by 7.77 percent, while a 1 percent increase in the SVR will increase the NX by 0.022 percent in average. The NX model with The United Kingdom (based on QTY) shows that a 1 percent growth rate in the GDP, EXR and MS will decrease the NX by 0.982, 11.480 and 2.511 percent respectively, a 1 percent growth rate in the IR will increase the NX by 6.869 percent, while a 1 percent increase in the SVR will increase the NX by 0.057 percent in average. In these 6 models, the variables EXR and MS are elastic, the variables GDP and IR are mixed, while the variable SVR is inelastic. Finally, the Adj. R^2 for China, Germany, Singapore and Thailand based on AUD values is 27.7, 18, 48.7 and 32.3 percent respectively and for France and The United Kingdom based on QTY, the values are 5 and 29.9 percent respectively.

8.4.2.7 NET EXPORT MODELS; CATEGORY: 8517

Table: 8.9 (Part A)

NET EXPORT MODELS: CATEGORY 8517*							
AUSTRALIA - GERMANY							
AUD	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-3.148	-0.798	**R^2**	0.208	**LMT F(2,57)**	0.085	
Δ(LnGDP)	-1.308	-0.695	**Adj. R^2**	0.127	**LMT F(Prob.)**	0.919	
Δ(LnEXR)	-2.690	-0.606	**F(6,59)**	2.58**	**BPGT F(5,60)**	1.456	
LnMS	-0.577	-0.410	**F(Prob.)**	0.027	**BPGT F(Prob.)**	0.218	
Δ(LnIR)	0.543	0.201	**DW**	1.895	**RESET F(1,58)**	0.035	
Δ(LnSVR)	0.002	0.136	**AIC**	3.369	**RESET F(Prob.)**	0.853	
AR(1)	0.438	3.723*	**SC**	3.601	**JBT χ^2 (2)**	2.710	
			LL	-104.2	**JBT χ^2 (Prob.)**	0.258	
QTY	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	6.311	0.923	**R^2**	0.110	**LMT F(2,57)**	1.302	-Model is mis-specified. -Incorrect sign for GDP; EXR; MS; IR. -Model is not significant.
Δ(LnGDP)	2.676	0.513	**Adj. R^2**	0.020	**LMT F(Prob.)**	0.280	
Δ(LnEXR)	7.441	0.653	**F(6,59)**	1.221	**BPGT F(5,60)**	0.352	
LnMS	3.344	1.368***	**F(Prob.)**	0.309	**BPGT F(Prob.)**	0.879	
Δ(LnIR)	-5.415	-0.823	**DW**	2.095	**RESET F(1,58)**	4.782**	
Δ(LnSVR)	0.016	0.346	**AIC**	5.159	**RESET F(Prob.)**	0.033	
AR(1)	0.223	1.778***	**SC**	5.392	**JBT χ^2 (2)**	1.830	
			LL	-163.26	**JBT χ^2 (Prob.)**	0.401	
AUSTRALIA - MALAYSIA							
AUD	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-2.251	-1.723***	**R^2**	0.808	**LMT F(2,60)**	9.543*	-Residuals are serially correlated. -Residuals are Heteroscedastic. -Residuals are not normally distributed.
Δ(LnGDP)	-2.304	-1.534***	**Adj. R^2**	0.799	**LMT F(Prob.)**	0.000	
Δ(LnEXR)	-2.148	-0.815	**F(3,62)**	87.04*	**BPGT F(2,63)**	2.70***	
AR(1)	0.907	16.243*	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.075	
			DW	2.823	**RESET F(1,61)**	0.075	
			AIC	2.688	**RESET F(Prob.)**	0.181	
			SC	2.821	**JBT χ^2 (2)**	5.62***	
			LL	-84.714	**JBT χ^2 (Prob.)**	0.060	
QTY	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-6.358	-12.976*	**R^2**	0.112	**LMT F(2,60)**	2.42***	-Residuals are serially correlated. -Model is mis-specified.
Δ(LnGDP)	-0.062	-0.011	**Adj. R^2**	0.069	**LMT F(Prob.)**	0.098	
Δ(LnEXR)	-8.381	-0.863	**F(3,62)**	2.6***	**BPGT F(2,63)**	0.118	
AR(1)	0.338	2.759*	**F(Prob.)**	0.059	**BPGT F(Prob.)**	0.889	
			DW	2.110	**RESET F(2,60)**	4.909**	
			AIC	4.808	**RESET F(Prob.)**	0.011	
			SC	4.941	**JBT χ^2 (2)**	1.634	
			LL	-154.68	**JBT χ^2 (Prob.)**	0.442	

Electrical Apparatus for Line Telephony or Line Telegraphy, Including Line Telephone Sets with Cordless Handsets and Telecommunication Apparatus for Carrier-Current Line Systems or for Digital Line Systems; Videophones

DW – Durbin-Watson Statistics
AIS – Akaike Info Criterion
SC – Schwartz Criterion
LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at the 1%, ** significance at 5%, ***significance at 10%***

Table: 8.9 Continued (Part B)

NET EXPORT MODELS: CATEGORY 8517*							
AUSTRALIA - SINGAPORE							
AUD	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.598	-2.714*	**R^2**	0.304	**LMT F(2,53)**	2.56***	-Residuals are serially correlated. -Model is mis-specified. -Incorrect sign for MS; IR; SVR.
Δ(LnGDP)	-1.251	-0.751	**Adj. R^2**	0.228	**LMT F(Prob.)**	0.087	
Δ(LnEXR)	-2.988	-0.840	**F(6,55)**	4.002*	**BPGT F(5,56)**	0.278	
Δ(LnMS)	1.520	0.542	**F(Prob.)**	0.002	**BPGT F(Prob.)**	0.924	
Δ(LnIR)	-3.039	-1.229***	**DW**	2.225	**RESET F(1,54)**	6.319**	
LnSVR	-0.005	-0.246	**AIC**	2.748	**RESET F(Prob.)**	0.015	
AR(1)	0.458	3.683*	**SC**	2.988	**JBT χ^2 (2)**	0.342	
			LL	-78.194	**JBT χ^2 (Prob.)**	0.843	
QTY	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-1.369	-3.027*	**R^2**	0.370	**LMT F(2,53)**	9.260*	-Residuals are serially correlated. -Model is mis-specified. -Incorrect sign for MS; IR; SVR.
Δ(LnGDP)	-1.276	-0.444	**Adj. R^2**	0.302	**LMT F(Prob.)**	0.000	
Δ(LnEXR)	-3.773	-0.609	**F(6,55)**	5.391*	**BPGT F(5,56)**	0.376	
Δ(LnMS)	10.360	2.086**	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.863	
Δ(LnIR)	-6.331	-1.471***	**DW**	2.403	**RESET F(1,54)**	16.048*	
LnSVR	-0.020	-0.558	**AIC**	3.921	**RESET F(Prob.)**	0.000	
AR(1)	0.530	4.491*	**SC**	4.161	**JBT χ^2 (2)**	2.575	
			LL	-114.55	**JBT χ^2 (Prob.)**	0.276	
AUSTRALIA - UNITED KINGDOM							
AUD	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-1.887	-3.949*	**R^2**	0.588	**LMT F(2,57)**	0.818	-Model is mis-specified. -Incorrect sign for GDP; EXR; MS; IR.
Δ(LnGDP)	1.527	1.126***	**Adj. R^2**	0.546	**LMT F(Prob.)**	0.447	
Δ(LnEXR)	0.819	0.167	**F(6,59)**	14.02*	**BPGT F(5,60)**	0.858	
Δ(LnMS)	1.986	0.401	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.514	
Δ(LnIR)	-2.881	-1.859***	**DW**	2.164	**RESET F(2,57)**	2.64***	
LnSVR	0.026	1.791***	**AIC**	2.552	**RESET F(Prob.)**	0.080	
AR(1)	0.784	9.822*	**SC**	2.784	**JBT χ^2 (2)**	0.240	
			LL	-77.201	**JBT χ^2 (Prob.)**	0.887	
QTY	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-2.531	-4.500*	**R^2**	0.272	**LMT F(2,57)**	1.048	-Residuals are not normally distributed. -Incorrect sign for GDP; IR; SVR.
Δ(LnGDP)	2.541	0.584	**Adj. R^2**	0.198	**LMT F(Prob.)**	0.357	
Δ(LnEXR)	-11.362	-0.751	**F(6,59)**	3.677*	**BPGT F(5,60)**	0.139	
Δ(LnMS)	-5.476	-0.357	**F(Prob.)**	0.004	**BPGT F(Prob.)**	0.982	
Δ(LnIR)	-11.877	-2.605**	**DW**	2.100	**RESET F(1,58)**	2.700	
LnSVR	-0.018	-0.451	**AIC**	4.526	**RESET F(Prob.)**	0.106	
AR(1)	0.476	4.049*	**SC**	4.758	**JBT χ^2 (2)**	5.05***	
			LL	-142.37	**JBT χ^2 (Prob.)**	0.080	

Electrical Apparatus for Line Telephony or Line Telegraphy, Including Line Telephone Sets with Cordless Handsets and Telecommunication Apparatus for Carrier-Current Line Systems or for Digital Line Systems; Videophones

DW – Durbin-Watson Statistics
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BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at the 1%, ** significance at 5%, ***significance at 10%***

According to Table 8.9, out of the eight NX models in Category 8517, 7 models are significant and 1 NX models with Germany based on QTY is not significant, while in most of the models, the majority of the variables are not significant.

The variables GDP, EXR, MS, and SVR are significant in 2, none, 2 and 1 out of the 8 models respectively, while the variable IR is significant in 4 out of the 8 models. However, an incorrect (positive) sign for the GDP (3 out of the 8 models; 1 based on AUD and 2 on QTY), for the EXR (2 out of the 8 models; 1 based on AUD and 1 based on QTY) and for the MS (4 out of the 8 models; 2 based on AUD and 2 based on QTY) is evident. Furthermore, an incorrect (negative) sign for the IR (5 out of the 8 models; 2 based on AUD and 3 based on QTY) and for the SVR (3 out of the 8 models; 1 based on AUD and 2 based on QTY) is evident. The correct coefficient signs for all the GDP, EXR, MS, IR and SVR are found in 3 out of the 8 models (2 based on AUD and 1 based on QTY), while for these 3 models, the coefficient range for the GDP and EXR is between (-0.062 and -2.304) and (-2.148 and -8.381) respectively, while the coefficients values for the NX model for Germany based on AUD values for MS, IR and SVR are -0.577, 0.543 and 0.002 respectively. Finally, the Adj. R^2 in overall for all 8 models in this category ranges between 2 and 79.9 percent.

In overall, out of the 8 estimated models in this category, only 1 model (the NX with Germany based on AUD) have the correct signs and have satisfactory passed all diagnostic tests. The NX model with Germany (based on AUD) shows that a 1 percent growth rate in the GDP and EXR will decrease the NX by 1.308 and 2.69 percent respectively, a 1 percent increase in the MS will decrease the NX by 0.577 percent, while a 1 percent growth rate in the IR and SVR will increase the NX by 0.543 and 0.002 percent respectively in average. The variables GDP and EXR in this model are elastic, while the variables MS, IR and SVR are inelastic. Finally, the Adj. R^2 for this model is 12.7 percent.

8.4.2.8 NET EXPORT MODELS; CATEGORY: 8703

Table: 8.10 (Part A)

NET EXPORT MODELS: CATEGORY 8703*							
AUSTRALIA - GERMANY							
AUD	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.723	-0.157	**R^2**	0.157	**LMT F(2,57)**	1.326	-Residuals are Heteroscedastic. -Model is mis-specified.
Δ(LnGDP)	-1.754	-0.598	**Adj. R^2**	0.072	**LMT F(Prob.)**	0.274	
Δ(LnEXR)	-1.288	-0.194	**F(6,59)**	1.8***	**BPGT F(5,60)**	2.473**	
LnMS	-2.008	-1.217***	**F(Prob.)**	0.098	**BPGT F(Prob.)**	0.042	
Δ(LnIR)	0.461	0.117	**DW**	2.080	**RESET F(1,58)**	6.087**	
Δ(LnSVR)	0.010	0.369	**AIC**	4.117	**RESET F(Prob.)**	0.017	
AR(1)	0.317	2.511**	**SC**	4.349	**JBT χ^2 (2)**	0.486	
			LL	-128.87	**JBT χ^2 (Prob.)**	0.784	
QTY	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.683	-0.138	**R^2**	0.167	**LMT F(2,57)**	0.582	-Residuals are not normally distributed. -Incorrect sign for MS; IR; SVR.
Δ(LnGDP)	-2.710	-0.903	**Adj. R^2**	0.082	**LMT F(Prob.)**	0.562	
Δ(LnEXR)	-3.218	-0.469	**F(6,59)**	2.0***	**BPGT F(5,60)**	0.196	
LnMS	2.175	1.229***	**F(Prob.)**	0.084	**BPGT F(Prob.)**	0.963	
Δ(LnIR)	-0.001	0.000	**DW**	2.010	**RESET F(1,58)**	1.439	
Δ(LnSVR)	-0.011	-0.385	**AIC**	4.190	**RESET F(Prob.)**	0.235	
AR(1)	0.338	2.707*	**SC**	4.422	**JBT χ^2 (2)**	18.400*	
			LL	-131.26	**JBT χ^2 (Prob.)**	0.000	
AUSTRALIA - MALAYSIA							
AUD	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.598	-0.999	**R^2**	0.277	**LMT F(2,34)**	0.469	
Δ(LnGDP)	-2.265	-0.462	**Adj. R^2**	0.217	**LMT F(Prob.)**	0.630	
Δ(LnEXR)	-9.842	-1.136***	**F(3,36)**	4.608*	**BPGT F(2,37)**	0.148	
AR(1)	0.527	3.743*	**F(Prob.)**	0.008	**BPGT F(Prob.)**	0.863	
			DW	1.839	**RESET F(1,35)**	0.010	
			AIC	4.080	**RESET F(Prob.)**	0.920	
			SC	4.249	**JBT χ^2 (2)**	0.023	
			LL	-77.606	**JBT χ^2 (Prob.)**	0.989	
QTY	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-3.898	-4.710*	**R^2**	0.519	**LMT F(2,34)**	0.258	-Residuals are not normally distributed. -Incorrect sign for GDP; EXR.
Δ(LnGDP)	8.131	2.194**	**Adj. R^2**	0.479	**LMT F(Prob.)**	0.774	
Δ(LnEXR)	8.975	1.301***	**F(3,36)**	12.95*	**BPGT F(2,37)**	0.707	
AR(1)	0.716	6.121*	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.500	
			DW	2.136	**RESET F(2,34)**	0.678	
			AIC	3.713	**RESET F(Prob.)**	0.514	
			SC	3.882	**JBT χ^2 (2)**	5.11***	
			LL	-70.268	**JBT χ^2 (Prob.)**	0.078	

Motor Cars and Other Motor Vehicles Principally Designed for the Transport of Persons (Other Than Public Transport Type), Including Station Wagons and Racing Cars
DW – Durbin-Watson Statistics
AIS – Akaike Info Criterion
SC – Schwartz Criterion
LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at the 1%, ** significance at 5%, ***significance at 10%***

Table: 8.10 Continued (Part B)

NET EXPORT MODELS: CATEGORY 8703*

AUSTRALIA - SINGAPORE

AUD	DEPENDENT VARIABLE: LnX/M						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	3.448	3.359*	**R^2**	0.365	**LMT F(2,37)**	1.238	
Δ(LnGDP)	0.580	0.217	**Adj. R^2**	0.267	**LMT F(Prob.)**	0.302	
Δ(LnEXR)	4.436	0.766	**F(6,39)**	3.732*	**BPGT F(5,40)**	2.12***	-Residuals are Heteroscedastic.
Δ(LnMS)	1.100	0.214	**F(Prob.)**	0.005	**BPGT F(Prob.)**	0.083	-Incorrect sign for GDP; EXR; MS; IR.
Δ(LnIR)	-4.621	-1.116***	**DW**	2.099	**RESET F(1,38)**	2.127	
LnSVR	0.228	0.428	**AIC**	3.629	**RESET F(Prob.)**	0.153	
AR(1)	0.566	4.467*	**SC**	3.907	**JBT χ^2 (2)**	3.484	
			LL	-76.461	**JBT χ^2 (Prob.)**	0.175	

QTY	DEPENDENT VARIABLE: LnX/M						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	1.640	1.322***	**R^2**	0.288	**LMT F(2,37)**	0.451	
Δ(LnGDP)	4.863	1.480***	**Adj. R^2**	0.178	**LMT F(Prob.)**	0.640	
Δ(LnEXR)	-0.943	-0.132	**F(6,39)**	2.63**	**BPGT F(5,40)**	1.739	-Residuals are Heteroscedastic.
Δ(LnMS)	0.973	0.156	**F(Prob.)**	0.031	**BPGT F(Prob.)**	0.148	-Incorrect sign for GDP; MS; IR.
Δ(LnIR)	-4.082	-0.810	**DW**	2.149	**RESET F(1,38)**	0.091	
LnSVR	0.200	0.305	**AIC**	4.013	**RESET F(Prob.)**	0.765	
AR(1)	0.523	3.845*	**SC**	4.292	**JBT χ^2 (2)**	77.843*	
			LL	-85.310	**JBT χ^2 (Prob.)**	0.000	

AUSTRALIA - THAILAND

AUD	DEPENDENT VARIABLE: LnX/M						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-3.540	-1.552***	**R^2**	0.833	**LMT F(2,31)**	0.760	
Δ(LnGDP)	-4.003	-1.163***	**Adj. R^2**	0.803	**LMT F(Prob.)**	0.476	
Δ(LnEXR)	-16.314	-1.749**	**F(6,33)**	27.42*	**BPGT F(5,34)**	0.141	
Δ(LnMS)	-15.722	-1.560***	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.981	
Δ(LnIR)	6.141	2.012**	**DW**	2.007	**RESET F(1,32**	0.588	
LnSVR	0.460	0.750	**AIC**	3.968	**RESET F(Prob.)**	0.449	
AR(1)	0.878	11.641*	**SC**	4.263	**JBT χ^2 (2)**	0.702	
			LL	-72.350	**JBT χ^2 (Prob.)**	0.704	

QTY	DEPENDENT VARIABLE: LnX/M						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-4.896	-3.560*	**R^2**	0.721	**LMT F(2,31)**	1.334	
Δ(LnGDP)	-0.418	-0.107	**Adj. R^2**	0.671	**LMT F(Prob.)**	0.278	
Δ(LnEXR)	-17.214	-1.631***	**F(6,33)**	14.24*	**BPGT F(5,34)**	0.277	
Δ(LnMS)	-11.919	-1.048***	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.922	-Residuals are not normally distributed.
Δ(LnIR)	6.236	1.818***	**DW**	1.932	**RESET F(1,32**	0.272	
LnSVR	0.142	0.207	**AIC**	4.122	**RESET F(Prob.)**	0.606	
AR(1)	0.785	8.317*	**SC**	4.417	**JBT χ^2 (2)**	5.62***	
			LL	-75.437	**JBT χ^2 (Prob.)**	0.060	

Motor Cars and Other Motor Vehicles Principally Designed for the Transport of Persons (Other Than Public Transport Type), Including Station Wagons and Racing Cars
DW – Durbin-Watson Statistics
AIS – Akaike Info Criterion
SC – Schwartz Criterion
LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at the 1%, ** significance at 5%, ***significance at 10%***

Table: 8.10 Continued (Part C)

NET EXPORT MODELS: CATEGORY 8703*							
AUSTRALIA - UNITED KINGDOM							
AUD	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-3.470	-9.420*	**R^2**	0.493	**LMT F(2,57)**	4.485**	-Residuals are serially correlated. -Model is mis-specified. -Incorrect sign for GDP; SVR.
Δ(LnGDP)	1.058	0.664	**Adj. R^2**	0.442	**LMT F(Prob.)**	0.016	
Δ(LnEXR)	-1.702	-0.297	**F(6,59)**	9.565*	**BPGT F(5,60)**	0.498	
Δ(LnMS)	-6.114	-1.057***	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.777	
Δ(LnIR)	0.160	0.089	**DW**	2.405	**RESET F(1,58)**	7.880*	
LnSVR	-0.037	-2.307**	**AIC**	2.762	**RESET F(Prob.)**	0.007	
AR(1)	0.685	7.135*	**SC**	2.994	**JBT χ^2 (2)**	2.261	
			LL	-84.141	**JBT χ^2 (Prob.)**	0.323	
QTY	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-4.080	-8.438*	**R^2**	0.336	**LMT F(2,57)**	1.638	-Model is mis-specified. -Residuals are not normally distributed. -Incorrect sign for GDP; EXR; MS.
Δ(LnGDP)	1.668	0.610	**Adj. R^2**	0.269	**LMT F(Prob.)**	0.203	
Δ(LnEXR)	3.775	0.389	**F(6,59)**	4.986*	**BPGT F(5,60)**	0.571	
Δ(LnMS)	0.093	0.009	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.722	
Δ(LnIR)	1.871	0.624	**DW**	2.033	**RESET F(1,58)**	7.535*	
LnSVR	0.003	0.117	**AIC**	3.746	**RESET F(Prob.)**	0.008	
AR(1)	0.599	5.254*	**SC**	3.978	**JBT χ^2 (2)**	35.305*	
			LL	-116.62	**JBT χ^2 (Prob.)**	0.000	
AUSTRALIA - UNITED STATES							
AUD	**DEPENDENT VARIABLE: Δ(LnX/M)**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	0.008	0.034	**R^2**	0.315	**LMT F(2,52)**	0.754	
Δ(LnGDP)	-7.849	-4.216*	**Adj. R^2**	0.226	**LMT F(Prob.)**	0.476	
Δ(LnEXR)	-0.435	-0.055	**F(7,54)**	3.551*	**BPGT F(6,55)**	1.269	
Δ(LnMS)	-7.701	-1.015***	**F(Prob.)**	0.003	**BPGT F(Prob.)**	0.287	
Δ(LnIR)	2.943	1.322***	**DW**	1.812	**RESET F(1,53)**	1.047	
Δ(LnSVR)	0.027	2.095**	**AIC**	2.731	**RESET F(Prob.)**	0.311	
Residuals (-1)	-0.475	-0.937	**SC**	3.005	**JBT χ^2 (2)**	0.039	
AR(1)	0.492	0.998	**LL**	-76.658	**JBT χ^2 (Prob.)**	0.981	
QTY	**DEPENDENT VARIABLE: LnX/M**						
	Coefficient	**t-ratio**	**Diagnostic Results**				**Note:**
Constant	-0.721	-0.892	**R^2**	0.706	**LMT F(2,53)**	0.694	
Δ(LnGDP)	-4.790	-2.706*	**Adj. R^2**	0.674	**LMT F(Prob.)**	0.504	
Δ(LnEXR)	-5.745	-0.765	**F(6,55)**	22.02*	**BPGT F(5,56)**	0.599	
Δ(LnMS)	-9.349	-1.270***	**F(Prob.)**	0.000	**BPGT F(Prob.)**	0.701	
Δ(LnIR)	0.152	0.071	**DW**	1.786	**RESET F(3,54)**	1.911	
LnSVR	0.005	0.264	**AIC**	3.020	**RESET F(Prob.)**	0.139	
AR(1)	0.833	11.513*	**SC**	3.261	**JBT χ^2 (2)**	1.817	
			LL	-86.634	**JBT χ^2 (Prob.)**	0.403	

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SC – Schwartz Criterion
LL – Log Likelihood
LMT – Lagrange Multiplier (Breusch-Godfrey) Test for Serial Correlation
BPGT – Breusch-Pagan-Godfrey Test for Heteroskedasticity
RESET – Ramsey RESET Test for Model Specification
JBT – Jarques-Bera Test for normality of the residuals
**** significant at the 1%, ** significance at 5%, ***significance at 10%***

According to Table 8.10, out of the twelve NX models in Category 8703, all 12 models are significant, while in most of the models, the majority of the variables are not significant.

The variables GDP, EXR, IR and SVR are significant in 5, 4, 4 and 2 out of the 12 models respectively, while the variable MS is significant in 7 out of the 12 models. However, an incorrect (positive) sign for the GDP (5 out of the 12 models; 2 based on AUD and 3 on QTY), for the EXR (3 out of the 12 models; 1 based on AUD; 2 based on QTY) and for the MS (4 out of the 12 models; 1 based on AUD; 3 based on QTY) is evident. Furthermore, an incorrect (negative) sign for the IR (3 out of the 12 models; 1 based on AUD; 2 based on QTY) and for the SVR (2 out of the 12 models; 1 based on AUD and 1 based on QTY) is evident. The correct coefficient signs for all the GDP, EXR, MS, IR and SVR are found in 6 out of the 12 models (4 based on AUD and 2 based on QTY), while for these 6 models, the coefficient range for the GDP, EXR, MS, IR and SVR is between (-0.418 and -7.849), (-0.435 and -17.214), (-2.008 and -15.722), (0.152 and 6.236) and (0.005 and 0.460) respectively. Finally, the Adj. R^2 in overall for all 12 models in this category ranges between 7.2 and 80.3 percent.

In overall, out of the 12 estimated models in this category, 4 models (the NX with Malaysia, Thailand and The United States of America based on AUD; The United States of America based on QTY) have the correct signs and have satisfactory passed all diagnostic tests. The NX model with Malaysia (based on AUD) shows that a 1 percent growth rate in the GDP and EXR will decrease the NX by 2.265 and 9.842 percent respectively. The NX model with Thailand (based on AUD) shows that a 1 percent growth rate in the GDP, EXR and MS will decrease the NX by 4.003, 16.314 and 15.722 percent respectively, a 1 percent growth rate in the IR will increase the NX by 6.141 percent, while a 1 percent increase in the SVR will increase the NX by 0.46 percent in average. The NX model with The United States of America (based on AUD) shows that a 1 percent growth rate in the GDP, EXR and MS will decrease the NX growth rate by 7.849, 0.435 and 7.701 percent respectively, while a 1 percent growth rate in the IR and SVR will increase the NX growth rate by 2.943 and 0.027 percent respectively in average. The NX model with The United States of America (based on QTY) shows that a 1 percent growth rate in the GDP, EXR and MS will decrease the NX by 4.790, 5.745 and 9.349 percent respectively, a 1 percent growth rate in the IR will increase the NX by 0.152 percent, while a 1 percent increase in the SVR will increase the NX by 0.005 percent in average. In these 4 models, the variables GDP, MS, EXR and IR are mostly elastic, while the variable SVR is inelastic. Finally, the Adj. R^2 for Malaysia, Thailand and The United States based on AUD values is 21.7, 80.3 and 22.6 percent respectively and for The United States of America based on QTY, the value is 67.4 percent.

8.4.2.9 SUMMARY - NET EXPORT MODELS; HS-2, HS-4

In this section, ninety-eight NX models are estimated and the results are interpreted. These 98 models consist of 58 models (29 based on AUD and 29 based on QTY) based on HS-2 and 40 models (20 based on AUD and 20 based on QTY) based on HS-4 level of aggregation. Accordingly, the initial summaries and the specific findings are made individually for the HS-2 and HS-4 level of aggregation, followed by the overall combined summaries for both levels of aggregation.

Summary: HS-2

Based on HS-2 level of aggregation, 49 out of the 58 models are significant and 9 models (Germany for the Category 30 - based on AUD, Malaysia and Thailand for the Category 30 - based on QTY, Germany, Malaysia and Singapore for the Category 85 - based on AUD, China and Thailand for the Category 87 - based on AUD and France for the Category 87 - based on QTY) are not significant. However, an incorrect (positive) sign for the GDP (34 out of 58 models; 18 based on AUD and 16 based on QTY), an incorrect (positive) sign for the EXR (22 out of 58 models; 15 based on AUD and 7 based on QTY), an incorrect (positive) sign for the MS (21 out of 58 models; 10 based on AUD and 11 based on QTY), an incorrect sign (negative) for the IR (21 out of 58 models; 10 based on AUD and 11 based on QTY) and an incorrect (negative) sign for the SVR (22 out of 58 models; 10 based on AUD and 12 based on QTY) is evident. The correct coefficient signs for all the GDP, EXR, MS, IR and SVR are found in 17 out of the 58 models (8 based on AUD and 9 based on QTY). Furthermore, for these 17 models, the coefficient range for the GDP, EXR, MS, IR and SVR is between (-0.017 and -4.138), (-0.321 and -46.873), (-0.017 and -44.979), (0.151 and 8.250) and (0.002 and 6.292) respectively. Finally, the Adj. R^2 in overall for all of the 58 models ranges between 0.2 and 74.8 percent.

In overall, out of the 58 estimated models based on HS-2, 12 models (the NX with Germany for Category 30 - based on AUD values; China and The United States of America for Category 30 - based on QTY values; China, Thailand and The United Kingdom for Category 84 - based on AUD values; China and The United Kingdom for Category 84 - based on QTY values; China for Category 85 - based on AUD values; Singapore for Category 85 - based on QTY values; China and Germany for Category 87 - based on QTY values) have the correct signs and have satisfactory passed all diagnostic tests. Furthermore, for these 12 models, the coefficient range for the GDP, EXR, MS, IR and SVR is between (-0.017 and -4.138), (-1.098 and -46.873), (-0.017 and -44.979), (0.151 and 8.250) and (0.002 and 6.292) respectively. The variables GDP, EXR, MS, IR and SVR in these 12 models are significant in (8 out of the 12 models), (7 out of the 12 models), (4 out of the 12 models), (6 out of the 12 models) and (6 out of the 12 models) respectively. Finally, the Adj. R^2 for these 12 models ranges between 9.3 and 44.9 percent.

Summary: HS-4

Based on HS-4 level of aggregation, 38 out of 40 models are significant and 2 models (France for the Category 3004 - based on AUD and Germany for the Category 8517 - based on QTY) are not significant. However, an incorrect (positive) sign for the GDP (13 out of 40 models; 5 based on AUD and 8 based on QTY), an incorrect (positive) sign for the EXR (10 out of 40 models; 4 based on AUD and 6 based on QTY), an incorrect (positive) sign for the MS (14 out of 40 models; 5 based on AUD and 9 based on QTY), an incorrect sign (negative) for the IR (12 out of 40 models; 3 based on AUD and 9 based on QTY) and an incorrect (negative) sign for the SVR (11 out of 40 models; 4 based on AUD and 7 based on QTY) is evident. The correct coefficient signs for all the GDP, EXR, MS, IR and SVR are found in 20 out of the 40 models (13 based on AUD and 7 based on QTY). Furthermore, for these 20 models, the coefficient range for the GDP, EXR, MS, IR and SVR is between (-0.062 and -7.849), (-0.418 and -18.592), (-0.167 and -15.722), (0.152 and 7.770) and (0.002 and 0.812) respectively. Finally, the Adj. R^2 in overall for all of the 40 models ranges between 2 and 90.9 percent.

In overall, out of the 40 estimated models based on HS-4, 12 models (the NX with The United Kingdom for Category 3004 - based on AUD values; China, Germany, Singapore and Thailand for Category 8471 - based on AUD values; France and The

United Kingdom for Category 8471 - based on QTY values; Germany for Category 8517 - based on AUD values; Malaysia, Thailand and The United States of America for Category 8703 - based on AUD values; The United States of America for Category 8703 - based on QTY values) have the correct signs and have satisfactory passed all diagnostic tests. Furthermore, for these 12 models, the coefficient range for the GDP, EXR, MS, IR and SVR is between (-0.232 and -7.849), (-0.418 and -18.592), (-0.577 and -15.722), (0.152 and 7.770) and (0.002 and 0.460) respectively. The variables GDP, EXR, MS, IR and SVR in these 12 models are significant in (5 out of the 12 models), (5 out of the 12 models), (6 out of the 12 models), (4 out of the 12 models) and (4 out of the 12 models) respectively. Finally, the Adj. R^2 for these 12 models ranges between 5 and 80.3 percent.

Overall Summary

Based on both HS-2 and HS-4 level of aggregation out of the ninety-eight NX models, 87 models are significant and 11 models are not significant. However, an incorrect (positive) sign for the GDP (47 out of the 98 models; 23 based on AUD and 24 based on QTY), an incorrect (positive) sign for the EXR (32 out of the 98 models; 19 based on AUD and 13 based on QTY), an incorrect (positive) sign for the MS (35 out of the 98 models; 15 based on AUD and 20 based on QTY), an incorrect (negative) sign for the IR (33 out of the 98 models; 13 based on AUD and 20 based on QTY) and an incorrect (negative) sign for the SVR (33 out of the 98 models; 14 based on AUD and 19 based on QTY) is evident. The correct coefficient signs for all the GDP, EXR, MS, IR and SVR are found in 37 out of the 98 models (21 based on AUD and 16 based on QTY), while for these 37 models, the coefficients range for the GDP, EXR, MS, IR and SVR is between (-0.017 and -7.849), (-0.321 and -46.873), (-0.017 and -44.979), (0.151 and 8.250) and (0.002 and 6.292) respectively.

Out of the 98 estimated models based on both HS-2 and HS-4, 24 models have the correct signs and have satisfactory passed all diagnostic tests, while these 24 models; 14 are based on AUD and 10 are based on QTY values. The coefficient range for the GDP, EXR, MS, IR and SVR in these 24 models is between (-0.017 and -7.849), (-0.418 and -46.873), (-0.017 and -44.979), (0.151 and 8.250) and (0.002 and 6.292) respectively. The variables GDP, EXR, MS, IR and SVR in these 24 models are significant in (13 out of the 24 models), (12 out of the 24 models), (10 out of the 24 models), (10 out of the 24 models) and (10 out of the 24 models) respectively. Finally, the Adj. R^2 for these 24 models ranges between 5 and 80.3 percent.

8.5 EMPIRICAL FINDINGS

Now that the ninety-eight NX demand models based on HS-2 and HS-4 levels of aggregation are estimated, this section will summarise the major empirical findings.

Almost all NX models estimated in this chapter are significant, while the estimated models produced similar results based on both AUD and QTY values. Furthermore, the overall results suggest that the relative GDP, EXR and the relative MS are elastic variables, which shows that relative changes in income, EXR and the MS are influencing the level of the trade balance in these selected TD categories. The most elastic variable to the level of the NX is the EXR, followed by relative income, MS and IR. The elasticity for the relative IR is mixed, while the relative SVR is the least elastic variable.

On the other hand, the most significant variables in the determination of the NX for all TD categories is a relative savings rates; followed by a relative interest rates, money supply and income, while the exchange rate variable proved to be the least significant. However, the significance and the elasticity of the individual variables to the NX levels differ when the estimated coefficients are observed on a category-by-category basis.

For Category 30, the most significant variable in the determination of the NX level is the relative savings rates, followed by relative income and the exchange rate, while the variables relative money supply and interest rates are the least significant. In addition, the relative money supply and the exchange rate are the most elastic variables to the NX levels in this category, followed by relative income, interest rates and savings rates.

For Category 84, the most significant variable in the determination of the NX level is the relative savings rates, followed by relative income, exchange rates and interest rates, while the variable relative money supply is the least significant. In addition, the exchange rate is the most elastic variable to the NX level in this category, followed by relative money supply, income, interest rates and savings rates.

For Category 85, the most significant variables in the determination of the NX level is the relative income, followed by the relative interest rates, the savings rates and the exchange rate, while the variable relative money supply is the least significant. In addition, the exchange rate is the most elastic variable to the NX levels in this category, followed by relative money supply, income, interest rates and the savings rates.

For Category 87, the most significant variable in the determination of the NX level is the relative interest rates, followed by the relative savings rates, the relative income rates and the exchange rate, while the variable relative money supply is the least significant. In addition, the relative interest rates and the exchange rate are the most elastic variables to the NX levels in this category, followed by relative income, money supply and savings rates.

For Category 3004, the most significant variable in the determination of the NX level is the relative money supply, followed by the relative savings, the income rates and the exchange rate, while the variable relative interest rates is the least significant. In addition, the relative money supply and the exchange rate are the most elastic variables to the NX levels in this category, followed by relative income, interest rates and savings rates.

For Category 8471, the most significant variable in the determination of the NX level is the relative savings rates, followed by the exchange rate, relative money supply and the income rates, while the variable relative interest rates is the least significant. In addition, the exchange rate is the most elastic variable to the NX levels in this category, followed by relative income, money supply, interest rates and savings rates.

For Category 8517, the most significant variable in the determination of the NX level is the relative interest rates, followed by relative income, money supply and the savings rates, while the variable exchange rate is the least significant. In addition, the relative income and the exchange rate are the most elastic variables to the NX levels in this category, followed by the relative money supply, interest rates and savings rates.

Finally, for Category 8703, the most significant variable in the determination of the NX level is the relative money supply, followed by the relative income, interest rates and the exchange rate, while the variable relative savings rate is the least significant.

In addition, the relative income and the exchange rate are the most elastic variables to the NX levels in this category, followed by relative money supply, interest rates and savings rates.

In summary, the overall results in the estimated NX models that did not satisfactory pass all diagnostic tests (74 out of 98 models) should be viewed with caution; as these NX models require further improvements. These improvements include and are not limited to like further corrections, adjustments and/or even considerable modification of the models, in order to obtain more reliable models which will in turn, make it possible to get a clearer understanding of the determinants of the NX with the selected TD countries in the selected TD categories. Despite, these shortcoming the NX models estimated which did not satisfactory pass all diagnostic tests are revealing valuable information that can be utilized by trade policy makers and various parties involved in international trade in these selected TD categories.

Finally, by observing only 24 models (14 based on AUD and 10 based on QTY values) that have the correct a-priory signs and have satisfactory passed all diagnostic tests, the main result are rather different to the remaining 74 models. The most significant variables in the determination of the NX for all TD categories in these 24 models is a relative income and the exchange rate; followed by a relative money supply and the interest rates, while the relative savings rates variable proved to be the least significant. Furthermore, the most elastic variable to the level of the NX in these 24 models is the exchange rate, followed by relative money supply, income and interest rates, while the relative savings rate is the least elastic variable.

8.6 CONCLUSION

In this chapter, the econometric methodology, theoretical development of the NX models and relevant empirical studies has been reviewed. A comprehensive review of the econometric methodology carried-out in Chapter 6, has highlighted the importance of testing the variables for the unit root, cointegration and to carry out numerous diagnostic tests in order to choose suitable econometric models and to validate the estimated model's reliability. A review of theoretical development and the existing empirical literature for the NX models has identified suitable variables used in the NX model.

Based on this review, the selected independent variables for the NX are GDP, EXR, MS, IR and SVR. The dependent variable NX is expressed as a ratio of the Australian X over the Australian M in the observed TD category, between Australia and the selected TD country. Furthermore, the independent variables GDP, MS, IR and SVR are expressed as a ratio of the Australian GDP, MS, IR and SVR over the corresponding TD countries values, while the EXR is expressed as the value of one unit of the foreign currency in terms of the Australian currency. In overall, the NX models in this study are examining this phenomenon from absorption, elasticity and a monetary perspective, in order to divulge the determinants of the trade balance between Australia and the selected TD countries in the selected TD categories.

The 3 major differences that exists between existing studies that estimated the NX and this study are as follow; Firstly, unlike the existing NX models in the literature which uses the dependent variable of the overall aggregated X, and M volumes, the dependent variable in this study refers to the specific TD categories. This approach is likely to reveal more specific information as to which variable(s) are significant in the determination of the X and M levels on a category-by-category basis. Secondly, unlike existing studies which only estimate the NX on monetary values, this study estimates the NX based on both the monetary and QTY values for each selected TD category. Thirdly, unlike existing NX models, this study contains an additional independent variable, the SVR as according to IS-LM inclusion of this variable is justifiable. This approach to the best of my knowledge, has not been used in any previous studies, which at the same time, is one of the significant contributions of this study.

The total number of models estimated in this chapter is 98, which includes 58 models based on HS-2 and 40 models based on HS-4 level of aggregation. Furthermore, these models are estimated side-by-side for each category based on AUD and QTY values. As a result, the 29 models are estimated based on AUD and 29 based on QTY values (based on HS-2 level of aggregation) and 20 models are estimated based on AUD and 20 based on QTY values (based on HS-4 level of aggregation). The adopted approach of estimating the NX models side-by-side based on AUD and QTY values for each category as mentioned earlier is a significant contribution to this study, as it allows it to compare the disparities (comparative analysis) and to evaluate the corresponding results from 2 different perspectives. Furthermore, due to data unavailability, the NX models for the selected TD service categories and some TD goods categories[165] are not estimated.

In overall, in 79 out of the 98 models estimated, the unit root was present only in some variables, while in the remaining 19 models, the unit root was present in all variables. For the 79 models where only some variables contained the unit root, the first difference of such variable was taken, which proves to be sufficient in all of the cases for all such variables to become stationary. Once non-stationary variables become stationary, the OLS procedure was applied followed by the standard diagnostic tests. For the remaining 19 models, where all variables were non-stationary, the JMLP test for cointegration was carried out. The JMLP revealed that 17 out of the 19 models were cointegrated and one cointegrating equation was identified for each of these models, while the remaining 2 models were not cointegrated. For these 17 cointegrated models (with one cointegrating equation each), the ECM was applied, followed by the standard diagnostic tests. For the remaining 2 models, the first difference of all variable was taken, which proves to be sufficient in all of the cases for all such variables to become stationary. Once all non-stationary variables become stationary, the OLS was applied, followed by the standard diagnostic tests.

The iterative Cochrane-Orcutt procedure for the serial correlation correction was applied in 73 out of the 98 models. This procedure proved to be successful in 52 models, while it was unsuccessful in 21 models (where the serial correlation problem was still present after applying this procedure).

In overall, 87 out of 98 models are significant, while 24 out of 98 models (14 based on AUD and 10 based on QTY) have the correct signs and have satisfactory passed all diagnostic tests. The most significant variables in the determination of the NX for all TD categories in these 24 models is a relative income and the exchange rate; followed by relative money supply and interest rates, while the relative savings rates variable proved to be the least significant. Furthermore, the most elastic variable to the level of the NX in these 24 models is the exchange rate, followed by relative money supply, income and interest rates, while the relative savings rate is the least elastic variable.

[165] For a complete list of the NX models that are not estimated due to data unavailability (for both the goods and the service categories), based on HS-2 and HS-4 level of aggregation respectively, refer to Tables 8.1-8.2

Finally, by evaluating the model fits, the Adj. R^2 for these 24 NX models ranges between 5 and 80.3 percent.

In summary, the overall findings suggest that most of the NX models estimated in this chapter require further improvements. These improvements includes and are not limited to like further corrections, adjustments and/or even considerable modification of most of the models, in order to obtain more reliable models. This in turn will make it possible to get a clearer overall understanding of the determinants of the NX with all selected TD countries and in all selected TD categories.

Despite these shortcomings, the models estimated in this chapter provide valuable information that can be utilized for policy makers in Australia when assessing the growing TD deficit in these categories between Australia and the selected TD countries. Now that the NX models have been estimated, all intended aims of this thesis, which includes the selection of the TD categories and countries, calculating the revealed and competitive advantage and various trade indices in the selected TD categories, estimating the X supply and the M demand, calculating the extent of IIT in these categories and finally estimating the NX, have been completed. The next chapter, Chapter 9 will summarize the contribution and highlight limitation of this study and additionally, it will make recommendation for further research in this area.

CHAPTER 9

9. SUMMARY AND CONCLUSION

9.1 INTRODUCTION

The aim of this study was to investigate the selected Trade Deficit (TD) categories between Australia and the selected TD countries. By referring to the current literature, it is evident that an examination of the Australian TD did not receive sufficient attention amongst the researchers despite its significance. As a result, this study has addressed limitations in the existing literature by developing the selection framework for the TD categories between Australia and the Rest of the World (RoW) which warrants further investigation. Empirical analysis in this study covers the period between 1990 and 2006, while during this period, all trade flows between Australia and all countries in the world are taken into account. Furthermore, almost all of the selected TD categories and TD countries in this study are empirically analysed for the first time in the literature which is at the same time, one of the most significant contributions of this study.

The main purpose of this chapter is to summarize the analytical methods used in this study and to outline the major findings in the investigation of the selected TD categories between Australia and the selected TD countries. In addition, this chapter also highlights the limitations of this study, as well as recommendations for further research in this area.

9.2 SUMMARY OF CONTRIBUTION AND CONCLUSION

An overview of the international trading environment is carried-out in Chapter 2. Based on this overview, it has been established that countries that are more engaged in international trade have achieved higher economic growth compared to countries that are relatively less engaged in international trade. In addition, it is apparent that the trade volumes amongst the countries overtime has grown tremendously. The trade in manufacturers traditionally dominates the composition of trade, while over this period trade in services has increased in significance. Despite the fact that international trade in services is gaining more significance in recent times, trade in manufacturing remains the most significant component of Export (X) and Import (M) volumes amongst countries, and this trend appears to continue in the near future. As a result, the world's trade volumes in the manufacturer's products accounts increasingly for the higher volumes as a proportion of the world Gross Domestic Product (GDP) than the overall trade in service products as a proportion of the world GDP.

Furthermore, strong evidence exists that relatively open economies (countries) are achieving higher economic prosperity compared to less open economies (countries); although, not all scholars agree that free trade would always lead to higher economic prosperity. This scenario is likely to occur when some countries due to various macroeconomic factors, experience continual unbalanced trade with other countries. Unbalanced trade associated with an increasing TD as a proportion of the GDP, represents growing liabilities with the RoW. Furthermore, these increasing liabilities can have negative macroeconomic consequences for the countries in question if the growing TD levels are not managed well.

Australia is one of the countries with a prolonged and persistent TD levels with the RoW and this in overall has been occurring for the last past 50 years. Furthermore, the overall Australian TD level is more pronounced in the last 30 years. The most disconcerting fact is that the TD levels are increasing as a proportion of the GDP, while this increasing debt levels associated with a growing TD is mainly used for Consumption (C) rather than for Investment (I). Since these trends are not encouraging, further overviews of the macroeconomic situation in Australia, as well as a review of the empirical studies in this area are conducted in Chapter 3.

A comprehensive overview of the Australian macroeconomic and trading environment, in order to determine the specific areas that warrant further empirical investigation associated with a growing TD in Australia is carried-out in Chapter 3.

Based on this overview, it has been established that the major Australian industries are „Service', followed by „Mining, Agriculture, Forestry and Fishing', „Electricity, Gas, Water, Construction and Dwellings', while „Manufacturing' accounts for a smallest proportion of all industries. Furthermore, the „Service' industry is the fastest growing industry, while the „Manufacturing' is the lowest value added industry in Australia. During the period of this analysis (1990-2008), the total value added for the „Manufacturing' industry accounts for a negligible one tenth of growth compared to the „Service' industry. This relative decline in significance of the manufacturing industry in Australia is likely to be the contributor to the growing TD in Australia.

A further review in this chapter has also established that „Consumption' is the main driver of economic growth in Australia followed by „Investment', with the „Consumption' levels are growing two and half times faster than the levels for the „Investment' levels. In addition, the Net Export (NX) has a negative contribution to economic growth in Australia for the entire period between 1990 and 2008, whereas the NX negative contribution to economic growth is recently more pronounced.

According to the Net International Investment Position (NIIP) that measures the stock of international liabilities, Australia's debt levels are growing approximately three times faster than the levels of Australia's GDP during this period, while these trends are more pronounced in recent times. Additionally, the TD, the Current Account Deficit (CRAD) and C levels as a percentage of the GDP are increasing overtime, whereas I to GDP levels are decreasing over this period. To make this situation even more uncomfortable, the long-run trends show that the TD and CRAD are significantly increasing despite the fact that the Australian Terms of Trade (TOT) are at historically high levels.

A review of the current literature in Chapter 3 suggests that there has not been a sufficient investigation of the Australian TD at the aggregate level, particularly involving the major trade categories; while the existing literature is sporadic and selective in their focus on industries, countries and the X and M determinants. According to this overview, it becomes evident that an inclusive approach, which encompasses the formal selection protocol for the TD categories, needs to be adopted in order to better explain the growing TD in Australia.

In order to identify which TD categories and TD countries warrant further investigation, the selection protocol has been developed and applied in Chapter 4. Since the selection protocol was previously not existent in the current literature, the entire selection protocol and corresponding selection criteria was developed from the very beginning. The selection protocol created and applied, has identified 11 TD categories (4 goods categories based on HS-2[166], 1 service category based on ANZSIC-1[167], 5 goods categories based on HS-4[168] and 1 service category based on ANZSIC-2[169] level of aggregation) and the 8 TD countries[170] that warrant an in-depth

[166] Harmonized Commodity Description and Coding System - Second Level of Aggregation.
[167] Australian and New Zealand Standard Industrial Classification - Main Divisional Level of Aggregation
[168] Harmonized Commodity Description and Coding System - Fourth Level of Aggregation
[169] Australian and New Zealand Standard Industrial Classification - First Sub-divisional Level of Aggregation.

analysis. The 11 selected TD categories which warrant further investigation consists of the 4 goods categories based on HS-2 level of aggregation (Categories 30[171], 84[172], 85[173], 87[174]) and 1 service category based on ANZSIC-1 level of aggregation (Category 1[175]). Furthermore, these 4 goods and 1 service categories dis-aggregated to a lower level of aggregation and once the selection protocol is applied once again, a further 5 goods categories (Categories 3004[176], 8471[177], 8473[178], 8517[179], 8703[180] based on HS-4 level of aggregation) and 1 service category (Category 1.2[181] based on ANZSIC-2 level of aggregation) has been identified.

The selected TD categories and countries in Chapter 4 are analysed in the remaining 4 Chapters (Chapter 5, 6, 7 and 8). The main analysis in these remaining 4 chapters are from the point of Comparative Advantage (CA), trade indices, econometric estimation of the X supply and M demand, establishing the extent of the Intra-Industry Trade (IIT) and econometric estimation of the determinants of the NX levels in the selected TD categories between Australia and the selected TD countries.

Chapter 5 reviews the theoretical development for the basis of trade between nations and explains the underlying reasons for the countries specialization in the specific industries. Furthermore, a comprehensive review of the existing literature has lead to the identification of the measurements of the CA. The CA measurement has been developed and applied by Balassa (1965) and Vollrath (1991), while Balassa's (1965) measurement of the CA is Balassa Revealed Comparative Advantage Index (BRCAI) and Vollrath (1991) measures the Vollrath Revealed Export Advantage Index (VRXAI), the Vollrath Revealed Trade Advantage Index (VRTAI) and the Vollrath Revealed Competitive Advantage Index (VRCAI).

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[170] These 8 selected TD countries are: China, France, Germany, Malaysia, Singapore, Thailand, The United Kingdom and The United States of America.
[171] Category 30: - Pharmaceutical Products
[172] Category 84: - Nuclear Reactors, Boilers, Machinery and Mechanical Appliances; Parts Thereof
[173] Category 85: - Electrical Machinery and Equipment and Parts Thereof; Sound Recorders and Producers, Television Image and Sound Recorders and Reproducers, and Parts and Accessories of Such Articles
[174] Category 87: - Vehicles Other Than Railway or Tramway Rolling-Stock, and Parts and Accessories Thereof
[175] Category 1: - Transportation Services
[176] Category 3004: - Medicaments (Excluding Goods of 3002, 3005 or 3006) Consisting of Mixed or Unmixed Products for Therapeutic or Prophylactic Uses, Put Up in Measured Doses or in Forms or Packagings for Retail Sale
[177] Category 8471: - Automatic Data Processing Machines and Units Thereof; Magnetic or Optical Readers, Machines for Transcribing Data onto Data Media in Coded Form and Machines for Processing Such Data, Not Elsewhere Specified or Included
[178] Category 8473: - Parts and Accessories (Other Than Covers, Carrying Cases and the Like) Suitable for Use Solely or Principally with Office Machines
[179] Category 8517: - Electrical Apparatus for Line Telephony or Line Telegraphy, Including Line Telephone Sets with Cordless Handsets and Telecommunication Apparatus for Carrier-Current Line Systems or for Digital Line Systems; Videophones
[180] Category 8703: - Motor Cars and Other Motor Vehicles Principally Designed for the Transport of Persons (Other Than Public Transport Type), Including Station Wagons and Racing Cars
[181] Category 1.2: - Freight Transports

Prior to the calculation of these indices, the boundary of what the total trade consists of has been defined for the first time in the literature. The total trade in this chapter is observed as the total value of the X and M in all goods and total value of all goods and services combined, and these indices are calculated side-by side for both. This approach has addressed the contextual meaning of total trade, which is likely to assist the comparison of these indices in future studies in the area of international trade analysis.

Furthermore, this chapter has also included additional trade performance indices, which includes the Trade Specialization Index (TSI), the Export Propensity Index (XPI), the Import Penetration Index (MPI) and the Export / Import Ratio (XMR), which are calculated and interpreted for the selected TD categories between Australia and the selected TD countries.

By observing the calculated index BRCAI, Australia records a Revealed Comparative Disadvantage (RCD) in all of the selected goods categories based on both HS-2 and HS-4 level of aggregation, except Category 3004, in which a Revealed Comparative Advantage (RCA) exists since 1999. Furthermore, the RCD for all TD categories in overall is more pronounced as a proportion of the total trade in the goods and services combined than as a proportion in the total goods trade.

By observing the VRXAI, VRTAI and VRCAI, based on VRXAI, Australia records a Revealed Export Advantage (RXA) in all categories, while based on VRTAI and VRCAI, Australia records a RCD in all goods categories analysed. Furthermore, the RCD in overall is more pronounced as a proportion of the total trade in goods than as a proportion in the total trade in the goods and services combined.

Finally, by observing the trade performance indices TSI, XPI, MPI and XMR, the following has been established. Based on TSI, Australia possesses a RCD in all categories. Based on the XPI, there is evidence that the Australian X in all categories except for category 1.2, is increasing overtime as a proportion of the domestic output in all categories. Base on MPI, the M competition for the Australian producers in all TD categories is increasing, which suggests increasing international competitive pressure in all of the selected TD categories. Finally, the trade performance index XMR shows that the Australian X as a proportion of the M in the selected TD categories is increasing in all categories except in categories 85, 1, 8517 and 1.2, where this proportion is decreasing.

The econometric methodology, theoretical developments of the X supply and M demand models and relevant empirical studies are reviewed in Chapter 6. A comprehensive review highlighted the importance of testing the variables for the unit root, cointegration and to carry out numerous diagnostic tests in order to choose suitable econometric models and to validate the estimated model's reliability. Furthermore, a review of theoretical development and the existing empirical literature has identified suitable variables that have been used in the estimation of the X supply and M demand models.

Based on this review, the X supply models were estimated as a function of the Relative Price (RP), Real Gross Domestic Product (RGDP), Trend and Dummy, while the M demand models were estimated as a function of the RP, RGDP, Q2[182], Q3[183] and Q4[184]. Unlike existing studies which estimated the X supply and M demand models, the variable RP is calculated as Average Unit Value (AUV) for the X over AUV for the M for the X supply models and as AUV for the M over AUV for the X for the M demand models. This approach of calculating the RP variable, is to the best of my knowledge, has not been used in any previous studies which at the same time, is one of the significant contributions of this study. Furthermore, the variable Trend is a proxy variable for the capacity utilization and the dummy variable is denoted 0 before July 2000 (before the introduction of the GST in Australia) and 1 after July 2000.

The total number of models estimated in this chapter is 232, which includes one hundred and sixteen X supply and one hundred and sixteen M demand models. The one hundred and sixteen X supply and M demand models estimated, consists of 66 models based on HS-2 level of aggregation and 50 models based on HS-4 level of aggregation. Furthermore, these models are estimated side-by-side for each category based on Australian Dollar Currency (AUD) and Quantity (QTY) values. As a result, the 33 models are estimated based on (AUD) and 33 based on QTY values based on HS-2 level of aggregation and 25 models are estimated based on AUD and 25 based on QTY values based on HS-4 level of aggregation for both the X supply and M

[182] Q2 variable is a quarterly dummy variable for June quarter.
[183] Q3 variable is a quarterly dummy variable for September quarter.
[184] Q4 variable is a quarterly dummy variable for December quarter.

demand models. The adopted approach of estimating the X supply and M demand models side-by-side based on AUD and QTY values for each category is another significant contribution of this study, as it allows to compare the disparities (comparative analysis) and to evaluate the corresponding results from a different perspective.

In overall, 218 out of 232 models are significant and 42 out of 232 models (eighteen X supply and twenty-four M demand) have the correct signs and have satisfactory passed all diagnostic tests. Out of these 42 models, all eighteen X supply models are based on AUD values and for the twenty-four M demand models, 12 models are based on AUD and 12 on QTY values. As a result, it can be concluded that the X supply models based on AUD values performed better, while the M demand models performed similarly based on both AUD and QTY values. For these 42 models, the estimated coefficient for the RP in both the X supply and M demand models is mostly significant, and the RGDP is mostly significant in the X supply models and mostly not significant in the M demand models. Furthermore, in both the X supply and the M demand models, the coefficients for the RP indicate that the X supply and M demand are price inelastic, while the RGDP coefficients indicate in overall, that both the X supply and the M demand are income elastic. In addition, the capacity utilization and the dummy variable in both the X supply models and in the M demand models are mostly not significant based on both AUD and QTY values. In overall, the capacity utilization variable in the X supply models indicate that only marginal and inconclusive evidence exists that capacity utilization increases the X supply, while the dummy variable suggests that since the introduction of the GST in July 2000, the overall X supply has considerably increased in most of the categories. Furthermore, the dummy variables in the M demand models indicate in overall, that the M demand for the June, September and December quarters is lower compared to the March quarter in average. Finally, by evaluating the model fits, the Adj. R^2 for these eighteen X supply models range between 4.8 and 55 percent, and for these twenty-four M demand models, range between 11.5 and 73.2 percent.

In summary, the overall findings suggest that most of the X supply and M demand models estimated in this chapter require further improvements[185]. These

[185] Incorrect a-priory signs, insignificant coefficients estimated, etc. for some models are likely to be due to serial correlation, heteroscedasticity, model mis-specification, non-normality of residuals and the presence of collinearity in these models.

improvements include and are not limited to like further corrections, adjustments and/or even considerable modification of most of the models, in order to obtain more reliable models. However, despite these shortcomings, the models estimated in this chapter provide valuable information that can be utilized for policy makers in Australia when addressing the growing TD deficit in these categories between Australia and the selected TD countries.

The theoretical development and empirical literature of the simultaneous X and M between countries known as IIT has been reviewed in Chapter 7. A comprehensive review of the existing empirical literature has identified numerous measurements of the extent of the IIT, while all existing measurements for IIT posses some advantages and limitations when compared to one another. Based on an overall evaluation, the adopted measure for the extent of the IIT in the selected TD categories between Australia and the selected TD countries in this study is an unadjusted Grubel & Lloyd Index (GLI) which has been widely utilized in most of the existing studies.

The unadjusted GLI has been used to calculate the extent of the IIT based on both monetary and a QTY value, which again to the best of my knowledge, has not been calculated previously in any other studies. Furthermore, the calculated indices for IIT in this chapter are based on quarterly time intervals to avoid „time interval bias'.

Once an unadjusted GLI has been calculated, which are based on monetary values, QTY and the AUV, the median values of these indices were calculated for the three time periods (1990-1995, 1996-2001 and 2001-2006) in order to observe the changes in the extent of the GLI over these sequential periods. In addition to median values, the GLI Time-coefficient was estimated based on monetary values, QTY and the AUV, to establish the Long-Term (LT), the Period between 1990 and 2006 and Short-Term (ST) trends, the Period between 2000 and 2006 to identify the extent of the IIT and the extent of the Horizontal Intra-Industry Trade (HIIT).

As expected, the calculated median values of the extent of the IIT in all selected TD categories between Australia and the selected TD countries in overall, is relatively high based on both levels of aggregation. However, despite the high levels of the extent of the IIT in the selected TD categories, this extent has been significantly decreasing overtime amongst almost all of the selected TD categories and countries at both levels of aggregation. These decreasing trends are more pronounced in the ST than in the LT, while the only exception to this finding is the extent of IIT for The United Kingdom, where the extent of the IIT based on HS-4 level of aggregation is moderately increasing.

While the extent of the IIT is decreasing overtime for most of the TD countries, the HIIT is in overall increasing for all countries. This finding suggests that the simultaneous X and M between Australia and the selected TD countries is increasing in the products of similar quality. This finding suggests that the selected TD categories and corresponding industries are becoming more internationally competitive, which is consistent with the findings in Chapter 5 based on the MPI indices.

Finally, the econometric methodology, theoretical development of the NX models and relevant empirical studies are reviewed in Chapter 8. A review of theoretical development and the existing empirical literature for the NX models has identified suitable variables used in the NX model.

Based on this review, the NX models were estimated as a function of the GDP, Exchange Rates (EXR), Money Supply (MS), Interest Rates (IR) and Savings Rates (SVR). Furthermore, the independent variables GDP, MS, IR and SVR are expressed as a ratio of the Australian GDP, MS, IR and SVR over the corresponding TD countries values, while the EXR is expressed as the value of one unit of foreign currency in terms of the Australian currency. In overall, the NX models in this study is examined from an absorption, elasticity and a monetary perspective, in order to divulge the determinants of the trade balance between Australia and the selected TD countries in the selected TD categories.

The 3 major differences that exists between existing studies that estimate the NX and this study are as follows; Firstly, unlike existing NX models in the literature which uses the dependent variable of the overall aggregated X, and M volumes, the dependent variable in this study refers to the specific TD categories. This approach is likely to reveal more specific information as to which variable(s) are significant in the determination of the X and M levels on a category-by-category basis. Secondly, unlike existing studies which only estimate the NX on monetary values, this study estimates the NX based on both monetary and QTY values for each selected TD category. Thirdly, unlike existing NX models, this study contains an additional independent variable, the SVR and according to IS-LM, the inclusion of this variable is justified. This approach to the best of my knowledge, has not been used in any previous studies, which at the same time, is one of the significant contributions of this study.

The total number of the NX models estimated in this chapter is 98, which includes 58 models based on HS-2 and 40 models based on HS-4 level of aggregation. Furthermore, these models are estimated side-by-side for each category based on AUD and QTY values. As a result, the 29 models are estimated based on AUD and 29 based on QTY values (based on HS-2 level of aggregation) and 20 models are estimated based on AUD and 20 based on QTY values (based on HS-4 level of aggregation). The adopted approach of estimating the NX models side-by-side based on AUD and QTY values for each category as mentioned earlier is another significant contribution of this study, as it allows it to compare the disparities (comparative analysis) and to evaluate the corresponding results from 2 different perspectives.

In overall, 87 out of 98 models are significant, while 24 out of 98 models (14 based on AUD and 10 based on QTY) have the correct signs and have satisfactory passed all diagnostic tests. The most significant variables in the determination of the NX for all TD categories in these 24 models are relative income and the exchange rate; followed by relative money supply and interest rates, while the relative savings rates variable proved to be the least significant. Furthermore, the most elastic variables to the level of the NX in these 24 models are the exchange rates, followed by relative money supply, income and interest rates, while the relative savings rates are the least elastic variable. Finally, by evaluating the model fits, the Adj. R^2 for these 24 NX models ranges between 5 and 80.3 percent.

In summary, the overall findings (similarly as with the X supply and M demand models) suggest that most of the NX models estimated in this chapter require further improvements. These improvements includes and are not limited to like further corrections, adjustments and/or even considerable modification of most of the models, in order to obtain more reliable models. However, despite these shortcomings, the models estimated in this chapter provide valuable information that can be utilized for policy makers in Australia when assessing the growing TD deficit in these categories between Australia and the selected TD countries.

9.3 RESEARCH LIMITATION

Since this study has taken into account all trade flows between Australia and all the countries in the world, the enormity of this study is evident. This approach has identified several limitation of this study. One of the first limitations would be limited depth of the analysis (comprehensiveness) of the individual selected TD categories and countries. Furthermore, limited research in this area has lead to some limitation of the selection framework for the TD categories and countries. This selection framework is the first attempt to develop such a framework and it is likely to require further development.

The second limitation of this study is associated with the nature of the secondary data used in this study, which includes trade and other macroeconomic data used in this research. Although the trade data used in this study for the goods categories is very unique and comprehensive, unfortunately the QTY data for some selected TD categories was unavailable. Furthermore, the main problem with the data for the selected TD service categories on a country level was unavailable, and this has resulted in a limited analysis of the selected TD service categories. Other data limitation includes macroeconomic data for the selected TD countries, because it was limited in the time-span for some countries (eg. China), while Malaysian macroeconomic data was too short to utilize them in the econometric analysis. Furthermore, due to some data unavailability, some macroeconomic data such as the EXR data for Germany and France was estimated for some period, while some variables such as capacity utilization in the X supply models has been proxy with the time trend variable.

The final and the main limitations to this research are associated with econometric models estimated in this study for the X supply, M demand and NX models. Although many models estimated have passed all diagnostic tests, there are also many models in which independent variables shows the incorrect signs and/ or the models did not pass some diagnostic tests and such models require further development (inclusion and/or exclusion of some variable) and/or employing a different functional form(s) of the model(s). Furthermore, the functional forms of the X supply, M demand and NX models are the same for all the selected TD categories. This approach was adopted since a vast number of models were estimated, however, it is likely that different categories would reveal the necessity of different model(s) functional form compared to the one used in this study.

9.4 RECOMMENDATION FOR FURTHER RESEARCH

The very broad scope of this study has created a number of areas that require further investigation in this area. The areas of further research can be summarized in 3 broad areas which includes 1. An expansion of this research; 2. Consideration of different methodologies and 3. Utilization of different data sources.

Firstly, this research can be expanded with the analysis of each selected TD category between Australia and the selected TD country from a different aspect and in more detail. Furthermore, further research is required for the trade flow analysis in the selected TD categories between Australia and the selected TD countries which have been selected but not investigated[186], while trade flows between these countries and Australia certainly warrants significant attention. Also, as the data for the selected TD service categories 1 and 1.2 were not available on a country level. Therefore, it would be highly desirable to conduct a similar and additional study for these 2 categories as data becomes available in the future, since these 2 categories contribute significantly to the overall TD in Australia.

Secondly, it would be beneficial to use different methodologies which are applicable for the trade flow analysis. One aspect of this would be to embark upon the usage of different functional form models and to estimate the X supply, the M demand and the NX models in such functional forms. Furthermore, these models should be developed on a category-by-category basis, as different categories may require different functional forms, as the volume of trade flows exhibit different patterns when compared with the selected TD categories.

Lastly, further required research in this area would be to utilize different data sources and data on different levels of aggregation in the selected TD categories. The utilization of the data from different sources and conducting a similar analysis, would verify findings presented in this study. Another aspect to consider in future research would be to include and not limited to by using a longer time series data and for different time periods. Finally, additional analysis in this area should be conducted

[186] These countries include Canada, Ireland, Italy, Papua New Guinea and Vietnam, while the Australian TD with these 6 countries is significant and based on the selection framework developed in Chapter 4, it warrants further investigation.

based on further disaggregating the selected TD categories and to estimate the X supply, the M demand and the NX in these categories.

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