Stock Market Anomalies for Companies Listed on the National Stock Exchange of Australia

Doctorate of Business Administration

College of Law and Justice

by

John Borromeo

3039591

2018

Thesis submitted to fulfill the requirement of Doctorate of Business Administration of Victoria University

ABSTRACT

Purpose – Many theoretical financial theories attempt to explain the behaviour of stocks and the structure of their returns, namely the Portfolio Theory, the Capital Asset Pricing Model (CAPM), the Efficient Market Hypothesis (EMH), and Behavioural Finance. These theories, however, have provided incomplete and contradictory explanations regarding stock market anomalies. The aim of this research is to analyse the theory of anomalies and develop a comprehensive theoretical model based on the extant financial theories to develop an improved explanation about stock market anomalies.

The principal aim of the current research is to examine the presence of several anomalies, covering macroeconomic, calendar and event variables, in a secondary stock market within Australia, namely the National Stock Exchange of Australia (NSXA), and a number of the sub-indices contained within this stock market.

Design/methodology/approach – This research empirically tests the efficiency of the NSXA. The role played by each of the following independent variables is examined by applying specific statistical techniques: long and short-term interest rates; exchange rates; day of the week; weekends; months of the year; turn of the calendar year, January, turns of the month; Australian end of financial year; Australian federal election, US presidential election and sporting events

Findings – The results are interesting and contradict with the existing research. Though the empirical analyse yields statistically significant results for some hypothesis and not for others, the research finds that: a clear interest rate effect for both short and long-term interest rates; an observable and strong monthly effect and suggestive relationship between the NSX Resources sub-indices and Australian federal elections.

Research limitations/implications – the main limitations of the research related to: 1) the particularity of investors in the NSXA falls out of the scope of this study, they may provide further insight as to why the anomalous behaviour was observed; 2) difficulty quantifying the physical location of the companies listed on the exchange as knowledge of this may have been supportive in explaining trading patterns and anomalous behaviour and 3) the impact of market capitalization and firm size was not considered due to a lack of available data. Future research may want to incorporate firm size when undertaking analysis to determine if a relationship exists between company size and anomalies.

The main implication of the research is that there is only partial confirmation for the validity of the EMH. While the EMH is not rejected in each of the tests undertaken, the fact that some anomalies are observed implies that the EMH cannot be seen as an all-encompassing theory of how stock markets operate or behave. The current research raises the concept of segmented market efficiency.

Practical implications – This research indicates that the NSXA does exhibit several specific anomalies. The presence of such anomalies provides investors with greater knowledge which can be used to maximise financial returns, in both the medium and long term, by improving decisions relating to the timing of stock investment.

Originality/value – To the researcher's best knowledge the focus of stock market anomalies in an Australian context has been exclusively to examine the Australian Stock Exchange (ASX). This is the first study to focus on a "secondary" smaller, less well recognised stock market, the NSXA. Additionally, this is the first study to consider economic, calendar and event variables in an integrated model to provide an improved explanation of stock anomalies.

DECLARATION

I, John Borromeo, declare that the DBA thesis entitled "Stock market anomalies for companies listed on the National Stock Exchange of Australia", is no more than 64, 399 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 part, for the award of any other academic degree or diploma. Except where otherwise indicated, this thesis is my own work.

ACKNOWLEDGEMENT

This work was only achievable due to a team effort.

Therefore, I will always be grateful for all the support, advice and assistance made available to me by my principle supervisor Dr. Yongqiang Li and my co-supervisor Dr. Segu Zuhair who provided timely and effective supervision. I am genuinely in awe of their level of knowledge, intelligence and wisdom.

Furthermore, I would like to thank Professors Anne-Marie Hede and Bruce Rasmussen for having the confidence to allow me to complete my studies. Also, the numerous staff within VISES and VU City campus library who have always been friendly and never had any problem with helping me. I would also like to acknowledge the initial assistance provided by Professor. Sardar Islam and thank him for his efforts.

Finally, and with the deepest regret, I am eternally indebted to my dear mother, Anna, who passed away while I was undertaking my research and my father, Antonio (also deceased). They both valued and saw the importance of education, even though they had extremely limited opportunities, and encouraged me to always improve and better myself through seeking knowledge.

This has made me realise that time is the most valuable commodity a person possesses and to never take it for granted and the opportunities that come with it.

DEDICATION

This thesis is dedicated to my beautiful wife, Anne. Without her continual support, encouragement and unconditional love, I would certainly not have been able to complete my work. Additionally, I would also like to devote this thesis to my two wonderful sons, Michael and Andrew, and hope that one day this thesis, and the effort required to complete it, will inspire them to achieve the best they can and to never give up and see anything they commence through to its conclusion, however difficult or long it may take.

Table of Contents

List of Figures and Graphs

List of Tables

Appendix

List of Abbreviations / Keywords

APT - Arbitrage pricing theory

ASX - Australian Stock Exchange

AGBR - Australian government bond rate

BAB - Bank accepted bill rate

BF – Behavioural finance

B/M - Book to market

CAPM - Capital asset pricing model

CR - Cash rate

DOW - Day of the week effect

EMH - Efficient market hypothesis

EOFY - End of financial year effect

HE - Holiday effect

JE - January effect

MPT - Modern portfolio theory

NSXA - National Stock Exchange of Australia

TLS - Tax-loss selling hypothesis

TOTM - Turn of the month effect

TOTY - Turn of the year effect

WE – Weekend effect

1. INTRODUCTION

1.1. Background

The total number of Australian investors in the stock market from 2000 to 2014 has progressively increased from 3.13 million to 4.68 million. According to the ASX Australian Investor Study (2017), between 2012 and 2017, the proportion of 18 to 24-year-old investing in the stock market has doubled from ten to twenty percent and that for 25 to 34-year-old has increased from 24 percent to 39 percent.

Over the last couple of decades ownership of on-exchange investments as a proportion of adult population has grown exponentially from nine percent in 1985 to thirty-seven percent in 2017 (ASX Australian Investor Study, 2017). This demand was fuelled by many factors including: the advancement in stock market trading technologies which have made stock markets more accessible as well as the accumulation of personal savings into superannuation accounts. Despite the popularity of stock market investment, many individual investors do not fully appreciate the factors which can influence the share price (ASX Australian Investor Study, 2017).

All stock market investors aim to find an acceptable trade-off between risk and return. The challenge is how to generate superior financial returns which requires investors to make informed investment decisions based on various sources of information. Stock market anomalies can be considered both an opportunity and a risk for investment decisions. This is because an informed investor may either see anomalies, in general, as an opportunity to be exploited or as a risk which they tend to avoid in their investment decision process.

Considering the importance of this balance to investors, this thesis will investigate the effect of several stock market anomalies on the predictability of stock market behaviour. Source data will be obtained from openly accessible data from the National Stock Exchange of Australia (NSXA). The sample covers daily closing values during the period from 23 November 2007 to 17 May 2013 which appropriately falls into the post Global Financial Crisis era. This research developed a multivariate conceptual framework and an econometric model based on several major financial theories including: Arbitrage Pricing Theory (APT), Capital Asset Pricing Model (CAPM), the Efficient Market Hypothesis (EMH) and Modern Portfolio Theory (MPT). Nine distinct anomalies were identified which was used to establish the conceptual framework. The econometric model employed eighty-six individual variables ensuring a comprehensive assessment of systematic risks or beta.

An informed investor requires a basic understanding of the trade-off between risk and return, originating in MPT (Markowitz 1952). This theory provides a rationale for portfolio construction which maximizes financial returns for a given level of both systematic and unsystematic risk. In turn, an individual financial asset's risk and return should not be assessed in isolation, but in conjunction with the analysis of the impacts financial risk and return have on the overall portfolio. The investor needs to be aware that while unsystematic risk can be reduced through a strategy of diversification, this is not possible with relation to systematic risk (Mayo 2013). It could be argued that anomalies present both arbitrage opportunities and a source of systematic risk (based on the sophistication of the investor) as they are intrinsic in nature and are unable to be minimized through a strategy of diversification. Theoretically, systematic risk though could be managed using the CAPM.

The financial literature has seen many developments in financial theory such as the CAPM and APT (Szylar, 2013). The CAPM is a market equilibrium model used to determine the relationship between systematic risk and the required financial return of an asset based on the asset’s beta value. Beta refers to the volatility of a financial asset (in this case a stock) in comparison to the overall financial market. CAPM enables an asset to be priced according to its level of risk. Theoretically CAPM enables an investor to be compensated for all risk and the time value of money. The CAPM is a single factor model, whilst APT is a multifactor econometric model. The validity of the CAPM had been questioned in the empirical literature which consequently led to the development of APT (Ross 1976). This theory assesses the relationship between the risk and expected rate of return of financial assets in financial markets. APT calculates expected financial returns of an asset considering the assets sensitivity to variations in numerous macroeconomic factors. APT assumes that stock returns are influenced by both firm specific accounting information and macroeconomic factors. The validity of

APT has been questioned in the empirical literature particularly in relation to methodological issues. Therefore, do theoretical concepts such as the CAPM and APT provide the investor with sufficient knowledge to make better informed investment decisions, particularly as they relate to stock market investment decisions? Can such theories provide sufficient explanation for the behaviour of stock prices? The current research will attempt to address these questions.

Overall what causes stock volatility is not clearly understood (Bittlingmayer 1998). Stock market participants use multiple techniques to assess individual stocks with the aim of predicting future price movements such as fundamental analysis and technical analysis. Measuring the intrinsic value of a stock is at the core of fundamental analysis. This includes analysing both macroeconomic and microeconomic data and company specific information. Unlike fundamental analysis, technical analysis does not place any measurable emphasis on a stocks intrinsic value but instead focuses on developing stock charts to highlight patterns of performance which may suggest how a stock will behave in the future under similar circumstances (Lo et. al. 2000, Nazario et. al. 2017). The EMH casts doubt regarding the use of either of these analytical techniques to obtain superior financial returns and in an Australian context this has been highlighted in previous research (Drew et. al. 2003, Drew et. al. 2000 and Groenewold 1997). The empirical Australian literature has focussed solely on data obtained from the Australian Stock Exchange (ASX) research. This research adds to the current body of literature and provides a unique perspective regarding the behaviour of stock market behaviour by focusing on an important, but yet to be researched stock market in Australia, – the NSXA. Research based on the performance of this previously overlooked stock market may provide further insight into the behaviour of stock markets and the link between anomalies and the EMH. This research also provides the opportunity to determine if there may be a difference between the actions of institutional investors (considered more sophisticated) and individual investors. Additionally, the current research methodology to investigate anomalies across all possible categories (calendar, seasonal, behavioural and macroeconomic) may provide evidence for a new explanation of share price anomalies.

The examination of stock market behaviour and the degree to which this has a certain level of predictability has been an area of intense interest and research from academics, the professional investment community and individual investors. In conjunction with this the degree of influence that macroeconomic variables have on the patterns of behaviour of stock market outcomes and to what extent has also been an area of great interest to the same groups. This will then be followed by a discussion on the motivation and background of this study, and its significance, the objectives of the study, the design and outcomes of the study and concluding with a description of the structure and organisation of the entire research.

1.2. Limitations of the Previous Research

In examining the existence of anomalies previous academic articles have focussed on the major stock indices within countries. Therefore, historical source data has originated from indices such as the Dow Jones, the S&P indices, the FTSE indices or the Tokyo Stock Exchange TOPIX. This pattern has also been replicated when researchers have investigated anomalies in developing markets. From an Australian context stock market time series data has principally focussed on the Australian Stock Exchange. This researcher has, to date, been unable to discover previous research papers which have looked at any alternative exchanges from an Australian context. Consequently, the anomalies research, from an Australian perspective, has not explored this issue to its full extent.

Further to this previous research has generally focussed on a specific anomaly in a sort of vacuum without consideration given to the potential for other external factors to have some degree of influence. This may lead to some questioning the absolute validity, or relevance, of the research. For example, are anomalous stock market patterns simply due to the behaviour and motivation of individuals acting in self-interest (for example pure profit taking), as a response to an external event (a major development or change in the economy) or due to the need to respond to personal priorities (transferring wealth to a family member as a gift). These issues have not been adequately accounted for in previous research.

1.3. Addressing the Limitations

Therefore, the current research will overcome some of these issues through incorporating a new data set and examining data which has not previously been considered within the one research paper.

The Australian stock market is a well-established and sophisticated market. The market is dominated by the role of the Australian Stock Exchange. Most Australian companies are listed (or choose) to list on the Australian Stock Exchange as well as investor preference for trading on the ASX. This can be traced to many factors, including (but not limited to): a highly liquid market; a high level of information availability; a lower level of risk or a familiarity with the exchange itself. For example, see Marrett *et. Al.* (2008) and (2011) who exclusively focuses on the Australian Stock Exchange and the component sub-indices. The current research will address this emphasis, by examining an alternative exchange – the NSXA. The NSXA is an alternative exchange with a focus, though not exclusively, on small to medium firms seeking a public listing.

Therefore, the overall objective of the current research is to assess the efficacy of the EMH to explain several anomalies in a less researched stock exchange the NSXA. Additionally, the impact of financial and economic variables on stock market behaviour will also be incorporated into the model, which is an innovation of the research method. The results of previous research, with a predominate focus on the main stock exchanges, have been mixed with numerous anomalies either being arbitraged out of existence, still existing but unable to be financially exploited or in existence with the possibility of developing trading strategies to exploit such anomalies and deliver profitable returns. The fact that numerous anomalies have not been totally arbitraged out of existence, even if only from a statistical perspective, provides a contradiction to the premise of efficient markets established by the EMH. The current research recommences the debate by using as the dataset a previously not considered stock exchange.

The proposed methodology will provide a unique opportunity for an updated understanding regarding the predictability stock market behaviour and the EMH. Specifically, the data source will be derived from three sub-indices of the NSXA – the NSX All Equities Index (NXSAEI), the NSX Agriculture Index (NSXAGR) and the

NSX Resources Index (NSXRES). Historical index closing values are taken for the period from November 2007 (the earliest available recorded entry) through to May 2013. Financial variable data, for the same period, were obtained from the Reserve Bank of Australia website.

The conceptual model will incorporate nine broad independent variables covering macroeconomic data, specific anomalies and specific events and determine their influence over the behaviour of closing values on multiple indices of the NSXA. The objectives of the research will be to:

1) determine the existence and relationship between several anomalies on a previously overlooked stock exchange – the NSXA;

2) explore any possible relationship between other leading economic indicators and the predictability of the financial return of stocks on the NSXA;

3) explain why an anomaly might exist;

4) in the context of the dataset employed, National Stock Exchange of Australia (NSXA), the current research will also seek to address the positioning of anomalies, i.e. are they structural and therefore the new norm or are they outliers, possibly statistically significant but financially un-exploitable, and

5) apply an appropriate time series statistical technique to identify any pattern shift.

The primary objective of this thesis is to investigate what are the causes of the financial anomalies which may have implications as to whether stock markets are efficient and whether specific trading strategies may obtain superior financial returns. The efficacy of standard financial theory relating to efficient markets is examined. Using time series data from a smaller, less analysed stock market, the link between stock market activity and investor behaviour and actions is empirically examined. A review of the literature on this debate is presented to provide the theoretical foundations.

The following research questions ensue from this review:

1) Does the theory relating to efficient market apply to the stock exchange the NSXA?
2) If efficient market theories are demonstrated to not be entirely valid does this mean that anomalous stock market behaviour and trading strategies can be exploited to obtain superior financial returns?

To address the research questions posed several hypotheses have been developed which are discussed in a later section of this chapter. In this research, quantitative time series data have been used to examine the potential relationship that may exist between anomalies and stock market trading behaviour. Time series stock market closing values were obtained directly from the NSXA website which maintains a database of historical closing daily stock market index values. The data were analysed using a linear regression econometric method, specifically using the statistical software STATA 10 which is an integrated statistical package for data analysis. The proposition will be to determine if there is any link between the independent variables (anomalies and financial data) and the dependent variable (the closing values on the NSXA sub-indices), *i.e.* can the independent variables be used to predict the behaviour in closing values on the NSXA sub-indices? The results have the potential to expand our understanding of anomalies and the predictability of stock market behaviour, which previous research has demonstrated is a contentious issue that is not clearly understood using existing conceptual frameworks. Finally, the research hypotheses were tested using the above-mentioned method and integrated with the theoretical framework to provide meaningful results.

1.4. Significance of this research project

This research merits theoretical and practical significances. The predictability of stock market behaviour is of interest to both academics and financial market practitioners because of its implication for the efficiency of stock markets, the theory relating to the EMH and the opportunity to develop trading strategies based that allow either the institutional or individual investor to outperform the market. At the core of the issue is a simple question – what causes stock prices to fluctuate? Stock markets are considered rational and with the prices of stocks having fully reflected all publicly available information, which is the basic premise of the EMH. As soon as new information is released, stock prices quickly adjust to account for the information release. Therefore, the use of fundamental or technical analysis to “beat the market” should be an exercise in financial futility. But efficient markets do not explain many observed anomalies that remain persistent within stock markets.

Findings such as small capitalised stocks or firms with poor price-earnings ratios consistently outperforming the overall stock market or riskier stocks with high beta values performing no better than low beta value firms challenge our understanding of why stock markets fluctuate. Or why calendar anomalies such as the January and Weekend effects remain persistent and largely unexplainable, even though stock market participants are fully aware of their existence and should have arbitraged such anomalies out of existence.

1.5. Contribution to knowledge & summary of significance

This research will increase our understanding of the behaviour of stock markets, enabling investors to better appreciate the impact of events and timing for portfolio composition on stock performance. Such findings may further lead to better returns within specific timeframes throughout the year. The current research will contribute to the current body of knowledge in the following manner:

1. An examination of the influence of several specific anomalies on a secondary smaller, less well reported and understood stock market exchange – the NSXA - thereby clarifying the nature and behavior of the specific anomalies, how they can potentially impact on a market and allowing individual investors to be more fully informed to potentially exploit these anomalies and thereby improve returns; *i.e.* increasing investor sophistication.

2. Statistical time series analysis will be employed to identify breaks in patterns of stock market performance over both the short and medium terms.

3. Look at the potential impact of leading financial and economic indicators (within the same conceptual model) on the NSXA which have not been undertaken in previous research.

4. The use of the piecewise linear regression procedure will provide an original contribution to the investigation of anomalies on an alternative stock exchange. To the best knowledge of the researcher, this is the only paper which has utilized this approach in this circumstance.

5. Finally, the results will extend the current theoretical explanations for the existence of calendar anomalies and their influence on stock market performance from an Australian context.

This research will improve professional and individual investor's appreciation of the influence and impact of specific market anomalies on several different levels within financial markets. The current research will allow these groups to better understand whether several anomalies are equally as prevalent within the NSXA as has been reported previously across several other stock markets.

In summary, the research will make a significant contribution to the existing knowledge relating to the performance of a less researched stock market in an Australian context by examining:

1) the pervasiveness of several stock market anomalies within a previously unexamined stock market;

2) if any relationship exists between several leading financial economic indicators and the predictability of stock returns on a smaller secondary stock market and

3) assess the degree of variability in outcomes across each of the sectors examined.

This research will add to the current body of knowledge by determining the impact of the anomalies and key economic variables on a secondary alternative stock exchange and the degree of influence on stock market closing values. Previous research has been based on time series data obtained from regularly reported, highly visible financial markets. In the Australian context the source for time series data has been historical data from the Australian Stock Exchange. The current research will navigate a new direction by using time series data from an exchange that is not as well reported and focuses on firms with lower levels of market capitalisation. This will provide an interesting insight into the prevalence and behaviour of specific anomalies as previous research has generally concluded that many previously reported anomalies appear to be more prevalent in smaller capitalised companies. Many of the firms listed on the NSXA fall into this category.

The NSXA though provides several variables which may provide additional insights into the behaviour of market anomalies – 1) the level of dissemination of publicly reported, widely accessible information is minimal when compared to the ASX and 2) the level and frequency of trade is smaller when compared to the ASX. This is important as it may relate to some of the previous explanations for the existence of stock market anomalies such as the size effect, the information hypothesis or market trading/participant hypotheses. This has not been address by previous research.

These outcomes will also have practical benefits for industry practitioners and private investors by improving their understanding of the behaviour of anomalies beyond the usually reported index (for example the S&P ASX 200) and have the potential to improve investment education, trading strategies and financial performance.

1.6. Research Methodology

The methods used to undertake the current research will involve a synthesis of observational, conceptual and statistical techniques. The interaction, if any, between daily closing values of stocks and anomalies will act as a proxy for the observational component, this being consistent with previous empirical methodologies. At the core of the anomalies literature are the behavioural patterns of stock market participants. It is expected that such an approach will address many of the unresolved questions about anomalies and their relationship to an alternative stock market. To facilitate a detailed explanation of such questions, stock market variables will be gathered to develop a specific model providing an explanation of the possible relationship between investor behaviour and anomalies.

The literature review will be undertaken with the objective to identify the core concepts and theoretical framework and establish the significant variables leading to the development of a conceptual framework. The conceptual framework will be tested using appropriate statistical techniques. To determine the significance of each of the model variables computer based statistical analysis will be applied. Output will be presented in tabular form. Application of regression methods will be employed to measure the statistical significance of each of the independent variables. Closing index values time series data for the period 2007 to 2013 will be obtained directly from the NSXA website. Macroeconomic variables will be obtained from the Reserve Bank of Australia.

1.7. Development of the research hypotheses

The research focused on several factors, such as macroeconomic parameters, calendar anomalies and event variables. We find robust support for the macroeconomic parameters, conditional support for the calendar anomalies and no support for event variables. However, the empirical work failed to provide any evidence supporting anomalies such as the Weekend (WE), the January (JE), Turn of the Month (TOTM) or Holiday (HE) effects.

1.7.1 The Weekend Effect

While financial markets may not be perfect, according to the EMH they at least display qualities of efficiency. With regards to stock markets, at any specific point in time, all available information relating to a stock/s is incorporated into the current price and therefore future price changes based on this cannot be predicted from previous ones, the semi-strong form of market efficiency. Furthermore, patterns in historical stock price changes cannot be employed as a predictor of future prices, the weak form of market efficiency. The EMH though, has been contentious, at least from an academic perspective, as it has been unable to fully rationalise why there is some degree of predictability in stock market activity (and consequently stock prices) in the form of calendar anomalies. One such anomaly is the Weekend/Monday effect.

The Weekend Effect (WE) refers to the general pattern of stock market behaviour in which Monday returns are consistently negative compared to Friday returns (Nageswari 2011). The dilemma with this outcome is that due to the extended time over which Monday returns accrue (three days) this would imply an increase in market risk and therefore require investors to be appropriately compensated with higher returns compared to Fridays. The predictability of this anomaly is important as it contradicts to the EMH. The original investigation into the WE can be attributed to Fields (1931) who observing that DJIA closing values demonstrated a predictable pattern of returns with consistent significant negative Monday closing values preceded by positive Friday closing values. Table 1.7.1.a provides a brief overview of some of the research.

Table 1.7.1.a; Brief overview of some of the WE findings

AUTHOR/S	PERIOD & DATA STUDIED	STATISTICAL TEST	OTHER ANOMALIES INVESTIGATED	FINDINGS
Cross (1973)	Jan. 1953 – Dec. 1970; S&P Composite Index	Mann-Whitney U Test	n.a.	Weekend effect statistically significant at 10 percent level
French (1980)	1953 – 77; S&P Composite Portfolio	Regression	Holidays	Negative mean returns for S&P stocks on Monday
Gibbons et. al. (1981)	Jul. 1962 – Dec. 1978; S & P 500 index + value- and equal-weighted portfolios constructed from the CRSP	Regression F & T tests	n.a.	Negative mean Mon. stock returns on Monday & below-average T-bill Mon. returns
Keim et. al. (1984)	1928 – 82; S&P Composite Index + daily ISL OTC stock price files	Regression F & T tests	n.a.	Average Fri returns are positive whilst average Mon returns are negative. Unlikely presence of market specialist accounts for DOW effect
Jaffe et. al. (1985)	1962 – 83; US 1970 - 83; Japan 1976 - 83; Canada 1950 - 83; UK 1973 - 83; Australia	Descriptive statistics Regression F & T tests	n.a.	Weekend effect observed in all countries. Australia & Japan Tues lowest mean daily returns.

AUTHOR/S	PERIOD & DATA STUDIED	STATISTICAL TEST	OTHER ANOMALIES INVESTIGATED	FINDINGS
Choy et. al. (1989)	Jan. 1984 – May 1984 & Aug. 1985 – Dec. 1985; FT All Share Index	Correlation Regression F & T tests	n.a.	Strong UK DOW effect in large cap than small cap stocks
Jaffe et. al. (1989)	1930 – 81; US Jan. 1970 – Apr. 1983; Japan Jan. 1976 – Nov. 1983; Canada	Descriptive statistics, Correlation, Regression T tests	n.a.	Abnormally low Mon. returns follow stock market declines. Anomaly disappears when market has previously risen.
Wang et. al. (1997)	Jul. 1962 – Dec. 1993; NYSE- AMEX Jan. 1973 – Dec. 1993; Nasdaq Jan. 1928 – Dec. 1993; S&P Composite Index	Regression	TOTM	Monday effect occurs in final two weeks of month. Mean Monday returns for first three weeks of month not significant

The current research provides the opportunity to extend the previous empirical literature by examining the WE from an Australian perspective using time series data collected from an overlooked stock exchange, the NSXA.

1.7.2. The Day of the Week Effect

While previous research has referred to the WE and day of the week effect (DOW) as essentially the same anomaly the current research will adopt a slightly different perspective. The current research analysed the day of the week effect from the perspective of determining any consistent pattern in daily stock market returns other than those that occur with the weekend/Monday effect. The aim is to determine if average daily stock returns are different and consistent for specific days of the week. A similar distinction has been noted in previous empirical research (Junkus 1986, Kumar et. al. 2017 and Kuria 2013). The DOW effect refers to the significant inequality in mean of returns across alternate days of the week, while the WE. refers specifically to the behavior of mean returns over the weekend, particularly the observation that mean returns on Monday are the smallest or negative, while mean returns on Friday are positive and higher. Table 1.7.2.a provides a brief overview of some of the DOW findings.

Table 1.7.2.a; Brief overview of some of the DOW findings

AUTHOR/S	PERIOD & DATA STUDIED	STATISTICAL TEST	OTHER ANOMALIES INVESTIGATED	FINDINGS
Berument et. al (2001)	Jan. 1973 – Oct. 1997; S&P 500	OLS regression / Ljung-Box Q test / Lagrange Multiplier / Autoregressive Conditional Heteroskedastic test	n.a.	DOW effect is present in both stock volatility and returns
Ajayi et. al. (2004)	Jul. 1999; Croatia / Sept. 1994; Czech Republic / Jul. 1995; Estonia / Jan. 1995; Hungary / Feb. 1997; Latvia / Jun. 1998; Lithuania / Jan. 1995; Poland / Sept. 1997; Romania / Jan. 1995; Russia / Jan. 1995; Slovakia / Sept, 1994; Slovenia	OLS regression	n.a.	No consistent support for the presence of any significant daily patterns in stock market returns across the 11Eastern European emerging markets
Boudreaux et. al. (2010)	Feb. 1976 – Sept. 2002; DJIA Feb. 1976 – Sept. 2002; S&P500 Oct. 1984 – Sept. 2002; NASDAQ	Descriptive statistics T-test	n.a.	Weekend effect present only during non-Bear market periods. Possible day of the week effect during both Bear and non-Bear market periods.

Based on the existing empirical literature, the current research will augment the debate by investigating the DOW anomaly employing a neglected dataset, i.e. NSXA closing values, to determine the anomalies efficacy.

1.7.3. The Month of the Year Effect

Are average monthly stock returns different and consistent for specific months of the year other than what has been reported for the January effect? Overall particular months of the year are seen as the most profitable to undertake investment and trading activities in financial markets. Again, though the research varies widely in relation to whether the anomaly is truly significant and whether there is any consistency in relation to which month or months prove to be the most predictable and favourable.

Merrill (1966) for the first time dealt with the predictability of monthly trading patterns in financial markets. A descriptive study examining the Dow Jones Industrials over the period 1896 to 1965 concluded that December was the most favourable month to undertake investment activities. This was followed by August and then July. Several studies (Bhabra et al. (1999), Gibson et al. (2000) and Johnston et. al. (2005)) have reported that January may not always represent the month with the highest mean return. Each of these studies concluded that the highest mean stock market returns occurred November for the stock markets investigated, thereby contradicting the argument supporting the JE and questioning its broad applicability. Table 1.7.3.a presents a summary of some of the research and findings relating to the MOTY effect. A more detailed discussion will be provided in the literature review chapter.

Table 1.7.3.a; Brief overview of some of the MOTY findings

AUTHOR/S	PERIOD & DATA STUDIED	STATISTICAL TEST	OTHER ANOMALIES INVESTIGATED	FINDINGS
Giovanis (2009)	Multiple dates Multiple international indices	GARCH EGARCH	January	December effect present in 20 stock markets. February effect in 9 stock markets. January effect in 7 stock markets. April effect in 6 stock markets
Chia et. al. (2012)	Jan. 2000 - Jun. 2009; Nikkei 225 index	OLS regression / ARCH-LM Statistic / Ljung-Box Q 2 Statistic / Wald Test	n.a.	Nikkei 225 index exhibited strong November returns greater than those occurring in January
Marrett et. al. (2011)	Sept. 1996 - onwards All Ordinaries index Small Ordinaries index Ten ASX/S&P industry indices	Breusch-Godfrey Lagrange test White's heteroskedasticity statistical test	n.a.	Returns are significantly higher in April, July and December combined with mixed outcomes at the sub-index level
Patel (2008)	Jul. 1999 - Jun. 2007; BSE 500 & NSE 500	Parametric T- test Non - parametric Mann-Whitney test ANOVA Kruskal-Wallis test	n.a.	Mean returns for Nov & Dec significantly greater compared to other months supporting a Nov.-Dec. effect Also identify a Mar. - May effect in which mean returns for these months are significantly less compared to other nine months Each of the effects are independent of each other

The current research provides the opportunity to extend the previous empirical literature by examining the MOTY effect from an Australian perspective using NSXA time series data.

1.7.4. January - Turn of the Year Effect

The January effect refers to the tendency for stock prices to recede towards the end of December and increase in the first few days in the month of January, particularly within US stock markets. Theoretically this could present investors with profitable arbitrage opportunities. The existence of the January effect is inconsistent with the principle of efficient markets or the EMH. According to the EMH if stock prices follow a random walk this implies that it is impossible to predict future price movements, and therefore returns, based on publicly available information, *i.e.* past price movements cannot be used to determine current/future price movements. A seminal paper which questioned the above theory was undertaken by Rozeff and Kinney (1976) who discovered that January returns on an equally weighted index on the New York Stock Exchange consistently averaged 3.5 percent while all other months averaged 0.5 percent.

Keim (1983) extended the research undertaken by Rozeff et al (1976) by focussing on small firms. Keim demonstrated that consistent excess returns were noticed in January and that half of the excess returns occurred in the first five trading days in January. Further clarification was provided in relation to the outcome noted in Keim's research by Reinganum (1983) who observed that returns in January were greater for small firms who experienced significant price declines in the previous twelve months compared to small firms that had performed well and seen improvements in share prices - what he referred to as "winners. Thus, Thaler (1987) noted that the JE was primarily a small firm/cap effect, and the anomaly was not observed for large cap firms/stocks.

Lakonishok and Smidt (1988), using the Dow Jones Index as a data source to research the January effect, concluded that there was support for the existence of the anomaly. What this implies is that the January effect appears to be a proxy for what has been referred to as the small firm effect and that small firms appear to offer significant positive returns only during the January period, with this being concentrated in the first five days of trading. Table 1.7.4.a provides a summary of some of the research and findings relating to the January / TOTY effect, with a more detailed discussion available in the literature review chapter.

Table 1.7.4.a; Brief overview of some of the January / TOTY findings

AUTHOR/S	PERIOD & DATA STUDIED	STATISTICAL TEST	OTHER ANOMALIES INVESTIGATED	FINDINGS
D'Mello et. al. (2003)	1986 - 1992; all stocks listed on the Institute for the Study of Securities Markets database	OLS regression	n.a.	JE is primarily due to tax-loss selling, as opposed to any firm size or share price effects Stocks that have experienced large capital losses in the current and prior years are more prone to abnormal selling pressure Individuals, not institutional investors, are the major factor influencing selling pressure and the JE.
Asteriou et. al. (2006)	Jan. 1991 - May 2003; DataStream	OLS regression Breusch–Godfrey Lagrange multiplier test ARCH–LM test Newey– West heteroscedasticity test	n.a.	January effect in four countries from eight reviewed - Hungary, Poland, Romania & Slovakia Support for tax-loss selling hypothesis for two country cases - Hungary and Romania

AUTHOR/S	PERIOD & DATA STUDIED	STATISTICAL TEST	OTHER ANOMALIES INVESTIGATED	FINDINGS
Depenchuk et. al. (2010)	Jan. 2003 - Dec. 2007; PFTS Index & S&P 500 Index	Regression Non - parametric t - test Wilcoxon signed rank test	Weekend effect TOM effect.	No evidence of a January effect or weekend effect in the Ukrainian stock and bond markets. However, our results support a TOM effect in the Ukrainian stock market
Ahsan et. al. (2013)	Jan. 1987 - Nov. 2012; Dhaka Stock Exchange All Share Price Index	Regression	n.a.	No significant support for the January effect. A June effect is observed. TLS hypothesis does not explain outcome
Sikes (2014)	1987 - 2010; NYSE, AMEX, & NASDAQ stocks	Descriptive statistics OLS regression	n.a.	TOTY returns attributable to tax-loss-selling by institutional investors, particularly for small cap stocks.

Based on the existing empirical literature, the current research will augment the debate by investigating the JE/TOTY anomaly using NSXA closing values, to determine the anomalies efficacy.

1.7.5. Turn of the Month Effect

This anomaly refers to the pattern in which stock prices tend to rise towards the end and beginning of each month, providing returns which outperform the rest of the month (Maher, 2013). The TOTM effect was originally reported by Ariel (1987). Using both equally-weighted and value-weighted daily stocks from the NYSE during the period 1963 to 1981 it is demonstrated that mean daily stock returns are positive at the beginning of the month through to the first half of the month. In the second half of the month returns reverse and become negative. Lakonishok and Smidt (1988) also produced formative research regarding the TOTM effect, focussed on Dow Jones Industrial Average (DJIA) historical data for the period covering 1897-1986. Lakonishok et. al. (1988) demonstrated that DJIA returns were consistently anomalous over the period observed around the turn of the month, (as well as: the turn of the week, around the turn of the year and holidays). Table 1.7.5.a presents a summary of some of the research and findings relating to the TOTM anomaly. A more detailed discussion will be provided in the literature review chapter. The current research provides the opportunity to extend the previous empirical literature by examining the TOTM effect from an Australian perspective using NSXA time series data.

1.7.6. End of financial Year effect – Australia

Substantial research has focussed on the JE in U.S. markets, which serves as a proxy for the end of financial year, as December is the last month of the financial year in the United States of America. One explanation which has been used to explain the JE, is the tax-loss selling (TLS) hypothesis, in which stocks are sold in December to realize losses to offset gains accumulated throughout the year (Lee, 1992). Following a similar rationale, in an Australian context, testing for an end of financial year effect (EOFY), may provide further insight into the anomaly and the relevance of the TLS hypothesis. Furthermore, this may provide further clarity in defining the JE as either a calendar anomaly or what could be classified as a financial/event anomaly. This is an area which has received little attention which offers opportunity for further research. A similar perspective has been adopted in the empirical research (Raj et. al., 1994).

One of the formative papers exploring stock return seasonality in an Australian context was published by Brown, Keim, Kleidon and Marsh (1983). Focussing on the efficacy of the tax-loss selling hypothesis the authors noted that Australian stock returns presented a unique case. Seasonalities were observed, particularly for small stocks, across both January and the July-August period. With the Australian financial year concluding on 30 June, TLS may explain some of the July-August seasonal and therefore an EOFY effect. TLS could not explain the Australian January seasonal. Table 1.7.6.a is a summary of some of the research and findings relating to the EOFYA effect, with a more detailed discussion available in the literature review chapter.

Table 1.7.5.a; Brief overview of some of the TOTM findings

AUTHOR/S	PERIOD & DATA STUDIED	STATISTICAL TEST	OTHER ANOMALIES INVESTIGATED	FINDINGS
Kallunki et. al. (2001)	Jan. 1991 - Dec. 1997; Helsinki Stock Exchange	Regression	n.a.	Support for a TOTM effect and associated with Ogden (1990) liquidity hypothesis.
Kunkel et. al. (2003)	Aug. 1988 - Jul. 2000; Multiple international indices - Australia All Ordinaries, Austria ATX, Belgium BEL-20, Brazil Bovespa, Canada TSE 300 Composite, Denmark KFX, France CAC 40, Germany Dax, Hong Kong Hang Seng, Japan Nikkei 225, Malaysia KLSE Composite, Mexico IPC, The Netherlands AEX General, New Zealand NZSE 40, Singapore Straits Times, South Africa Johannesburg All Share, Switzerland Swiss Market, UK FTSE 100, United States S&P 500	Summary statistics Parametric and nonparametric tests OLS regression Durbin –Watson test Kolmogorov–Smirnov test Bowman– Shelton test Three-way ANOVA Wilcoxon signed rank test	n.a.	TOTM effect present in16 of international indices reviewed 4-day TOM period accounts for 87% of the monthly return, on average
McGuinness (2006)	Feb. 2000 - mid-Jun. 2005; Hang Seng Index & Hang Seng Small Cap Index	Descriptive statistics OLS regression	n.a.	Strong TOTM effect for small-cap stocks in Hong Kong

AUTHOR/S	PERIOD & DATA STUDIED	STATISTICAL TEST	OTHER ANOMALIES INVESTIGATED	FINDINGS
McConnell et. al. (2008)	1987 - 2005; US CRSP value-weighted & equal-weighted Jan. 1990 - Jan. 2006; numerous international indices	Regression	n.a.	TOTM effect pervasive for various categories of U.S. stocks & for 30 of the countries studied TOTM effect not caused by month-end buying pressure, i.e. a pay-day effect
Nikkinen et. al. (2009)	Jan. 2001 - Dec. 2007; NASDAQ OMX Helsinki 25 Index	Regression	Intramonth	TOTM supported Influenced by U.S. macroeconomic news announcements Global financial markets are integrated
Tangjitprom (2011)	1988 - 2009; SET index for the period & SET50 index	Multiple regression	MOTY WE	Abnormally high TOTM effect Economically difficult to exploit due to transaction costs

Table 1.7.6.a; Brief overview of some of the EOFYA findings

AUTHOR/S	PERIOD & DATA STUDIED	STATISTICAL TEST	OTHER ANOMALIES INVESTIGATED	FINDINGS
Brown et. al. (2006)	Dec. 1995 - Dec. 2000; 450 IPOs first listed on ASX & all other stocks on All-Ordinaries Index	Regression	Disposition effect	June effect due to TLS rather than window dressing or momentum effect. Authors refer to outcome evidence highlighting a "disposition effect".
Durand et. al. (2006)	Jan. 1980 - Dec. 2001; All stocks listed on ASX	Descriptive statistics Kolmogorov-Smirnov One-Sample Test Paired-sample t test	Momentum	No evidence for a momentum effect. Evidence of positive returns for ‘loser’ portfolios in July, 1st month of the Australian financial year
Brown et. al. (2010)	Jul. 1994 – Jun. 2007; All firms listed on the ASX	Descriptive statistics Regression	n.a.	A July effect - significant TLS of stocks lost value over the financial year. Reflected in high trading volume & greater sell orders in June with rebound in July. Evidence small mining stocks are particular targets for TLS.

AUTHOR/S	PERIOD & DATA STUDIED	STATISTICAL TEST	OTHER ANOMALIES INVESTIGATED	FINDINGS
Liu & Li (2011)	Jan. 1980 - Aug. 2010; ASX/S&P50 index	Descriptive statistics Regression	n.a.	Examined MOTY effect in 50 individual stocks on ASX. July / EOFY effect only supported in 3 stocks.
Marrett et. al. (2011)	Sept. 1996; 12 ASX sub-indices	Descriptive statistics Regression	n.a.	At the market level, evidence supports significantly higher returns in April, July and December - nearly 3 times higher than average returns across all months. TLS & liquidity constraint hypotheses may offer possible explanations for outcomes

Based on the existing empirical literature, the current research will add to the debate by investigating the EOFY anomaly using NSXA closing values, to determine the anomalies relevance.

1.7.7. Holiday effect

The holiday effect (or pre-holiday effect) (HE) refers to the outcome in which for stocks consistently provide abnormally high returns the day before a holiday, (Gama et. al., 2013). The HE has been one of the most researched of the calendar anomalies. Lakonishok et. al (1988), in a formative study, noted that this anomaly pre-1987 accounted for between 30 to 50 percent of the total return on US stock markets. Another significant research which supported Lakonishok et. al (1998) was undertaken by Ariel (1990), observing that pre-holiday returns compared to return accruing on non-pre-holidays were nine to fourteen times higher. Over one-third of the return accruing to the broad market over the 1963-1982 period was ascribed to the eight trading days prior to holidays during each calendar year. Table 1.7.7.a presents a summary of some of the research and findings relating to the holiday effect. A more detailed discussion will be provided in the literature review chapter.

Table 1.7.7.a; Brief overview of some of the HE findings

AUTHOR/S	PERIOD & DATA STUDIED	STATISTICAL TEST	OTHER ANOMALIES INVESTIGATED	FINDINGS
Arsad et. al. (1997)	Jul. 1935 - Dec. 1994; FT Industrial Ordinary Shares index	OLS regression	WE JE	Research outcomes supported existence of a HE in the FT Index
Coutts et. al. (2000)	Oct. 1986 – Aug. 1996; Athens Stock Exchange General index & Banks, insurance, leasing sub-indices	Descriptive statistics Regression	WE JE	HE present in all indices, Though not significant for Leasing All four indices mean returns are 6 to 13 times greater pre-holiday trading compared to remaining days of year
Marquering et. al. (2006)	1960 – 2003; DJ Industrial Average	Regression	WE Time-of-month effect JE TOTM Small firm effect	HE no longer evident. After publication/recognition significance of anomaly weakened considerably
Marrett & Worthington (2009)	Sept. 1996 – Nov. 2006; ASX, multiple sub-indices	Descriptive statistics Regression	n.a.	Overall evidence of pre-holiday effect, particularly with small cap stocks and retail sub-index No support for a post-holiday effect.

AUTHOR/S	PERIOD & DATA STUDIED	STATISTICAL TEST	OTHER ANOMALIES INVESTIGATED	FINDINGS
Alagidede (2008)	Jan. 1990 – Sept. 2009; Nigeria NSE All Share index Jan. 1990 – Sept. 2009; Kenya NSE20 index Dec. 1997 – Sept. 2006; Tunisia Tunnindex Jan. 2002 – Oct. 2006; Morocco MASI index Jul. 1997 – Oct. 2006; South Africa FTSE/JSE All Share index Dec. 1997 – Sept. 2006; Egypt CASE30 Share index Jun. 1995 – Sept. 2006; Zimbabwe ZSE Industrial index	OLS regression	MOTY	Significant returns in days preceding public holidays for South Africa No significant HE in other stock markets in sample

The current research provides the opportunity to elaborate on the previous empirical literature by examining the HE from an Australian perspective using NSXA time series data.

1.7.8. Events effect

Event studies focus on the impact of specific activities or actions, both internal and external to the firm, which have the potential to influence the financial performance of the firm and its stock price. Event studies can improve the investors' understanding of how events affect firms by: 1) providing a measure of the impact on the wealth of the firms' investors / stockholders and 2) serve in capital market research as a way of testing market efficiency. If stock markets are efficient the information contained in an event, or the occurrence of the event itself, will be fully reflected in the price of the stock. Overall an event study measures the impact of a specific event on the value of a firm. Events can cover numerous activities such as firm specific events (for example stock splits or major announcements), macroeconomic news (for example changes in interest rates or economic activity), and political announcements such as new elections or general significant events such as sporting events or significant natural events. In this section the current research will focus on "behavioural" events such as elections and sporting events. Macroeconomic events will be treated separately.

1.7.8.1. Elections

The Table 1.7.8.1.a below provides a summary of some of the research and findings relating to the potential influence of election events, with a more detailed discussion available in the literature review chapter.

Table 1.7.8.1.a; Brief overview of some of the election events findings

AUTHOR/S	PERIOD & DATA STUDIED	STATISTICAL TEST	OTHER ANOMALIES INVESTIGATED	FINDINGS
Mandaci (2003)	20 Nov. 1991 / 24 Dec. 1995 / 18 Apr. 1999 / 3 Nov. 2002 - Turkey ISE-100 index	T-test Z-test	n.a.	Consistent abnormal financial returns observed, particularly a few days post elections, excluding 1991election
Zach (2003)	1993 – 1997; Tel Aviv Stock Exchange Daily 100 index (TAD100) ISRIX a self-constructed equally-weighted index comprising daily returns of Israeli stocks traded in the United States	Descriptive statistics Wilcoxon rank-sum test Siegel Tukey test Regression	n.a.	Political news contributes to the variability of stock returns for Israel only listed stocks and dual listed stocks (Israel & US stock markets), but not for Israeli stocks listed solely in the US
Białkowski et. al. (2008)	1980 – 2004; MSCI Country Indices, representing 27 industrial nations & MSCI World Index	Descriptive statistics Regression	n.a.	National elections induce periods of increased stock market volatility which increases in the last week before an election

Based on the existing empirical literature, the current research will add to the debate by investigating the influence of elections on NSXA closing values, to determine any anomalous behaviour.

1.7.8.2. Sports Events

Table 1.7.8.2.a presents a summary of some of the research and findings relating to the impact of sporting events on stock market closing values. A more detailed discussion will be provided in the literature review chapter.

Table 1.7.8.2.a; Brief overview of some of the sporting events findings

AUTHOR/S	PERIOD & DATA STUDIED	STATISTICAL TEST	OTHER ANOMALIES INVESTIGATED	FINDINGS
Veraros et. al. (2004)	2004; Athens Stock Exchange (ASE) & Milan Stock Exchange (MSE)	OLS regression	n.a.	Announcement of Greece as host country of 2004 Olympics had positive effect on the general index of the ASE No impact on losing country Italy MSE
Mishra et.al. (2010)	1995 – 2005; Indian NSE, CNX Nifty	Descriptive statistics Regression	n.a.	An asymmetric relationship between performance of Indian cricket team and stock returns on the Indian stock market is established

The current research provides the opportunity to elaborate on the previous empirical literature by examining the influence of Australian sporting events over NSXA closing values.

1.7.9. The Impact of Macroeconomic Variables

The current research will offer a new perspective on the study of anomalies by incorporating an analysis of the impact of several macroeconomic variables on stock market closing values and to what extent this influences the predictability of outcomes. The variables to be considered in the research are: the Australian government bond rate (AGBR), the cash rate (CR), the bank accepted bill rate (BAB) and a random selection of international currencies considered to be important international markets for Australia. While previous research has examined the role played by economic variables to date this has not been incorporated into a conceptual framework which includes other reported anomalies. Incorporating economic variables into the conceptual framework alongside calendar and event variables will allow the reader to compare the significance of each of the independent variables and gauge which variable/s (or category of variables) has a more robust influence on the dependent variable, something which has not been considered in the previous empirical literature. This is important as it enable the reader to gauge the significance of macroeconomic variables in predicting stock market behaviour compared to other anomalies.

The relationship between economic variables and stock market behaviour has produced conflicting outcomes in the empirical literature. A brief overview of some of the studies which have found no or limited correlation include: Kim et. al. (2004) noting that while stock markets react to the release of macroeconomic news, debt markets appear to be more greatly influenced by such news releases. In looking at the Japanese financial markets the authors concluded that the stock market behaviour is more influenced by firm or industry specific news whereas debt markets are more concerned with macroeconomic events. Bartolini et. al. (2008) suggest that only a small number of macroeconomic news releases have any effect on stock prices in a significant and systematic way, while most of the macroeconomic information releases tend to generate inconsistent and insignificant responses. The strongest, the authors note, is on interest rates while the weakest is on stock prices. The limited influence of economic variables is also observed by Khalid (2012). Investigating the long-run effect of macroeconomic variables on the movement of Karachi Stock Exchange (KSE) returns using monthly data for inflation, exchange rates and treasury bills, the author concludes that there is no significant relationship between the independent variables employed and returns behaviour on the Karachi Stock Exchange. A similar outcome is seen in Onasanya et. al. (2012). Addressing the question of whether macroeconomic variables - specifically external debt, the inflation rate, real interest rates, direct investment, and exchange rate - have a significant influence on the behaviour of the Nigerian stock market, the authors find that the macroeconomic variables used did not significantly influence returns on the Nigerian stock market. Interest rates particularly were seen to be negatively related and insignificant to stock market returns.

Other studies have found significant support for the relationship between economic variables and stock market behaviour including Menike (2006), who directly contradicts Kim et. al. (2004) observing a strong relationship between macroeconomic variables and the movement of stock prices on the Colombo Stock Exchange. Further changes in the money supply appear to have a positive impact on stock prices while variations in the exchange rate clearly have a negative impact. Determining whether there existed a dynamic relationship between sector-specific indices of Bursa Malaysia and macroeconomic variables using a vector error correction model and granger causality test, Pyeman et. al. (2009) document that most of the macroeconomic variables considered in the research were found to influence the direction of movement of the sector-specific indices. The macroeconomic variables employed in the study included gross domestic product, consumer price index, Treasury Bill interest rates, M1 money supply and several exchange rates. Heaton et. al. (2011), also looking at sector specific variables, find that international commodities economic data to have a statistically significant and economically meaningful effect on four indices of the Australian Stock Exchange - materials (XMJ), industrials (XNJ), energy (XEJ) and the market-wide S&P ⁄ ASX 200. The most influential international commodities economic data relate to metals and energy prices while the most affected indices are the ASX energy and the ASX materials. Overall though the authors conclude that overnight movement in the S&P 500 index appears to have greater influence on ASX stock price behaviour.

Investigating the role of macroeconomic factors in explaining Turkish stock returns for the period July 1997 to June 2005, Kandir (2008) obtained mixed results. The independent macroeconomic variables used in the research were: the growth rate of industrial production, the growth rate of narrowly defined money supply, changes in international crude oil price, changes in consumer price index, exchange rates, interest rate variations and the return on the MSCI World Equity Index. Kandir (2008) based the analysis not on individual stocks but groups of stock portfolios. The author concluded that exchange rates, interest rates and returns on the MSCI World Equity index influenced the financial performance of all the constructed portfolio returns, while the CPI was found to be significant for only three of the twelve constructed portfolios. Not having any significant effect on stock returns were the growth rate of industrial production, money supply changes and changes in oil prices. Based on the abovementioned empirical literature, the current research will add to the debate by investigating the influence of several macroeconomic variables on NSXA closing values, to determine any anomalous behaviour.

1.8. Scope of the research

This research focuses on the behaviour of companies listed on the NSXA and its various sub-indices, to identify the determinants of several anomalies. The appearance of anomalies would raise questions regarding the validity of the EMH, which implies that all stocks follow a random walk and fully reflect all available information, thereby negating strategies to out-perform the market.

The current research centres on the NSXA data in that this stock market has been overlooked in the empirical research, particularly Australian research, where the ASX has been the major focus (Brown et. al 1983, Liu et. al. 2011, Marrett et. al. 2009, Marrett et.al. 2011 and Worthington 2005). Furthermore, compared to the ASX, the NSXA is a much smaller stock exchange both from the perspective of number of listings and market capitalization. This may provide a unique perspective from which to examine the predictability of market behaviour. Due to the size of each of the exchanges and the level of market activity, this may have additional implications regarding the types of investors actively involved in each of the markets and thereby trading behaviour. Overall, observation of the behaviour of NSXA historical stock values may provide a unique insight into stock market anomalies, with follow on implications for many recognised theories within the empirical finance literature.

Table 1.8.a; Number of companies listed and market capitalization ASX and NSXA as of Dec. 2016

	ASX	NSXA
No. of Listed Companies	2215	80
Market cap ($m.)	1,760,162	2,500

(Source: https://www.asx.com.au/about/historical-market-statistics.htm#No. of Companies and securities listed on ASX and https://en.wikipedia.org/wiki/National_Stock_Exchange_of_Australia).

The variables that will be investigated in the current research are the closing values of the NSXA and two sub-indices, the NSXAGR and the NSXRES. These form the dependent variables. The independent variables will include several variables across three broad categories of anomalies: macroeconomic, calendar/seasonal and event. These variables will be assessed from the perspective of the accepted theories in the financial literature such as: the CAPM, the EMH, APT and BF to determine which, if any, may provide an explanation of the observed outcomes.

1.9. Structure and organisation of the thesis

As discussed previously, the principle objective of the current research is to determine the efficacy of the EMH, its relationship to several anomalies and apply this to a new dataset – the NSXA. This research thesis is organised as follows (Figure 1.9.a provides a diagrammatic overview of the thesis):

Chapter 1 provides an overview of the research. This includes a summary of the seminal papers in this field. Additionally, the aims and objectives of the research are discussed, an explanation of the limitations of previous research and justification for the current research, the list of hypotheses and the contribution and significance of the research.

Chapter 2 reviewed the literature on relevant theories. The focus of this chapter is to review the theoretical foundations which underpins the current study - an overview of the seminal financial theories.

Chapter 3 synthesized the empirical evidence on anomalies. This chapter sets the empirical foundations upon which all other chapters are based by elaborating in greater detail the theories and explanations which have used in the discussion of anomalies within stock markets.

Chapter 4 provided the context of the study which provided an overview of the source of the data – the NSXA and provided a brief comparison with the main Australian stock exchange, the ASX.

Chapter 5 developed the conceptual framework built on the literature review. The aim is to build the conceptual framework based on the theoretical foundations and consequently operationalised it into statistical hypotheses. The conceptual framework provides the philosophical basis for the investigation in this research.

Chapter 6 provided the details of research methodology covering methodology employed to collect and analyse the research data and test the hypotheses, including an in-depth explanation the statistical technique used, which has been consistently featured in the literature.

Chapter 7 reported the results from the descriptive statistics and regression analysis.

Chapter 8 discussed the results detailed in Chapter 7 which referred to the statistical hypotheses and mapped back to the literature. Each of the research hypotheses and results were positioned in the existing literature and the contribution of this study highlighted.

Chapter 9 concluded by discussion of the contribution and the limitations of the research and proposed recommendations for future research.

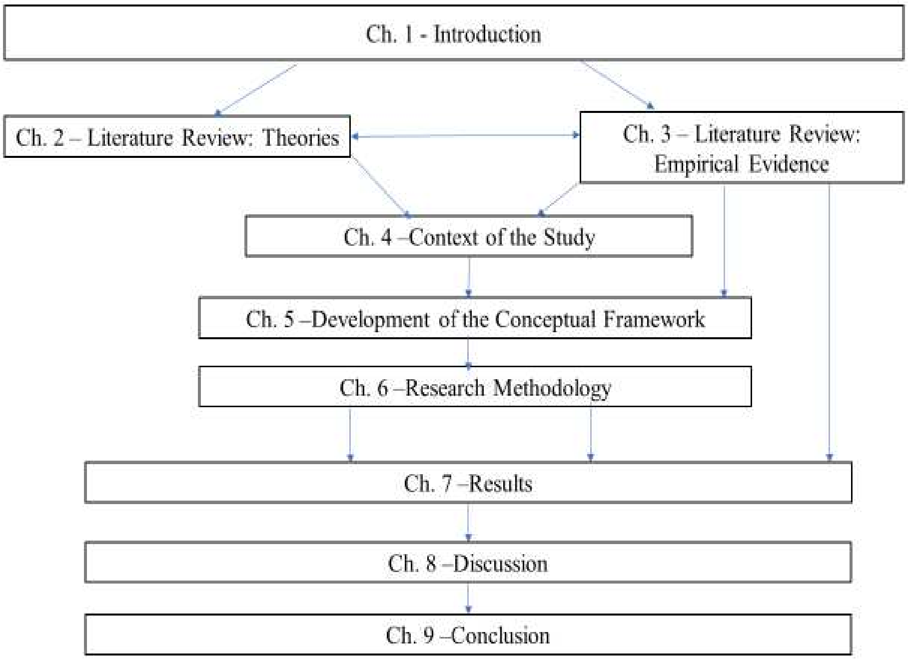


Figure 1.9.a; Outline of the Thesis Structure

1.10. Summary of findings

Table 1.10.a below provided a summary of the main findings. These will be explored in greater detail in later sections of the research. The core observation that can be assumed from the table is that market behaviour is not random and that it may be possible to see some stock market anomalies are statistically significant and tend not to be outliers.

In summary, the current research makes the following contributions:

1) Random walk theory (as espoused by the EMH) suggest that stock price movements do not follow patterns; historical data has no value and therefore anomalies should be considered outliers. The current research demonstrates that while anomalous behaviour may be structurally unstable, trading patterns do emerge or materialize, whether over short or longer timeframes and therefore should be accepted as the new norm, even if only short lived.

2) The current research generally confirmed the existing literature noting a relationship between leading economic indicators and the predictability of the financial return of stocks on the NSXA. The earlier empirical research, Jaffe et. al. (1976), Nelson (1976) and Fama et. al. (1977), acknowledged that specific macroeconomic variables influenced stock market returns and this has been supported by subsequent empirical research. It was strongly evident that changes in several of the indicators explored in the current thesis had a direct impact on the behaviour of the NSXA.

3) The current thesis sought to explain why an anomaly might exist. The research established some degree of causality between stock market behaviour and macroeconomic factors and an association to APT. With respect to calendar variables the mixed outcome would tend to provide some support for the EMH. Only the MOTY variables demonstrated some degree of predictability, though this was inconsistent. The results suggested support for a hybrid outcome incorporating both window dressing and portfolio rebalancing theories to explain the MOTY anomaly

4) The research has highlighted the lack of effectiveness of the EMH in explaining the behaviour of a stock market which is less understood and recognized. While the NSXA displays some of the characteristics of weak form efficiency, anomalous stock market behaviour is still evident. The importance of this is based on the implication that a stock market may concurrently be both efficient and inefficient. Furthermore, to the researchers' current understanding this is the only study which has incorporated both an encompassing model of market behaviour and adopted a specific regression approach, i.e. piecewise, within the one study, providing the opportunity to raise the possibility of introducing an alternative theoretical explanation of anomalous stock market behaviour - segmented market efficiency.

Table 1.10.a; Summary of findings

HYPOTHESIS	STATEMENT	RESULT R / A / I	IMPLICATION
H_1	Avg returns NSXA sub-indices not influenced by AGBR	R	A long-term interest rate effect - interest rates influence avg returns
H_2	Avg returns NSXA sub-indices not influenced by CRInterbankRate	I	Partial support affecting only the NSX-AGR, further investigation required
H_3	Avg returns NSXA sub-indices not influenced by BAB rate	R	A short-term interest rate effect - interest rates influence avg returns
H_4	Avg returns NSXA sub-indices not influenced by currency movements	R	An exchange rate effect - exchange rates influence avg returns
H_5	Avg returns NSXA sub-indices on each working DOW not statistically different	A	No DOW effect - avg returns are similar across each DOW
H_6	Avg returns NSXA sub-indices not statistically high on weekends	A	No WE effect - avg returns across weekend do not vary substantially
H_7	Avg returns NSXA sub-indices in all the year's months are equal	R	A MOTY effect - average monthly returns are predictable
H_8	Avg returns NSXA sub-indices at TOTY not statistically significant	A	No JE/JTOTY effect - avg returns over calendar new year period do not vary substantially
H_9	Average returns NSXA sub-indices at TOTM not statistically significant	A	No TOTM effect - avg returns between each month do not vary substantially
H_{10}	Avg returns NSXA sub-indices at EOFYA statistically not significant	A	No Aust. EOFY effect - avg returns at end of Aust financial year do not vary substantially

HYPOTHESIS	STATEMENT	RESULT R / A / I	IMPLICATION
H_{11}	Avg returns NSXA sub-indices not influenced by national holidays	A	No Aust. HE effect - avg returns prior to & after Aust. holidays does not vary substantially
H_{12}	Avg returns NSXA sub-indices not influenced by the Australian federal elections	I	Partial support affecting only the NSX-RES, further investigation required
H_{13}	Avg returns NSXA sub-indices not influenced by U.S. Presidential elections	A	No international election spill-over effect - avg NSXA returns just prior to & after U.S. elections do not vary substantially
H_{14} H_{15} H_{16}	Avg returns NSXA sub-indices not influenced by H_{14} - AFL Grand Final H_{15} – NRL Grand Final H_{16} - Melbourne Cup	A	No sports effect - sports events do not influence avg returns

Notes: R = reject; A = accept; I = inconclusive

2. LITERATURE REVIEW: THEORIES

2.1. Introduction

The literature review focuses on the theoretical foundations to this research. Chapter 3 will focus on the empirical evidence.

Money, time and risk are the variables at the core of financial decision making and the factors through which financial instruments, such as stocks, are traded in capital markets (Islam et. al. 2007). The aim of financial theory and practice is to assess the most efficient and effective allocation of cash flow risk over a specific timeframe to achieve a specific outcome. Financial assets are primarily influenced by three factors: the size of cash flows, risk associated with ensuring ongoing positive cash flows, and the time horizon (Islam et. al. 2007). Information regarding the stock price of a publicly traded firm provides the valuation of its equity and is influenced by these three factors. Information influences the movement of stocks, and therefore their behaviour and price, is information. The role played by information, who has access to information and the type of information (public or private) is equally as important in determining the value of a financial asset as the traditional measures - money, time and risk. Anomalies present both an arbitrage opportunity (for the informed investor) and an increased risk profile (for the uninformed investor). This has a direct impact on how stocks prices are established.

Several theoretical financial approaches have been developed to explain the behaviour of financial assets such as stocks and the structure of their returns. These include: MPT, the CAPM, APT, the EMH and BF (Kettell, 2001; Islam et. al., 2007). Such theories have been developed to explain what underpins the behaviour of stocks and/or their financial returns. Yet many of these theories have been found to be inadequate in explaining stock market behaviour in the context of real market experience due to the existence of anomalies. Anomalies violate the premise associated with many of the financial market theories. According to the empirical research stock market investment is not solely influenced by assessments of financial risk and return but also by behavioural factors. This research will review and discuss the theory of anomalies using a comprehensive approach.

This chapter provides an overview of the seminal financial theories structured as follows: sections 2.2 reviewed at MPT, section 2.3 examined the CAPM, section 2.4 discussed APT, section 2.5 detailed the EMH, section 2.6 referred to BF theory, section 2.7 provided an overview of all the theories in tabular form, section 2.8 provided an overview of some of the theories which explains stock market anomalies, section 2.9 highlights the research gap while the final section concludes the chapter. Each section identified the leading researchers, followed by the propositions, then the relevance of the theories to this research, strengths of theories and limitation which highlighted the research gap. This will be further followed with a brief comparison of the theories, identifying the research gap and establishing connections with the other chapters.

2.2. Modern Portfolio Theory

2.2.1. Primary Researcher

Markowitz (1952) originated the concepts associated with modern portfolio theory, including optimal mean - variance portfolios and the efficient frontier portfolio with multiple risk - return combinations allowing investors to assess acceptable levels of risk for specific levels of returns. According to Markowitz investment decisions were related to utility maximization under conditions of uncertainty. The basic premise behind portfolio theory is that a portfolio of stocks provides the most effective compromise between secure (i.e. minimized risk) and superior financial returns compared to individual stock selection (i.e. picking up the “winners"). The overall aim of modern portfolio theory is to maximize the expected financial returns of a portfolio in relation to the risk associated with it, or alternatively for a given level of expected return minimize the associated degree of risk through proportional asset selection and allocation. From a practical perspective portfolio theory provides the investor the analytical tools to determine the optimal diversification strategy (i.e. the most efficient portfolio).

2.2.2. Key Proposition

Risk and return are the two key features of any investment strategy, in which the mean absolute deviation and the standard deviation are the measures for risk. Selection of optimally efficient portfolios requires specific information including: i) the minimum financial return required of the assets by the investor; ii) the standard deviation of each of the assets; and iii) the covariance between the returns of each pair of assets. Based on this information the investor can develop the efficient portfolio frontier. A portfolio is said to be efficient if it minimizes risk for a specific return or provides the greatest financial return for a specified level of risk (Guerard, 2010, p. 31). Solving either of the following problems determines the most efficient portfolios:

a. For a chosen portfolio risk maximize expected return (Islam et al, 2007 and Markowitz, 1952):

$$E[R_p] = X_1E[R_1] + X_2E[R_2] + ... + E[R_n]$$

Subject to: $\sigma_p^2 = \Sigma_i\Sigma_j X_i X_j \sigma_{ij} = V^*$

$$X_1 + X_2 + ... + X_n = 1$$
$$X_1, X_2, ..., X_n \geqslant 0$$

b. Minimize the portfolio risk given the portfolio expected return:

$$\sigma_p^2 = \Sigma_i\Sigma_j X_i X_j \sigma_{ij}$$

Subject to: $E[R_p] = X_1E[R_1] + X_2E[R_2] + ... + E[R_n] = R_p^*$

Where: $E[R_p]$ = the return on a portfolio;
$X_1E[R_1]$ = the return on asset $_1$;
$X_2E[R_2]$ = the return on asset $_2$ and
$X_nE[R_n]$ = the return on asset $_n$ in a multi-asset portfolio.

As the portfolios on the frontier have the highest $E[R]_p$ for each value of σ_p or the lowest σ_p for each value of $E[R]_p$ they are the most efficient. However, to understand the investor's utility function requires establishing the optimal portfolio, which is then expressed as the indifference curve. Accordingly, a rational investor will prefer assets offering high expected returns and low risk. This assumes that all investors are risk averse.

Consequently, the investors' utility function μ is derived as:

$$\mu = F(E[R_p], \sigma_p^2)$$
$$\partial\mu/\mu E[R_p] > 0$$
$$\partial\mu/\partial\sigma_p^2 < 0$$

The acceptable risk-return trade-off is reached at the intersection between the investor's indifference curves and the efficient frontier. It is at this stage that the optimal portfolio is constructed and therefore the investor can determine the percentages to invest in each of the asset classes that form the portfolio (Xi). The risk associated with a stock should be considered in terms of its contribution to the overall risk of a diversified portfolio, rather than in isolation was the core premise of Markowitz's theory. Markowitz was able to demonstrate how portfolio risk could be minimized through selecting stocks that do not move in unison due to uncontrollable external variables. Statistically the implication is that of an imperfect correlation in stock prices with the reduction in risk through a diversification strategy.

2.2.3. Application to Current Research

The premise of modern portfolio theory, in which risk is minimized through the selection of stocks which do not move in unison is questionable. The anomalies literature demonstrates that there is a high level of cointegration in stock movements due to external independent variables such as calendar events or reactions to economic data as well as many other factors and therefore provides a challenge to the theory.

2.2.4. Benefits of MPT

MPT provides a relatively straightforward methodology for investors to make investment decisions. According to Omisore et.al. (2012) MPT is a sophisticated investment decision approach that aids an investor to classify, estimate, and control both the kind and the amount of expected risk and return. The fundamental concept behind the MPT is that assets in an investment portfolio should not be selected individually, each on their own merits. Rather, it is important to consider how each asset changes in price relative to how every other asset in the portfolio changes in price.

Furthermore, MPT provides a tool to construct an optimal level of diversification among asset classes to minimize risk.

2.2.5. Theoretical Limitations

Mangram (2013) provides a succinct review of some of the limitations of MPT. These include:

The key MPT assumptions are considered somewhat questionable:

1) Investor Rationality – this has been questioned, particularly within the BF field, in that investors are prone to irrational behaviour (such as herd behaviour or the speculative nature of stock markets);

2) Perfect Information – the concept that information is available to all investors in a timely and complete manner is questioned due to information asymmetry;

3) Unlimited Access to Capital – the ability of investors to access an unlimited borrowing capacity at a risk-free interest rate has been considered unrealistic, particularly for the individual investor and

4) No Taxes or Transaction Costs –MPT assumes no taxes or transactions costs, which is contrary to real world practice.

2.3. Capital Asset Pricing Model

2.3.1. Primary Researcher

Capital market theory is an extension of Markowitz's modern portfolio theory. This is the basis on which the capital asset pricing model (CAPM) was developed by Sharpe in 1964 and Lintner in 1965. Sharpe extended the number of assumptions made by MPT to include a further two, primarily; 1) the homogeneity of investor expectations and 2) investors can finance investments at the risk-free rate.

2.2.2. Key Proposition

The methodology for selecting an optimal portfolio of risky assets is central to modern portfolio theory. While capital market theory is an extension of modern portfolio theory, it addresses portfolio selection from a different perspective. It asks the questions, what would occur to asset (stock) markets if all investors, using the modern portfolio theory framework, sought portfolios of risky assets? What would be the impact on equilibrium asset prices and financial returns? Two specific factors can be measured by the CAPM: i) an individual asset's risk of and ii) the relationship between the financial returns from a specific investment and its related risk (Elbannan, 2015).

The CAPM equation relates an asset's beta to its expected return. The formula states:

$$E(r) = R_f + ß \text{ x } (R_m - R_f) \text{ where:}$$

$E(r)$ = required return on asset

R_f = risk-free rate of return (commonly based on U.S. Treasury bill)

ß = beta coefficient (non-diversifiable risk of the asset)

R_m = market return (measured by market portfolio of assets)

(Source: Coffie et. al., 2015, pg. 126)

The equilibrium of the risk and expected return on risky assets is the fundamental principle behind the CAPM. The CAPM, to some degree, represents the cornerstone of modern financial economics (Mullins,1982). According to the CAPM theory individual investors have similar investment timelines, access to stock choice and overall expectations. Furthermore, the assumption is made that all investors can borrow and lend at the risk-free rate (R_F). Therefore, some combination between (R_F) and the tangent of the efficient portfolio will provide a more acceptable compromise between the level of risk and the potential return at every level of risk, compared to the efficient frontier Markowitz referred to.

The CAPM states that investors are not compensated by financial markets for accepting risk that is able to be eliminated or minimized through diversification. Total risk is defined as the sum of systematic (undiversifiable) and unsystematic (diversifiable) risk. Systematic (market) risk, quantified as beta, captures the interaction between individual financial securities or portfolios to shifts in the overall market portfolio. Due to the co-integration between stock prices and the overall economy, financial diversification will not lead to an elimination of risk. This is because many macroeconomic variables (such as inflation or interest rates) impact all industries equally causing stocks to move in unison. Alternatively, unsystematic risk is associated with the variability of returns specific to an individual stock, such as factors internal to the firm or to the industry sector in which the firm operates.

Therefore, the CAPM states that higher returns are only achievable if the investor accepts a higher level of systematic risk as represented by beta. Consequently, financial returns are a linear function of beta. In summary the CAPM has five main principles (Kettell, 2001):

1) diversification reduces the impact of risk;

2) market risk (beta) is unable to be diversified, therefore diversification has only a limited ability;

3) investment in higher risk assets must be compensated with higher financial returns;

4) the return on a specific investment is dependant only on the degree to which it impacts systematic risk (beta) and

5) beta, a measure of systematic risk, is the relationship between investment risk and the markets.

2.2.3. Application to Current Research

The empirical literature has examined whether the CAPM can explain misspecification in the pricing of stocks due to the existence of anomalies. The research has focused more on accounting based anomalies such the book to market ratio (B/M) anomaly or the momentum effect. A large body of work has questioned the ability of the CAPM to explain why anomalies occur or exist.

Sloan (1996) is the first to report that differences in returns to high and low accrual firms are not explained by differences in risk as measured by the CAPM or firm size. This finding that high and low accrual stocks are mispriced, given their risk, is commonly referred to as the accruals anomaly. Sloan (1996) further finds that the accruals anomaly appears to be due to the market over-estimating the persistence of the accruals component of earnings and therefore over- (under-) valuing high (low) accrual firms.

Avramov et. al. (2006) test whether asset pricing models can explain the size, B/M, and momentum anomalies for individual stocks, concluding that the CAPM is unable to account for, and therefore explain, these anomalies. This outcome is supported by Lewellen et. al (2006) observing that the CAPM does not describe the cross section of average stock returns, particularly as it relates to the outperformance of small stocks over large, high B/M firms performing better than those with low B/M ratios or why stocks with high returns over the previous 12 months outperform those with inferior recent financial returns. Whilst focussing on ICAPM, Kahn (2008) also finds that accruals anomaly cannot be sufficiently explained using the CAPM.

2.2.4. Benefits of CAPM

The CAPM provides a systematic approach to stock valuation. The model provides a logical foundation for investors to measure performance based on returns that have been judiciously risk adjusted. The CAPM additionally provides a clear explanation of the disadvantages a lack of diversification has for investors, in that they are accepting, irrespective of motives, additional risks which is not being appropriately compensated. This provides the opportunity for portfolio improvement, leading to an improvement in investor education/awareness and financial innovation. The CAPM can improve our understanding of how financial markets operate by examining why asset prices and investor behaviour deviate from the prescriptions of the model.

2.2.5. Theoretical Limitations

The empirical research has noted several theoretical failings of the CAPM. The assumption that the investor can either borrow or lend funds at a risk-free rate, as suggested by the CAPM, has been considered unrealistic (Black, 1972). The CAPM suggests that variability in stock and portfolio expected returns can only explained by changes in market beta and not any other variables. Numerous studies have questioned this assertion and have suggested that there is an imprecise relationship at best between market beta and the variability in expected returns, (Chan et. al., 1991 and Fama et. al., 2004) and particularly in relation to the size effect (Banz, 1981). Furthermore, Fama et. al., (2004) posit that the assumption made by the theory that investors focus solely on measuring the risk and return of one-period portfolio returns is an extreme assumption.

2.4. Arbitrage Pricing Theory

2.4.1. Primary Researcher

The APT is a multi-factor model of asset pricing which determines asset values based on the concept of one price and an inability to pursue arbitrage strategies. While CAPM can be an equilibrium asset pricing model, APT is derived from a statistical model. Ross (1976, 1976a) introduced APT as an alternative to the CAPM. APT is a one-period model where an investor assumes that the stochastic properties of stock returns are homogenous with a factor structure. According to Ross as no arbitrage opportunities are available to stock investors, expected financial returns are therefore approximately linearly related to several influential factors according to their ability to impact stock returns.

2.4.2. Key Proposition

Diversification of asset investment options is at the core of the capital asset pricing model. In relation to stocks company-specific risk can be reduced through a strategy of diversifying holdings. While such a strategy can lead to a reduction in risk it does not lead to a minimization of risk due to exposure to broad market risk. An alternative theory to the CAPM, arbitrage pricing theory (APT) states that certain systematic factors have a significant impact on the long term returns of stocks, which cannot be accounted for solely by a beta measure. Unlike the CAPM, which is a single factor model, APT is considered a multi-factor model.

The APT model is expressed as (Islam et al, 2007):

$$E\,(R) = R_f + \beta_1[E(RM_1 - R_f)] + \beta_2[E(RM_2 - R_f)] + \ldots.$$ where,

- $E(R)$ = the expected return of an asset at a specific time;
- R_f = the risk-free rate of return and
- $[E\,(RM_1 - R_f)]$ = the risk premium per unit.

The most influential factors affecting stock prices, according to the academic literature have included: variations in forecasts of real GNP growth; unexpected variations in the term structure of interest rates; bond portfolio returns; unanticipated long and short-term inflation; exchange rate movements and unexpected changes in risk premiums. The weighting of these factors varies based on the individual stock and the industry sector. Overall, two broad categories of information have a direct impact on stock prices; macro factors and company specific information, according to the APT.

2.4.3. Application to Current Research

Using an APT based model Chen et. al. (1986) highlights the systematic effect economic variables have on the predictability of stock market returns. Gultekin et. al. (1987) present one of the few papers to test APT in relation to calendar anomalies, specifically the JE. The authors observe that while APT can account for the risk-return relationship in January, once January returns are excluded from the analysis the relationship between expected stock returns and the risk measures predicted by the APT is questionable. Employing a 5-factor arbitrage pricing model Ferson et. al. (1995) examine the predictability in U.S. stock returns over multiple timeframes. While 100 percent return predictability is not observed for any of the models, the authors demonstrate that a single-factor models is able to explain approximately 60 percent of the predictability in the observed sample of industry-grouped stock portfolios, while five-factor models capture about 80 percent on average, irrespective of the timeframe. In a study of the Italian stock market using a sample of 30 shares over the period from January 1990 to June 2001, Cagnetti (2002) finds that the explanatory power of APT to be significant. Of the five variables considered, the market portfolio variable accounted for approximately forty percent of total variance.

2.4.4. Benefits of APT

The benefits of APT include the following:

The sources of systematic risk can be extrapolated into their individual principal components;

1) Unlike CAPM which is a single period model, the APT model provides a more realistic multi-period framework, improving its applicability;

2) APT a less restrictive model in relation to returns. CAPM hypothesises that stock returns follow a normal distribution, unlike APT which does not make such an assumption and

3) Being a multi-factor model, expected returns within the APT model are calculated considering numerous factors and their sensitivities which may affect stock price variability.

2.4.5. Theoretical Limitations

According to APT the variations in the price of a stock are influenced by numerous risk factors, though such risk factors are not explicitly highlighted. This also presents a further issue in that such factors are not fixed and may vary over time, as well as the sensitivity of each of the factors are not explicit therefore making it difficult to determine which factor may be more influential. Furthermore, Shanken (1982) states that "…the testable implications of the APT is shown to be inadequate, as it precludes the very expected return differentials which the theory attempts to explain", (pg. 1129).

2.5. The Efficient Markets Hypothesis

2.5.1. Primary Researcher

A major influence over the behaviour of capital markets is a concept referred to as the EMH. This hypothesis states that the price of stocks at any given point in time fully reflects all the available information relevant to the value of the asset at that point in time (Dobbins et al 1994). Eugene Fama (1965) originally raised the theory of the EMH noting that in a stock market all stocks will reflect all available public information and therefore be appropriately priced. As stock markets are efficient the ability to outperform a benchmark based on the analysis of information or access to “private” information will be non-existent. An appropriate benchmark implies comparing stocks with similar characteristics. Therefore, it would be inappropriate to compare large capitalized stocks with smaller capitalized stocks, but rather with an index of large capitalized stocks.

2.5.2. Key Proposition

Most individuals trading stocks, as well as other types of financial instruments, assume that the stocks they have purchased have greater value than the purchase price which has been paid, while for stocks that are sold being worth less than the current selling price. Yet if markets are efficient, as is postulated by the EMH, and all market information is fully reflected in the current given stock price, then the purchase and sale of stocks with the aim of outperforming the market will essentially be a game of chance rather than skill. The definition of an efficient market is where there are substantial numbers of rational, profit-driven individuals actively participating on a regular basis in a market, attempting to ascertain the future market value of individual stocks with accessible market information (Islam et al, 2007). Also, information is freely available and accessible to all market participants.

The basis for the EMH is the random walk principle which asserts that price movements will not follow any patterns or trends and that past price movements cannot be used to predict future price movements. Stock price variations are random and unpredictable. There are three forms of market efficiency: the weak, the semi-strong and the strong forms of market efficiency. The factor which distinguishes each level of the hypothesis is the concept of information availability. The weak form states that all past market prices and information is fully reflected in the current stock price. Therefore, if stock prices already reflect all information that can be derived by examining market trading data, such as the history of past prices or trading volume, then the use of technical analysis as a technique to formulate investment strategies is flawed and the ability to earn abnormal profits using past price information is a game of chance. The weak form of the EMH is often referred to as the random walk theory.

The semi-strong form states that all publicly available information and historical stock price movements are fully reflected in a stock price. Included in such information are variables such as: past prices, company announcements, the quality/qualifications of management, company accounting information, earning forecasts or dividend information. As with the weak form if investors have access to such information from publicly available sources, it would be reasonable to expect it to be reflected in stock prices. Consequently, the use of fundamental analysis as a financial investment research tool is also flawed. Again, the ability to earn abnormal profits using past price information is a game of chance.

The strong form implies that all information is fully reflected in stock prices and consequently the benefit of insider information is of no use, this includes information available only to company insiders. Company directors are in an advantageous situation in being able to access pertinent company information before public release allowing them to potentially profit from trading on that information. These insiders, their relatives, and any colleagues are restricted from trading on that information by established insider trading laws and therefore any trading based on privileged information would be a violation of the law. The strong form of the EMH is a quite extreme variation. Overall, the more active participants within a market are, and the faster the dissemination of information, the more efficient a market should be.

2.5.2.1. Weak-Form Tests of the EMH & Market Anomalies

Initial tests of EMH were tests of the weak form and the efficacy of technical analysis. Serial correlation of stock market returns is one way of discerning trends in stock prices. Serial correlation refers to the tendency for stock returns to be related to past returns. Conrad and Kaul (1988) and Lo and MacKinlay (1988) examining the weekly returns of stocks on the New York Stock Exchange (NYSE) demonstrate that while weak predictable price trends exist over short periods, financially exploitable trading opportunities do not exist or at least are extremely improbable. Fama and French (1988) and Poterba and Summers (1988) conducting studies of long-term returns over multi-year periods demonstrate significant negative serial correlation in the performance of the aggregate market.

2.5.2.2. Semi-strong Form Tests of the EMH & Market Anomalies

Investigations of the reliability of fundamental analysis attempt to determine whether publicly accessible information beyond the trading history of a stock (as is used in technical analysis) can be used as a tool to improve investment performance and financial returns. Anomalies are quantifiable patterns of returns in publicly listed stock's that appear to contradict the EMH. There have been numerous examples of anomalies provided by researchers which imply that at the statistical level at least the randomness of stock market activity can be questioned. While the economic implications of most anomalies are minimal, they remain statistically significant and therefore important. Some early examples of semi-strong form tests include: post earnings announcement drift (Brown, 1968; Battalio et. al., 2005; Bernard et. al.1990); price – earnings effect (Basu, 1977, 1983); size / small – firm effect (Banz, 1981; Keim, 1983; Reinganum, 1983; Blume et. al. 1983; Arbel et. al., 1983; Arbel, 1985; Merton, 1987) and book to market effect (Fama et. al., 1992).

2.5.3. Application to Current Research

Due to this perceived inconsistency surrounding the EMH academic researchers have undertaken numerous empirical studies attempting to determine whether specific markets are in fact "efficient" and if so to what degree. This has led to researchers uncovering numerous other stock market anomalies that appear to contradict the EMH. Anomalies are generally broken into four areas: calendar, seasonal, behavioural and macroeconomic anomalies. The existence of such anomalies leads to questioning the efficacy and validity of the EMH. Additionally, the ongoing debate regarding stock market anomalies has also led to the question on whether these are financially and/or statistically significant. Some of the empirical literature has stated that anomalies may still be able to be financially exploited, though this appears more difficult when transaction costs are considered. From a statistical perspective each of the above anomaly types may be the norm, rather than aberrations of the EMH, which will be discussed later in the thesis.

2.5.4. Benefits of the EMH

The importance of the EMH within current financial theory remains open to conjecture. Overall, the EMH provides a succinct reflection of trading activities within a modern stock market, due to the speed and availability of information and its dissemination.

The EMH provides a concise rationale for accurate and timely price corrections for individual stocks and stock markets in general. An example of this can be seen in serial correlation tests which demonstrate that stock returns on one day are independent of future stock returns. An important ramification of the EMH is the inability to earn abnormal financial returns through active portfolio management. The implication is that a passive strategy will earn better returns which has benefits for the less sophisticated investor through reduced risk and a decrease in trading costs. According to EMH supporters market forces will always act to bring prices back to rational levels, implying that the impact of irrational behavior on financial markets is generally negligible and, therefore, irrelevant. (Lo, 2004). At a practical level the EMH highlights the impact of transaction costs on the ability to return abnormal profits from exploiting possible arbitrage opportunities.

2.5.5. Theoretical Limitations

Alternatively, there are certain patterns in stock prices, which the EMH fails to conclusively explain, particularly as they relate to the predictability of returns. Market anomalies, such as the January effect, the weekend effect and the momentum effect have been widely quoted as evidence against the EMH. The rationality and efficiency of financial markets (and stock markets specifically), as espoused by the EMH cannot be robust from a BF perspective which has documented numerous anomalies based on individual psychology. According to behavioural finance practitioners, quantitative models of efficient markets, all of which are predicated on rational choice, are likely to be questionable (Lo, 2004). Additionally, excess volatility within stock markets provides a key contradiction to the EMH.

2.6. Behavioural Finance Theory

2.6.1. Primary Researchers

Slovic's (1972) research titled "Psychological study of human judgement: Implications for investment decision making" was the first formal academic paper which focussed on individual behaviour and investment decisions. The beginning of the debate about the significance of behavioural finance (BF) (also referred to as behavioural economics) began with the work of two psychologists, Daniel Kahneman and Amos Tversky, who are the seminal researchers in the development of the discipline. Kahneman and

Tversky published numerous research papers introducing numerous theories and concepts which supported the establishment of BF, including: heuristics (1973); judgement under uncertainty (1974); prospect theory (1979) and framing of decisions (1986). Kahneman's and Tversky's most influential work related to prospect theory, which attempted to model the way people (investors) actually make decisions. Richard Thaler (another important contributor to the development of BF), applied BF concepts to financial markets. Thaler, in conjunction with DeBondt, introduced concepts such as: overreaction (1985) and mental accounting (1999). Other important contributors to the discipline included: Shefrin et. al. (1985) introducing the concepts of disposition and regret aversion Odean (1999) highlighting the theory of overconfidence.

2.6.2. Key Proposition

The traditional finance model assumes that investors make rational decisions based on the information they receive and process, i.e. investment decisions are made rationally and financial markets are efficient. This theory is challenged by psychologists as they posit that people (investors) make irrational economic decisions due to factors such as cognitive error or extreme emotional bias. BF studies the role played by psychological factors in the actions of all stock market investors and the implications for stock markets. BF questions the principle of rational behaviour and rational markets and therefore why stock markets are inefficient. BF uses a theoretical approach combining behavioural and cognitive psychology with principles from economics and finance to develop a rationale for the irrational financial decisions of investors. The empirical evidence presented by theories such as the CAPM and the EMH suggests that stock market participants behave as rational wealth maximizers, disregarding emotions and other extraneous factors, when making investment decisions and this is reflected in stock market behaviour. This is refuted by behavioural economists and psychologists who state that investors are prone to behave irrationally and stock markets are therefore imperfect.

It is through the study of the behaviour of the “rational investors" that BF endeavours to explain the inconsistent nature of traditional expected utility maximization and therefore the reasons for market inefficiency. According to BF emotional filters and shortcuts are commonly employed by investors to process information. This process leads to irrational, and therefore suboptimal, decision making thereby violating the rationality implied by efficient markets. The consequences of such behaviour have a direct impact on the overall performance of capital markets.

BF practitioners state heuristics, or imperfect rules of thumb, are used by people/investors to process information. This leads to the creation of biases which causes errors of judgement leading to suboptimal choices. Alternatively, standard financial theory assumes individuals process information rationally leading to efficient choices. According to the BF perspective markets are inefficient mainly due to heuristic-driven biases and errors, frame dependence emotions and social influence. This leads to an inconsistency between market price and fundamental value. Market efficiency is at the core of standard finance theory with pricing being an unbiased estimate of intrinsic value.

2.6.3. Application to Current Research

The process through which investors make informed investment choices is the focus of BF. Decision making processes are not always rational or unbiased as implied by traditional financial quantitative models. From a market wide perspective this can lead to predictable patterns behaviour which is manifested through the existence of numerous stock market anomalies.

BF theories have focussed on three fundamental themes:

1) framing - refers to how, and in what order, information is presented and viewed, influences the behaviour and decisions an individual reaches and influences how events are understood and responded to;

2) heuristics - can be seen as rules of thumb or mental shortcuts applied to decrease the level of cognitive dissonance and simplify the decision-making process. BF identifies several heuristics, including: ambiguity aversion, anchoring & adjustments, availability, conservatism, familiarity, mental accounting, overconfidence, regret aversion and representativeness and

3) market impact - BF implies that market pricing may not be efficient due to investor psychology leading to the existence of stock market anomalies.

Table 2.6.3.a in the appendices provides a brief overview of the main concepts within the BF field.

2.6.4. Benefits of BF

BF provides an opportunity to review financial markets from a more humanist perspective, which demonstrates how human behaviour, due to varying degrees of rationality, leads to imperfect markets unlike traditional finance which implies efficient markets due to totally rational human decision making. Additionally, the BF empirical literature makes available a substantial number of observations regarding human/investor behaviour and how this directly impacts financial/stock markets. A detailed understanding of human bias may allow financial market participants to better understand what causes changes in market conditions with flow on implications for portfolio management decisions.

2.6.5. Theoretical Limitations

BF has been criticised from the perspective of natural human biases that occur during the research process (Curtis, 2004), impacting the practicality of research outcomes. Lo (2005) noted the short-term nature of behavioural biases stating, "…all of us are subject to certain behavioural biases from time to time, EMH disciples argue that market forces will always act to bring prices back to rational levels, implying that the impact of irrational behaviour on financial markets is generally negligible and, therefore, irrelevant", (pg. 8). Fama et. al. (1973) argue that BF should be seen more as a collection of anomalies and not a true branch of finance and that markets will over time adjust to such anomalies as they become apparent. Fama (1998) also observes that BF is based on weak empirical evidence due to a collection of propositions rather than a coherent theory and without this BF cannot be a valid alternative to the EMH and the behaviour of stock markets.

2.7. Brief Comparison and Contrast of the Theories

Table 2.7.a presents a summary of each of the major finance theories comparing the core propositions.

Table 2.7.a; Brief comparison of the major finance theories

	MPT	CAPM	APT	EMH	BF
Main Propositions	Investors act rationally	Investors act rationally	Investors rationally explore investment options	Investors are rational & stocks valued rationally	Investors behave irrationally due to emotions and herd behaviour
	All available information in decision-making process considered	All available information in decision-making process considered	Only few systematic factors affect long-term average returns of financial assets	Stock prices fully reflect all available information	Investors information processing bias leads to cognitive errors and imperfect rules of thumb (heuristics)
	Investment markets efficient, reflect all available stock price information	Investment markets efficient, reflect all available stock price information	Stock returns depend on a variety of anticipated and unanticipated events, though markets remain efficient	Three forms of market efficiency: weak, semi-strong & strong	Discrepancy between market price and fundamental value due to heuristic-driven biases and errors, frame dependence, emotions and social influence
	Higher risk requires higher returns	Establishes risk-return trade-off	4 factors particularly influence stock returns: inflation, changes in industrial production, changes in risk premiums (bonds) & interest rates	Investors driven by self-interest	Investors focus heavily on recent experiences
	A normative theory – explains how investors should behave	Invest only in risk-free asset and market portfolio	A multi factor model with multiple betas	Markets seen as efficient, do not allow investors to earn above average returns	Investors overconfident in their abilities pushing stock prices to unrealistic levels in either direction

				without accepting additional risks	
	Expected returns of an asset calculated based on historical performance of returns	Required rate of return proportional to beta - beta measures systematic risk		Random walk theory - stock price movements do not follow patterns; historical data has no value	
	Impact of diversification - maximize returns, minimize risk but cannot eliminate all risk	Unsystematic & systematic risk can be controlled; Beta sole determinant financial return/s			
	Efficient frontier, best compromise between risk/return to create optimal portfolio	A one-factor model with one beta			
		A positive theory, explains how investors behave			

2.8. Theoretical Explanations for the Occurrence of Stock Market Anomalies

Table 2.8.a provides an overview of the main theories which have been developed to explain why anomalies are present within stock markets.

2.9. The Research Gap

While the current chapter has demonstrated that the empirical literature is quite comprehensive, gaps in the evidence are still present within the discussion, particularly from an Australian financial markets perspective. To the best knowledge of the researcher the application of the theories raised in this chapter have been overlooked in relation to secondary, less well and reported stock markets such as the NSXA.

Table 2.8.a; Brief overview of main theories explaining stock market anomalies

THEORY	DEFINITION	RESEARCH	RATIONALE
Intergenerational Transfer Hypothesis	JE due to transfer of wealth from older risk averse to younger risk prone investors particularly over the Christmas period.	Gamble (1993)	Older investors sell low beta stocks, does not depress their prices, because of their high liquidity. Gift capital to younger family members. They purchase higher beta stocks which increase prices, as markets for these stocks more likely to be illiquid.
		Cataldo et. al. (2000)	Older investors transfer a proportion of their wealth via gift of low beta stocks to younger investors which are subsequently liquidated. Proceeds reinvested in smaller, riskier firms. Due to illiquid market for small stocks trading activity more noticeable thereby making the January effect more noticeable due to the small firm/size effect.
Liquidity Hypothesis	An increase in investors liquidity due to payment wages, dividends & interest at specific time frames increases investors cash resources which are then partially diverted to stock purchases.	Ogden (1990)	U.S. investors receive majority their investment payments at the TOM leading to increased stock trading activity at the same time and also at the TOTY. Stock trading activity increases correlates with company payments made to investors.
		Ligon (1997)	JE is specifically a result of excess individual liquidity and trading patterns of individual investors and not excess institutional liquidity.
		Booth et. al. (2001)	Higher stock returns at TOM are due to the liquidity associated with the accumulation of cash by large traders at month-end.
Macroeconomic announcement hypothesis	TOM and intramonth anomalies arise from clustered information, particularly important macroeconomic news announcements released systematically at a certain point each month.	Nikkinen et. al. (2007)	The systematic clusterization of important macroeconomic news announcements around the first half of the month explains TOM & intramonth return patterns.
Seasonal Information Flows Hypothesis	Fundamental to this hypothesis is the dissemination of	Beaver (1968)	Around the earnings announcement period quantity of information available to market participants increased substantially compared to other financial periods. Stock market trading volumes increased

	information and the timing, speed and rate at which it occurs, causing fluctuations in stock market turnover and trading volume. This hypothesis has been considered central to the existence of numerous anomalies, particularly the JE.		during announcement periods compared to non-announcement periods.
		Kross and Schroeder (1984)	Focussing on quarterly information announcements conclude that early releases of information influenced by positive news and were associated with larger abnormal financial returns compared to late financial announcements.
		Lin and Rozeff (1995)	Examine speed with which private information is absorbed. Authors state 85 – 88% of private company financial information available to informed traders incorporated within the stock price by close of trade on the same day.
Tax-loss Selling Hypothesis	States that at end of financial year investors sell loser and offset these against realised gains to minimize capital gains and decrease tax liabilities.	Reinganum (1983)	Investors looking to realize losses on "loser" stocks sell these stocks at year end leading to further declines for such stocks. Then as selling pressure evaporates in the new financial year, (January for US stock market) stock prices for "loser" stocks rebound to an equilibrium level.
		Jones et. al. (1991)	Test TLS use stock returns data from the Cowles Industrial Index before and after introduction of personal income taxes in 1917. Excess returns at the turn-of-year and for January not significant until after 1917 supporting TLS. Authors note that window dressing hypothesis could not be ignored and may be working in conjunction with TLS.
		Johnston et. al. (1996)	Find strong positive relationship between level of individual investor ownership and abnormal January return in the following year and significant negative relationship between firm size and January returns. Firms that experience rebound in January and have positive abnormal financial returns are smaller and their ownership dominated by individual investors compared to firms that do not rebound in January, providing strong support for TLS.
		Starks et. al. (2006)	JE explained by TLS activities at end of the previous year. Additionally, funds associated with brokerage firms display more tax-loss selling behaviour.
Window Dressing Hypothesis	Institutional investors divest poorly performing stocks prior to a reporting period to	Ritter (1988)	Introduces concept - "parking the proceeds". Investors use TLS strategies at end US financial year (Dec), do not immediately reinvest stock market sale proceeds. Over year end period investors reassess stock market opportunities during month of January and gradually

	improve appearance of portfolio/fund performance before presenting to clients. Associated with TOTM & TOTY.		adjust stock portfolios. As individual investors have a greater focus on smaller cap stocks this leads to increased demand for such stocks with corresponding prices increase.
		Ritter et. al. (1989)	A consistent pattern of behaviour at end of financial year evident for high beta small value firms listed on NYSE - portfolio rebalancing. Institutional investors review stock portfolio holdings at TOTY, implement window dressing strategy and become net purchasers of more risky stocks at TOTY, leads to higher returns in January for such stocks.
		Athanassakos (1992)	Investigates efficacy of the portfolio rebalancing. Actions of institutional investors which directly influences stock price movements at the end of the financial year, particularly in relation to smaller cap firms compared to larger cap firms, contradicting Ritter (1988). Institutional investors implement portfolio rebalancing strategies motivated by conflict of interest which causes stock prices to increase in January. Conflict of interest due to factors such as nature of broker compensation & attempts by portfolio managers to maximize own utility rather than that of their clients.
		Lynch et. al. (2014)	Find abnormal pension fund selling in small stocks with poor past performance during final trading days in December providing some support for window dressing.

The focus relating to the Australian empirical research has been on the ASX. While not exhaustive, this can be seen in Table 2.9.a.

Table 2.9.a; Brief overview of Australian empirical research and major financial theories

THEORY	RESEARCH
MPT	Jing, C., Tripe, D. and Young, M., 2010
	Li, B. and Li, J., 2012
CAPM	Li, B. and Li, J., 2012
	Mazzola, P. and Gerace, D., 2015
APT	Faff, R. W., 1988
	Wang, G., 2008
EMH	Drew, M. E. and Stanford, J. D., 2003
	Liu, B. and Bin L.,2011
	Nisar, S. and Hanif, M., 2012
	O'Connell, D. and O'Grady, B., 2014
	Simmons, P., 2011
BF	Sinha, T., 1994
	Brown P., Chappel, N., Da Silva, R. R. and Terry, W., 2006
	Ramiah, V. and Davidson, S., 2007

The NSXA has not received any attention within the empirical literature to date. This is an important oversight, as the overall market capitalisation of combined NSXA listings compared to the ASX may provide the opportunity to realise further unique insight into stock market and information efficiency. Furthermore, the lack of attention paid to the NSXA, compared to the ASX, (as observed by the relative paucity of public information) would further warrant investigation of this dataset to assess possible predictable patterns of behaviour leading to implications for any of the main financial theories.

2.10. Summary

This chapter provided a summary with regards to the contextual background within which this study is based. In this chapter, the some of the core theories which have been developed to explain stock market behaviour were evaluated. Overall this chapter has demonstrated that the behaviour of stock markets and what influences them is, to a large degree, still quite abstract - stock markets are driven by the behaviours and expectations of individuals with complex and variable motivational factors. This implies that the assessment of stock market performance is an imprecise science relying on both rational explanations based in quantitative analysis and the qualitative theories of irrationality in cognitive psychology. While no single theory is able to offer a definitive explanation of the factors which influence stock market behaviour and the extent to which such behaviour is predictable, it is expected that the EMH and/or APT may provide the most plausible explanations for outcomes observed from NSXA data. This is because these theories provide the most succinct explanations of stock market outcomes without the need to undertake human based experimental research (as with BF) and cover a broader discussion of stock market behaviour compared to MPT and CAPM – which focus more on efficient construction of financial portfolios.

This chapter reviewed the theoretical foundations for the thesis. In Chapter 3, the relevant empirical evidence is established based on a detailed review of the literature as it relates to stock market behaviour. This will include a detailed description and analysis of the major stock market anomalies and numerous research papers, including the seminal papers.

3. LITERATURE REVIEW: EMPIRICAL EVIDENCE

3.1. Introduction

This chapter examines the empirical literature with a focus on the major anomalies across three broad categories: macroeconomic, calendar and events. The empirical literature has provided inconsistent results which have either affirmed or refuted the random nature of stock market behaviour. The current research confirms this outcome with mixed results, though an original explanation is provided in the form of a segmented market hypothesis. This Chapter is structured as follows: the first section provides an overview of f~~F~~inancial m~~M~~arket a~~A~~nomalies. This is followed by a discussion of the limitations of the existing literature and the motivation for the present thesis. The conceptual framework is then presented and explained followed by the chapter summary. This chapter will provide the background context upon which all other chapters are based by elaborating in greater detail the theories and explanations which have used in the discussion of anomalies within stock markets.

3.2. Overview of Financial Market Anomalies

Multiple studies have documented numerous anomalies in stock market behaviour across financial markets throughout the world. While a multitude of anomalies have been investigated in the empirical literature, the current research will focus on specific calendar, economic and event based anomalies. The following details some of the original or seminal contributions to the literature, while section 3.3 provides a broad chronological overview of the contributions which have been made across each of the anomalies.

3.2.1. Macroeconomic Variables

3.2.1.1. Primary Researchers

Some of the earlier empirical research which established the foundations for the studying the relationship between economic variables and stock market behaviour included: Jaffe et. al. (1976), Nelson (1976) and Fama et. al. (1977) acknowledging that specific macroeconomic variables influenced stock market returns.

3.2.1.2. Key Proposition

A large body of empirical research has been undertaken investigating the relationship between macroeconomic variables and stock market behaviour. Overall the research has noted the strong relationship which exists between these variables and stock prices across both developed and emerging stock markets.

3.2.1.3. Macroeconomic Literature in Detail

Chapter 2 established the theoretical foundations which underpin the current study and the seminal/original papers in their field. The overall purpose of the following section is to provide a detailed review of the international empirical evidence particularly as it relates to macroeconomic variables and its relationship to the conceptual framework and model to be used in the current research.

The following sections will detail the research from a country by country perspective to enable the reader to obtain a broad overview of the similarities and differences in the literature. While the list is not exhaustive, it includes a random selection of established and emerging country stock markets.

3.2.1.3.1. ASEAN

Wongbangpo et. al. (2002) focus on five ASEAN countries: Indonesia, Malaysia, the Philippines, Singapore, and Thailand) and examine the relationship between: GNP, CPI, the money supply, the interest rate, and the exchange rate and stock market returns for each country. The main finding is a long - term positive relationship between GNP and stock market returns and a negative relationship with inflation amongst all five indices.

3.2.1.3.2. Australia

Chaudhuri et. al. (2004) note the strong empirical relationship between real stock prices and real aggregate economic activity within the Australian stock market. Using oil prices, GDP, private consumption and money supply as barometers of economic activity, evidence of long-term relationships between stock prices and measures of aggregate activity are reported.

While Chaudhuri et. al. (2004) focussed on the overall Australian stock market, Heaton et. al. (2011) investigate the extent of dependence of four ASX sub - indices returns (i.e. materials, industrials, energy and the market -wide S&P / ASX 200 index) solely on the overnight news releases of international commodity information relating to energy, metals and agriculture and information releases relating to the S&P 500 index, as an explanatory variable, to control for the effect of economic news releases. Heaton et. al. (2011) conclude that: international energy prices significantly influence energy index international metals and energy price news significantly impacts the materials index; only overnight news relating to the S&P 500 index affects the industrials index while international commodities markets do not provide any explanatory power for the performance of the S&P / ASX 200 index.

3.2.1.3.3. Bangladesh

Ali (2011) finds no causal link between macroeconomic variables and stock returns at Dhaka Stock Exchange (DSE), supporting the conclusion reached by Ali et. al. (2010), Agreeing with these conclusions, Quadir (2012) also demonstrates a statistical insignificance between specific macroeconomic variables and stock returns on the DSE.

3.2.1.3.4. India

Ray (2012) using a comprehensive list of macroeconomic variables explores their impact on the Bombay Stock Exchange Sensex. Using a multiple regression statistical technique indicated that oil and gold price had a significant negative effect on stock price, while the opposite outcome occurred in relation to balance of trade, interest rate, foreign exchange reserve, gross domestic product, industrial production index and money supply news. No significant effect on stock price was observed for inflation data, foreign direct investment news, exchange rates or the wholesale price index.

3.2.1.3.5. International Correlations

Numerous studies have reported on the extent of integration and linkages between international stock markets based on macroeconomic and financial information releases. Longin et. al. (1995) demonstrate an increase in correlation between international stock market returns over a 30-year period, with evidence that economic variables such as the dividend yield and interest rates contain information about future volatility and correlation that is not contained in past returns alone. Supporting this outcome Becker et. al. (1995) focusing on intraday price movements of stock index futures contracts, document international (US and UK) stock market linkages attributable to reactions of foreign traders to public macroeconomic US news and information. Kortian et. al. (1996) provide evidence of quite significant cross-country 'contagion' or 'spill-over' effects on Australia's bond and equity markets, with US financial markets being the dominant foreign market influence on the both Australian bond and stock market. Copeland et. al. (1998) demonstrate the substantial contemporaneous effect of US stock markets on Australian financial markets, based on evolving macroeconomic and accounting factors.

3.2.1.3.6. Italy

Mastronardi et. al. (2013) study the intraday impact of the US, German and Italian macroeconomic news on the Italian stock market future index finding that the Italian stock market is significantly impacted by news announcements originating in foreign markets,

3.2.1.3.7. Kenya

In a study investigating the impact of macroeconomic variables on stock returns in the Nairobi Stock Exchange 20-Share index, Ouma et. al. (2014) find that a significant relationship exists between stock market returns and macroeconomic variables. Positively influencing returns were money supply and inflation news announcements. Exchange rate data had a negative impact on stock returns, with interest rates having no significant outcome.

3.2.1.3.8. South Korea

Kwon et. al. (1999) conclude that macroeconomic variables (industrial production index, exchange rate, trade balance and money supply) are significant in predicting changes in stock prices on the Korea Composite Stock Price Index (KOSPI) and the Small-size Stock Price Index (SMLS).

3.2.1.3.9. Malaysia

Pyeman et. al. (2009) focus is on individual sector-specific indices of the Bursa Malaysia. In summary the results ascertained that most of the sectoral indices of Bursa Malaysia were affected by the changes within the macroeconomic variables particularly the direction of response, the magnitude of impact as well as the persistence of response in various horizons.

3.2.1.3.10. New Zealand

Using a set of seven macroeconomic variables covering the period from January 1990 to January 2003, Gan et. al. (2006) provide support for a long run relationship between New Zealand's stock market index and the macroeconomic variables tested, with the interest rate, money supply and real GDP having the strongest predictive abilities.

3.2.1.3.11. Pakistan

Ihsan et. al. (2007) analysed the relationship between economic and financial variables with stock market behaviour on the Karachi Stock Exchange (KSE), concluding that overall macroeconomic and financial data had significant explanatory influence over the behaviour of stocks on the Karachi Stock Exchange. A contradictory perspective is provided by Ali, et. al. (2010) find no causal relationship between macroeconomic indicators and stock exchange prices on the KSE. Also using a sectoral study methodology like Pyeman et al (2009), Butt et. al. (2010) note that stock returns behave differently at the firm and industry level, stating that the impact of changes in economic factors on stock returns to have greater significance and strength at the industry level compared to the firm level. Examining the role played by a selected number of macroeconomic indicators on the KSE 100 share index prices, Haroon et. al. (2013) conclude that the performance of the index is negatively influenced by consumer price index and wholesale price index information. Furthermore, three, six and twelve-month Treasury bill data has a strong negative correlation with the performance of the KSE.

3.2.1.3.12. Sri Lanka

Looking at the impact of macroeconomic variables on the Colombo Stock Exchange Menike (2006) results were mixed with outcomes that partially supported previous research. Overall, the results revealed that macroeconomic variables had high explanatory power in determining stock prices and stock market behaviour. Inflation, interest rates and exchange rate announcements directly impacted stock market behaviour, with exchange rate news having the most significant impact.

3.2.1.3.13. Thailand

Brahmasrene et. al. (2007), examined the relationship between the Stock Exchange of Thailand (SET) and specific macroeconomic variables covering the post-financial liberalization and post-financial crisis in Thailand. The empirical analysis undertaken by the authors demonstrated that in the post-financial liberalization period, prior to Asian financial crisis, money supply announcements had a positive impact on the stock market performance. Exchange rate information, industrial production index data and oil prices had a negative impact on the performance of stocks. In the post-financial crisis period the only macroeconomic variable with any predictive ability was money supply data. Collecting stock returns data for the SET50 index, the Market for Alternative Investment (MAI) index and the average stock return of top-ten securities Tangjitprom (2012) states that the use of macroeconomic indicators as a tool to predict the future performance of stock returns would be ineffectual as these provided a limited explanation of the variability of stock returns.

3.2.1.3.14. Turkey

In their study on Istanbul Stock Exchange (ISE), Acikalin et. al. (2008) investigated the relationship between stock market returns and the macro economic variables in the Turkish economy. The authors provide empirical support demonstrating a long-term stable unidirectional relationship between the ISE and GDP, exchange and interest rates and the current account balance. Kandir (2008), in a similar study based on the ISE partially supports the results obtained by Acikalin et. al. (2008) in that stock returns are influenced by variations in exchange and interest rate as well as the return on the MSCI World Equity Index, but questionable significance for inflation, money supply or variations in oil prices.

3.2.1.3.15. United States

The NYSE, AMEX and Nasdaq stock exchanges respond strongly to macroeconomic news announcements according to Flannery et. al. (2002). Three variables: the CPI, PPI, and M1 - affect the returns, while six variables—Balance of Trade, Employment Report, Housing Starts, M1, M2, and Real Gross National Product (GNP) - affect the volatility of the stock market returns. Focusing on the market's response to employment data, Boyd et. al. (2005) demonstrates that when the economy is in an expansionary (contractionary) phase news announcement of high unemployment increased (decreased) stock prices. Chen (2009) provides an alternative approach investigating whether macroeconomic variables can be used to predict recessions in the stock market. Using monthly data from the S&P500 index the empirical evidence suggests that among the macroeconomic variables considered, yield curve spreads and inflation rates have the strongest predictive ability in forecasting a recession in US stock markets.

3.2.1.4. Application to Current Research

Interest in financial markets and the efforts to forecast their performance is connected to the burgeoning awareness within the empirical literature of the direct impact of broad financial variables on stock markets. There has been an overwhelming focus on the relationship between accounting and macroeconomic variables and stock market behaviour in developed capital markets such as the ASX. However, this relationship has received little attention.in relation to less developed or recognised stock markets. The NSXA can be viewed as an emerging stock market within the context of Australian financial markets. This combined with the lack of publicly available or followed announcements in relation to the NSXA, provides an ideal opportunity to examine this relationship and the impact on stock market behaviour. Therefore, the current research will hypothesize the following:

The average return of NSXA sub-indices are not influenced by:

H_1: *the Australian government bond rate;*

H_2: *the cash rate;*

H_3: *the bank accepted bill rate or*

H_4: *currency movements.*

3.2.2. Weekend / Monday / DOW Effect

3.2.2.1. Primary Researchers

This anomaly has been documented by numerous academics within the relevant disciplines. Some of the earlier seminal studies have included Fields (1931) who highlighted the significance and persistence of the day-of-the-week effect. This was followed by Cross (1973) who highlighted the tendency of US stock markets to consistently increase in value on a Friday and retreat on Monday. According to the calendar time hypothesis, French (1980) stated the financial return available to an investor on a Monday, compared to any other day of the week, should be three times greater to compensate for the degree of risk, compared to the trading time hypothesis where for each day of the week the expected financial return is constant. French noted the error in both hypotheses highlighting that the average financial return for a Monday was consistently negative, when compared to the positive returns that accrued to stocks on the remaining trading days of the week. French (1980) also detailed an alternative hypothesis, the trading time hypothesis, which postulated that for each of the five trading days in which a stock market operates the average financial returns are the same as returns are generated only during trading periods.

3.2.2.2. Key Proposition

The WE, also documented as the Monday effect, the DOW effect or the Monday seasonal, is a phenomenon in which stock market returns are generally greater (and usually positive) at the end of the trading week compared to returns that accrue on a Monday (Figure 3.2.2.2.a). This is contrary to what would normally be expected due to Monday returns covering a three-day period. With such an extended period the norm would be for financial returns on a Monday to appreciate compared to other days of the week, primarily due to the greater risk associated with holding stocks longer (i.e. close of Friday to open of Monday) without any ability to trade based on any new announcements. The importance of this anomaly is demonstrated by the figure below.

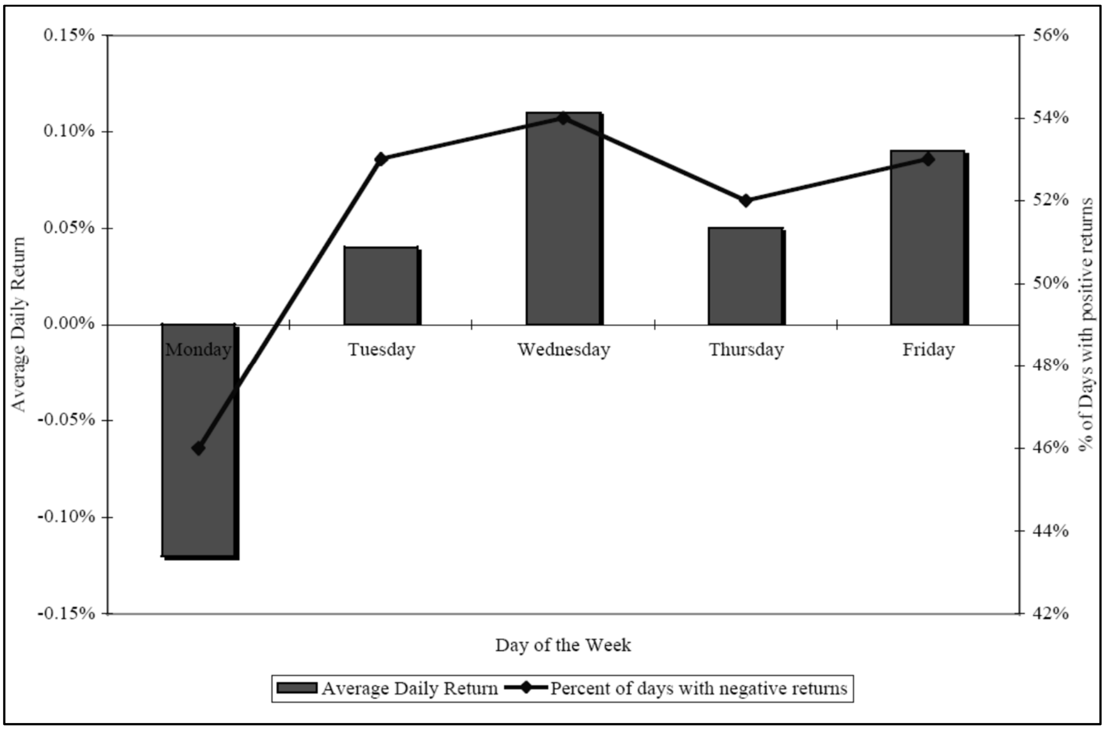


Figure 3.2.2.2.a; Returns by day of the week, 1927–2001. Damodaran (2003)

Several hypotheses have been suggested to validate the existence of the DOW anomaly: namely, an information release hypothesis (French, 1980), whereby firms delay the release of negative information until late in the week, a settlement regime hypothesis (Gibbons et. al., 1981) associated with differences in the timing of transactions and settlement, and an information processing hypothesis (Lakonishok et. al., 1990) linked with the asymmetry in information costs across small and large investors, (pg. 3, Marrett et. al., 2008).

3.2.2.3. Weekend / Monday / DOW Effect Literature in Detail

3.2.2.3.1. Brazil

Using both general index data and individual stock data obtained from the Sao Paolo stock exchange, Madureia et. al. (2001) adopt the approach of Jaffe et. al. (1989) - the twist of the Monday effect. The refers to Monday stock market returns being negative following an overall decline in the stock market during the previous trading week. If the overall financial returns in stock market were positive in the previous week the effect was non-existent. Consequently, Monday stock market returns are influenced by stock market outcomes in the previous week. Madureira et. al. (2001) verify this anomaly noting that after a week of negative returns the following Monday would end with a negative return, whilst a week of positive financial returns did not lead to negative returns on the following Monday.

3.2.2.3.2. China

Using daily stock return data for A and B shares traded on the Shanghai and Shenzhen stock exchanges Cai et. al (2006) study the efficacy of DOW anomaly. The authors note that this approach provides a unique perspective as each class of shares can be distinguished by a segmentation of ownership - A class shares are traded among individual Chinese citizens in each of the two exchanges, while B class shares are traded among both individual and institutional investors of foreign countries and people from Hong Kong, Macao, and Taiwan. Therefore, this may provide greater insight into the stock trading behaviour of individual and institutional investors and the relationship to the DOW anomaly. A consistent pattern of returns behaviour is discovered, with the average Monday returns from A class share being significantly negative in weeks three and four of the month, whilst average Tuesday returns on most of the A and B class shares providing negative returns only during week two of the month. Using the same data source as Cai et. al. (2006) - the Shanghai and Shenzhen stock exchanges – Zhang et. al. (2006) examine several anomalies, including the DOW effect, for the period 1991 to 2004. While Zhang et. al. (2006) do not distinguish between classes of shares, their findings partially support Cai et. al. (2006), demonstrating a Friday seasonal pattern which diminishes by 1997 followed by a positive Tuesday effect emerging from June 1998 onwards. The authors qualify their research outcomes concluding that while the research supports the existence of calendar anomalies, the anomalies appear to have substantially attenuated since having been documented. This would tend to affirm the core premise of the EMH.

Chan et. al. (2012) investigate the presence of the DOW anomaly on returns and volatility of the H-shares index, a previously overlooked data source, (a classification given to enterprises incorporated in mainland China and listed on Hong Kong stock exchange). Chan et. al. (2012) state that strong evidence of positive Monday and Friday effects on returns exists on the H index, though when market risks is considered the Friday effect becomes insignificant. Transaction costs negate the ability to generate abnormal profits based on the anomaly and therefore the EMH remains unchallenged. Lai et. al. (2012) provide a further paradox in relation to the DOW effect. Lai et. al.

(2012) test the anomaly using time series daily returns of the Shenzhen composite index from December 25, 1995 to December 31, 2010, supporting the existence of a significant negative Thursday effect during the entire period. This outcome supports Cai et. al. (2006) and Zhang et. al. (2006). Therefore, a strong degree of variability is present in relation to which day in the week is impacted by the anomaly.

3.2.2.3.3. Egypt

Investigating daily stock market anomalies in the Egyptian Capital Market Authority Index, Aly et. al. (2004) indicate that Monday's are positive and significant but are not significantly different from returns of the rest of the week and therefore no evidence is uncovered to support any daily seasonal patterns in the Egyptian stock market.

3.2.2.3.4. Greece

Al-Khazali, et. al. (2008) confirm a strong and persistent DOW effect, with a pattern of negative (positive) returns on Tuesday's (Friday's) on the General Index of the Athens Stock Exchange, referring to the finding as a "Tuesday effect". In a study which partially confirmed Al-Khazali et. al. (2008), Kenourgios et. al. (2008) support the presence of a DOW effect in both returns and volatility on the General Index of the Athens Stock Exchange from 1995 - 2000. Post – 2000 the authors note that the anomaly weakens in both return and volatility behaviour thereby adding to the international evidence as regards to its disappearance in developed stock markets since the 1990s. The post-2000 outcome though contradicts the results obtained by Al-Khazali et. al. (2008) over a similar period.

3.2.2.3.5. India

The contradictory nature of research outcomes, such as Mittal et. al. (2009) and Selvarani et. al. (2009), highlight the difficulty in extrapolating the efficacy of the DOW effect. In determining the robustness of the EMH and therefore the efficiency of the Indian stock exchange Mittal et. al. (2009) finds no evidence for either the: Monday, Friday or DOW effects, thereby concluding that the Indian stock market is information efficient and returns follow a random walk pattern. Opposing this outcome Selvarani et. al. (2009), conclude that while there is no immediate support for a Monday effect, a distinguishable Tuesday effect is evident in the Indian market, this providing evidence for the existence of market inefficiency.

In each of the previous studies data was obtained from different sources: Mittal et. al. (2009) - the National Stock Exchange of India, the Bombay Stock Exchange and Yahoo; Selvarani et. al. (2009) - the National Stock Exchange of India. This provides an interesting insight, in that different data sources may influence whether an anomaly is significant. The extent to which this statement is relevant is provided by the research outcomes of both Patel et. al. (2011) and Rastogi et. al. (2011). Patel et. al. (2011) finds no support for a DOW anomaly on the Bombay Stock Exchange, whereas when investigating Indian spot and futures data on the National Stock Exchange of India Rastogi et. al. (2011) conclude that a DOW anomaly is evident in the spot index but not the futures market. Concurring with Patel et. al. (2011), Nageswari et. al. (2011) find no evidence of a DOW anomaly within the Indian stock market. Bhattacharya et. al. (2012) is supportive of the Mittal et. al, 2009, Patel et. al. 2011 and Nageswari 2011 conclusions stating that the DOW effect does not exist in the National Stock Exchange of India, while contradicting Selvarani et. al. (2009) who used the same data source.

3.2.2.3.6. International Correlations

In a research article which considered stock market activity in the US, the UK, Japan, Canada and Australia Jaffe et. al. (1985) documented the existence of the DOW effect in each country, for both weekly and intra-daily trading behaviour in stocks, discovering a consistent fall in stock prices on Monday mornings and the reverse for the mornings of each other day of the week. Using Dow Jones Industrial Average data Lakonishok et. al. (1988) note Monday stock returns were significantly negative. In a comprehensive review of the DOW effect (as well as several other calendar anomalies) across eighteen countries Agrawal et. al. (1994) find that the lowest and negative returns occur on Mondays in nine countries and on Tuesdays in eight countries. The negative seasonal for Monday and Tuesday, the authors note, tends to fade in the eighties.

The robustness of the DOW effect is questioned by many authors including: Ajayi et. al. (2004) finding a lack of consistent support for the presence of any daily patterns in stock returns across eleven Eastern European emerging stock markets. Tonchev et. al. (2004) using data from across three Eastern European markets asserts that there is weak evidence for the DOW effect and only in the Slovenian stock market in the opposite direction with Monday mean returns being the highest.

Using a cross sectional sample of countries from the South East Asian region (Taiwan, South Korea, Hong Kong and Singapore) and Japanese and US stock market data Hui (2005) demonstrates that the DOW effect may not be a pervasive feature of matured capital markets around the world and some emerging markets. Conclusive evidence for the existence of the anomaly is evident for the Singaporean stock market. In a paper which both provides support and contradicts the outcomes reached by Hui (2005), Yakob et. al. (2005) examine the issue of stock market seasonality across several stock markets in the Asia Pacific region. Overall, evidence to support the presence of the anomaly is documented in five countries: Australia, China, India, Indonesia and Taiwan (for which Hui (2005) finds no support), while the weekend anomaly is found to be insignificant in the stock markets of: Hong Kong, Japan, Malaysia, Singapore (for which Hui (2005) finds support) and South Korea.

Apolinario et. al. (2006) examine if there is any contrast in the DOW effect across the German, Austrian, Belgium, Danish, Spanish, French, Dutch, Italian, Portuguese, United Kingdom, Czech Republic, Swedish and Swiss markets. A significant DOW effect is observed only in the French and Swedish markets and a pattern of weekend effect volatility across multiple European stock markets. Directly contradicting this conclusion, Chukwuogor-Ndu (2006) confirms the existence seasonal anomalies in both returns and volatility across several European stock markets.

Jones (2008) examines DOW effects across a wide cross-section of foreign stock markets over a ten-year period - 1998-2007, concluding that the anomaly lacks consistency over an extended timeframe. Significant negative Monday stock market returns are noted for the Brazilian, Singaporean, Malay and Taiwan indexes, while Egyptian and Israeli stock markets display significantly positive Monday returns. Insignificant Monday stock market returns are attributed to the markets in: Argentina, Mexico, the US, Australia, Hong Kong, India, Japan, South Korea, Austria, Belgium, France, Germany, the Netherlands, Switzerland, and the UK.

3.2.2.3.7. Mexico

Examining anomalies within the Mexican interest rate futures market Gurrola et. al. (2007) provide evidence for a DOW effect, observing that for the entire period and all the sub-periods within the study mean returns on Monday were always positive while

Friday were always negative. This implies that anomalous trading activity may extend beyond stock markets and into the broader financial markets.

3.2.2.3.8. Pakistan

Further evidence of conflicting outcomes reached while using the same data source is evidenced by the research undertaken by Hussain et. al. (2011) and Saeed et. al. (2011). Both studies examine the DOW effect in Karachi Stock Exchange. Hussain et. al. (2011) use a four-year period (January 2006 to December 2010) while Saeed et al (2011) consider a more comprehensive almost 13-year timeframe (July 1997 to April 2010). Whereas Hussain et. al. (2011) concludes that there is strong support for a Tuesday effect, Saeed et. al. (2011) results show no evidence for the presence of the anomaly. This may imply that anomalies may be dependent on investor sentiment at certain time periods. Also looking at the DOW effect in the Karachi Stock Exchange Hafeez et. al. (2014) provide an interesting conclusion. The anomaly is found to be present though on different days based on the individual sub-index. The daily findings reveal that there exists a Friday effect for KMI 30 index; Tuesday (supporting Hussain et. al., 2011) as well as Wednesday and Friday effects for both KSE 100 and KSE All Share indices.

3.2.2.3.9. United Kingdom

The existence of the DOW effect in the UK stock market disappeared in the 1990s according to Steeley (2001). The anomaly though was visible when returns were partitioned by the direction of the market. An explanation for this is related to the systematic pattern of market wide news arrivals that concentrates between Tuesdays and Thursdays, though this explanation has been questioned.

In a similar approach to Madureira et. al. (2001), (i.e. the use of individual stock data), the DOW effect in stock returns is examined by Draper et. al. (2002) on both the FTSE 100 index and the FT - All Share index, using a sample of 452 individual stocks. Draper et. al. (2002) reveal that the Monday effect is more prominent during the second half of the month with the fourth week of the month displaying a dominant influence role. The conclusion is that the anomaly is caused by multiple factors such as: account settlement day, ex-dividend day, arrival of (bad) news on Fridays, trading activity and bid-ask spread. The authors state that the anomaly can best be explained by the trading time hypothesis.

3.2.2.3.10. United States of America

Gibbons et. al. (1981) note that US stocks displayed a strong and persistent pattern of behaviour with returns on Monday being negative and Treasury bills displaying below-average returns also on a Monday. Keim et. al. (1984) could highlight how entrenched the weekend anomaly was in US finding a consistent pattern of negative Monday returns for the S&P Composite Index stretching back to 1928. Furthermore, the anomaly was pervasive in relation to actively traded over-the-counter stocks and for exchange-traded stocks of firms irrespective of market capitalisation.

Lakonishok et. al. (1990) find that the lowest trading volumes occurred on a Monday due to individual investors undertaking a substantial proportion of trading activities on a Monday, with the ratio of sell to buy transactions being heavily skewed towards stock sales, thereby providing a partial explanation for the anomaly. In relation to institutional investors, Mondays represented their lowest trading volumes.

Kamara (1997) states that equity derivatives and the institutionalization of stock markets has influenced the DOW effect. From 1962 to 1993 the anomaly has significantly declined, which is positively related to the ratio of institutional to individual trading activity. The anomaly for small stocks though, has remained consistent and unaffected by the interaction between individual and institutional trading participants. Wang et. al. (1997) indicate that DOW effect is persistent only across the final two Mondays of the month. The mean Monday return of the first three weeks of the month is, in general, not significantly different from zero and is generally significantly higher than the mean Monday return of the last two weeks

Using three different econometric models to test for both volatility and return equations on the S&P 500 market index Berument et. al. (2001) find a persistent DOW effect across all models, with lowest returns occurring on a Monday and highest returns on Wednesdays. Using multiple stock market indices (SP500, NYSE, DJCOMP, NASDAQ and Russell) Mehdian et. al. (2001) find that in the US the anomaly had significantly declined. They note that since 1987 a reversal of the traditional weekend effect had occurred in large capitalisation US stock markets. Sun et. al. (2002) note the

DOW effect only accrued in specific periods within the month, specifically between the eighteen and twenty-sixth days and therefore most of the anomaly occurs in the fourth week of the month. The authors provide some evidence that the weekend effect may be related to liquidity. Marquering et. al. (2006) investigate the robustness and dynamic persistence of many anomalies, including the DOW effect, analysing data from daily DJIA returns, 1960–2003. The authors note that the DOW effect had begun to diminish right after the publication of the Cross (1973) study. Furthermore, they conclude that after 1990 years positive Monday returns outnumbered years with negative returns, leading to the disappearance of the DOW anomaly.

3.2.2.4. Application to Current Research

The evidence regarding the efficacy of efficient markets theory can be seriously questioned by the overwhelming number of anomalies which demonstrate, at least from an academic perspective, the predictability of stock market behaviour. While it may appear difficult to transact profitably using trading strategies based on the previously mentioned anomalies this should not or does not imply that it is impossible, particularly with ongoing advances in electronic financial trading and more sophisticated programmed trading software. This is particularly important for anomalies which occur over very short time-frames such as the WE and DOW. This fact combined with the lack of publicly available or followed announcements in relation to the NSXA, provides an original opportunity to re-examine the WE and DOW anomaly using such data. Therefore, the current research will hypothesize the following:

$H_{5:}$ The average return of the NSXA sub-indices on weekdays is not statistically different and

$H_{6:}$ The average return of the NSXA sub-indices are statistically not high on weekends.

3.2.3. Month of the Year Effect

3.2.3.1. Primary Researchers

While examining the existence of January seasonality in other markets, systematically higher returns in months other than January have been observed which appear to outperform those of January. This anomaly has been referred to as the MOTY effect. One of the earliest pieces of research in the empirical literature to highlight this anomaly was undertaken by Gultekin et. al. (1987). The authors also referred to the anomaly as an end of financial year effect noting the consistency of stock market financial returns occurring in April for the UK market and in January and June for the Australian market.

3.2.3.2. Key Proposition

The MOTY effect is an extension of the January calendar anomaly where the financial return of a specific calendar month varies considerably from other months throughout the year. While the MOTY effect has focussed on the month of January, the academic literature has noted that across various financial jurisdictions consistent patterns of financial returns and stock market behaviour exist throughout other calendar months. The implication established by the MOTY effect is that financial returns on stocks are not equally distributed across each month of the year and are therefore, in theory, potentially financially exploitable. Broadly, the empirical literature has confirmed the existence of a monthly seasonal in stock market behaviour. Within the scope of US research this is manifested as the JE. In other international stock markets, the monthly anomaly has been observed in other months.

3.2.3.3. Month of the Year Effect Literature in Detail

3.2.3.3.1. Bahrain

Investigating the impact of the global financial crisis on the MOTY effect using Bahrain All Share Index data Al-Jafari (2011), using multiple statistical tests, reveals the anomaly to be non-existent during either the pre-global financial crisis period or during the financial crisis.

3.2.3.3.2. Bangladesh

Bepari et. al. (2009) confirm the existence of seasonality in stock market returns (an “April” effect) in an emerging stock market, the Bangladesh Dhaka Stock Exchange. The TLS hypothesis is considered in explaining the outcome. Additionally, the study further documents a statistically significant coefficient for the months of August and September which may be attributed to the information release hypothesis.

Rahman et. al. (2011) also investigate the existence of monthly seasonality effect in the Dhaka Stock Exchange. Whereas Bepari et. al. (2009) considered the overall index data used by Rahman et. al. (2011) included daily closing stock prices of DSE indices such as DSE all share prices index (DSI), DSE general index (DGEN) and DSE 20 index for the period January 2001 to June 2010. concluded that a significant April monthly seasonality existed in the Dhaka Stock Exchange, Rahman et. al. (2011) counter the findings of Bepari et al (2009) and provide support for a statistically significant May and June anomaly across all the three indices, which contradicts the core premise of the EMH even for emerging markets.

3.2.3.3.4. China

Gao et. al. 2005 document that Chinese stock market, as represented by the Shanghai and Shenzhen indices, is not weak-form efficient. Gao et. al. (2005) examine calendar effects in both the Shanghai and Shenzhen stock market indices, finding a predictable monthly pattern of stock market returns. They establish that the two markets exhibit a February year-end effect. The authors state that in China February is seen as the turn-of-the-year due to the commencement of the Chinese Lunar New Year in late January or early February and not at the turn of the calendar year. Qi et. al. (2013) examine Chinese daily gold returns from December 2002 to November 2011. Evidence is provided of a persistent monthly effect in the Chinese gold market with average gold returns being greater in the months of February, September and November compared to the remaining months.

3.2.3.3.5. Greece

Using an ordinary least squares (OLS) methodology and historical time series data obtained from the General Athens Stock Exchange for the period index, FTSE/ASE-20 and FTSE/ASE Mid 40 for the period covering November 1996 to July 2002 Floros (2008) finds no support for the January anomaly across each of the three indices. Interestingly, he demonstrates consistent higher returns in April, and lower returns in June, August and October, though estimating coefficients are statistically insignificant, except for significant negative returns in June across each of the three indices.

3.2.3.3.6. India

Patel (2008) finds two distinct calendar effects in stock market returns based on the two largest stock exchanges in India - the Bombay Stock Exchange and the National Stock Exchange of India. A March-to-May effect, where mean stock market returns for these months are significantly lower than compared to the remaining nine months and a November-December effect, in which significantly higher mean stock market returns were associated with these months than for the remaining ten months. These effects were independent of each other.

Dash et. al. (2011) focus on the monthly patterns of stock market returns in the Bombay Stock Exchange Sensitivity Index (Sensex), with results consistent with Patel (2008). Dash et. al. (2011) demonstrate that a strong MOTY with a significant positive November, August and December effects, and a negative March effect. The authors note that particular Indian cultural events may be influential in supporting the existence of the anomalies. Furthermore, negative March returns may be due to TLS with the end of the Indian financial year occurring in March. Nageswari et. al. (2011) provide no confirmation of seasonality in BSE Sensex index. Further expanding on this Selvakumar (2011) supports the conclusion reached by Nageswari et. al. (2011) in relation to the MOTY effect in that the results did not support any evidence of a monthly effect for both the BSE Sensex as well as the S&P CNX Nifty.

The primary objective of Debasish (2012) was to investigate the existence of seasonality focussing on the daily price series of eight individual Gas, Oil and Refineries companies and therefore determine whether this anomaly occurs at the "micro" level. Strong support for a MOTY effect is found that for all the eight selected companies with predictability of returns being strongest for the months of September, August and February.

3.2.3.3.7. International Correlations

Using pre-World War 1 stock market time series data Choudhry (2001) investigates the MOTY effect in the German, UK and US stock market returns. The author states that the use of pre-WW1 data minimizes the impact of any tax bias as during this period there existed a lack of any form of tax treatment for capital gains/loss existed in all three countries. Results obtained provide evidence of a MOTY effect on the UK and the US returns, whilst a strong August seasonal is observed in German returns.

Yakob et. al. (2005) provide strong evidence suggesting that the existence of seasonality is a global affair. Evidence is provided supporting the presence of the MOTY effect across eight countries in the Asia Pacific region (i.e. Taiwan, Malaysia, India, Indonesia, Australia, Hong Kong, South Korea and China) with only Japan and Singapore proving inconclusive.

Keong et al. (2010), focus on stock market returns over a 20-year period from 1990 to 2009 for eleven Asian countries. The stock markets in Indonesia, Philippines, Singapore, Taiwan, and Thailand all documented a positive January effect. Predictable April returns were noted for Indonesia, Malaysia, Korea and China, implying an April effect. Hong Kong, India, Indonesia and Philippines also showed significant support for a May effect, while only Indonesian returns data supported the existence of a negative August effect. The authors note the inconsistency between their results and the conclusion reached by Yakob et. al. (2005), stating that employing different periods or different models will exhibit different outcomes for the MOTY effect. Japanese results provide no support for a MOTY effect which contradicts the conclusion reached by Tsuji (2009).

3.2.3.3.8. Japan

Another paper which supports the existence of an April effect is Tsuji (2009). Using stock market return data for the Tokyo Stock Exchange Tsuji (2009) analyses book equity to market equity (BE/ME) portfolios finding that the biggest portfolio of 25 size-ranked portfolios in Japan earns the highest risk-adjusted returns in April. The author also finds that return volatilities are also the lowest in the month of April.

Investigating the MOTY effect in the Nikkei 225 index of the Tokyo Stock Exchange Chia et. al. (2012) find a significant November effect. Chia et. al. (2012) believe that the anomaly is consistent with previous research supportive of the TLS hypothesis. Finally, using a threshold generalized autoregressive conditional heteroscedasticity (TGARCH) model reveals no significant asymmetrical effect on positive or negative news.

3.2.3.3.9. Kuwait

Al-Saad et.al. (2005) find no January seasonal within the Kuwaiti stock market, which instead is impacted by a July seasonal. The authors note that due to general insignificance of tax issues a tax motivated reason for the anomaly is not plausible. The authors provide an alternative explanation - a summer holiday effect. The authors state that most investors take their holiday during the month of August and therefore exploit the month of July to invest and rebalance portfolios thereby leading to additional stock market activity in July and raising stock prices. Consequently, this may be seen more as a holiday anomaly.

3.2.3.3.10. Macedonia

Angelovska (2014) investigates the month-of-the-year effect in Macedonian Stock Exchange MBI10 Index from 2005 to 2009 finding that the months of March and August provide consistent positive returns (confirming the conclusion reached by Stoica et. al., 2011), while the month of November is predictably negative.

3.2.3.3.11. Malaysia

Wong et. al. (2007), investigate the Kuala Lumpur Composite Index from 1994 to 2006 for presence of a monthly anomaly. The authors examine data across the entire period, as well as partitioning data across three specific time periods, the pre - Asian financial crisis, during the Asian financial crises and post Asian financial crisis. For the entire sample period and during the crisis period no evidence of a statistically significant MOTY effect is found. In the pre - crisis period a significant February monthly is reported. For the post - crisis period a strong and persistent positive January monthly anomaly combined with a significant negative September effect is found supporting the outcome reached by Yakob et. al. (2005).

3.2.3.3.12. Pakistan

Ali et. al. (2009) examine whether there is evidence to support monthly calendar anomalies in an emerging stock market such as that in Pakistan, though no support for the MOTY anomaly in the Karachi Stock Exchange 100 index is found. An opposing outcome is highlighted by Zafar et. al. (2010), finding a significant negative monthly stock market returns in month of May on the Karachi Exchange 100 Index in Pakistan. The authors state that this outcome may be influenced by an event such as the national Budget announcement in month of June.

3.2.3.3.13. Romania

Panait (2013) concluded that the presence of the MOTY effect or the JE on the five most popular official Bucharest Stock Exchange indices: BET, BET-C, BET-FI, BET-

XT and BET-NG during the investigated period were not significant, confirming outcomes observed in previous research focussing on the Romanian stock market.

3.2.3.3.14. South Africa

Alagidede (2008) demonstrates support for a monthly anomaly in South Africa in the form of consistent higher February returns for the period of 1997 to 2006. This outcome is not supported by Darrat et. al. (2013) who find no evidence of a monthly seasonal on the Johannesburg Stock Exchange.

3.2.3.3.15. Tunisia

Investigating the existence of the MOTY effect in the Tunis Stock Exchange - a smaller more illiquid stock market with only fifty stocks traded daily from 8.30 to 11.30 am – Wyeme et. al. (2011) find evidence which contradicts both Nageswari et. al. (2011) and Selvakumar (2011). Evidence is found supporting an April effect. The authors note though that the presence of an April effect in the Tunis Stock Exchange could potentially be attributed to the reporting requirements for listed firms in Tunis Stock Exchange who are expected to submit annual financial reports three months into the new tax-year which may be explained by the information release hypothesis.

3.2.3.3.16. Turkey

Gulseven, (2014) examines the monthly returns in Turkish stock market to determine if there is any evidence of seasonality. Using data obtained from the Borsa Istanbul BIST 30 index the author states that there is evidence to support consistent seasonal behaviour in some of the months. Significant positive stock market return are observed for the months of April, July and December, while negative returns are evident in the months of May and August.

3.2.3.4. Application to Current Research

There are significant financial implications for stock market investors with regards to the efficacy of the MOTY effect and its relationship to the EMH. If there is a degree of predictability to stock market activity based on the MOTY, stock market investors may be able to take advantage of arbitrage opportunities and implement trading strategies which consider these predictable patterns. An observable, and potentially financially exploitable, pattern in stock market activity would contradict the basic premise of the EMH. Investigating the MOTY anomaly using a neglected stock exchange such as the NSXA provides an opening to further investigate this anomaly. Previous Australian research (Brown et. al. 1983, Gaunt et. al. 2000 and Marrett et. al. 2011) have all demonstrated significant monthly seasonal patterns in ASX returns other than January. Consequently, the current research will hypothesize the following:

$H_{7:}$ The average returns of NSXA sub-indices in all the year's months are equal.

3.2.4. January / Turn-of-the-Year Effect

3.2.4.1. Primary Researchers

Wachtel (1942) was one of the first researchers to identify a December–January seasonal pattern, noting that between 1927 and 1942 the Dow Jones Industrial Index displayed a consistent appreciation in January financial returns for eleven of the fifteen years investigated. Rozeff et. al. (1976), the authors of the seminal paper in relation to the January effect, highlighted that seasonal patterns existed in an equal weighted index of the NYSE, with the average January stock returns equalling 3.5 percent compared to the average returns of all other months equalling 0.5 percent per month. The use of an equal weighted index also implied that the JE was primarily influenced by trading outcomes in small firms. Keim (1983), one of the original researchers, notes that daily abnormal returns in January have significant means relative to the remaining eleven months. An inverse relationship between abnormal returns and size was highlighted and was more pronounced in January than in any other month. Keim (1983) demonstrates that more than fifty percent of the January premium occurs during the first week of trading in the year and particularly on the first trading day. This outcome has been supported by numerous other researchers. Another original contribution to the debate was made by Reinganum (1983), noting that small capitalization stocks experienced strong financial returns within the first few days of the month. Tax-loss selling (TLS) was considered as a possible explanation, the author notes "TLS cannot explain the entire January seasonal effect. The small firms least likely to be sold for tax reasons (prior year 'winners') also exhibit large average January returns, although not unusually large returns during the first few days of January,"(pg. 89). Other important early contributors in this area included: Dyl (1977) and Givoly et. al. (1983).

3.2.4.2. Key Proposition

According the EMH, stock prices behave in a random fashion (i.e. a "random walk"). The implication of this is that the prediction of future financial returns from trading in stocks using publicly available information is not possible and has no value. Previous stock price movements cannot be used to determine future stock prices – the weak form of the EMH. The academic literature though is mixed with much of the early research questioning the validity of the EMH, particularly as it applied to stock market behaviour around January.

The financial anomaly which has received the most attention, and arguably the most important, is the JE. This anomaly has also been referred to as the TOTY effect. The JE refers to an overall increase in the prices of stocks during January (Figure 3.2.4.2.a). This is caused by stock market investors (particularly American investors) selling stocks (often referred to as "losers" - those that have incurred for the investor a capital loss) in December creating a tax loss which is offset against stocks which have provided a capital gain ("winners") leading to an overall fall in stock prices for the month. Stock prices recover in January as investors re-enter the market creating increased demand by their stock purchases leading to an overall increase in financial value. The impact of the JE is more pronounced in the stock prices and trading of small capitalisation firms than mid to large capitalisation firms. The significance of the January effect is demonstrated by the figure below which demonstrates that overall January financial returns in US markets are more than twice as large as the next most favourable month, July.

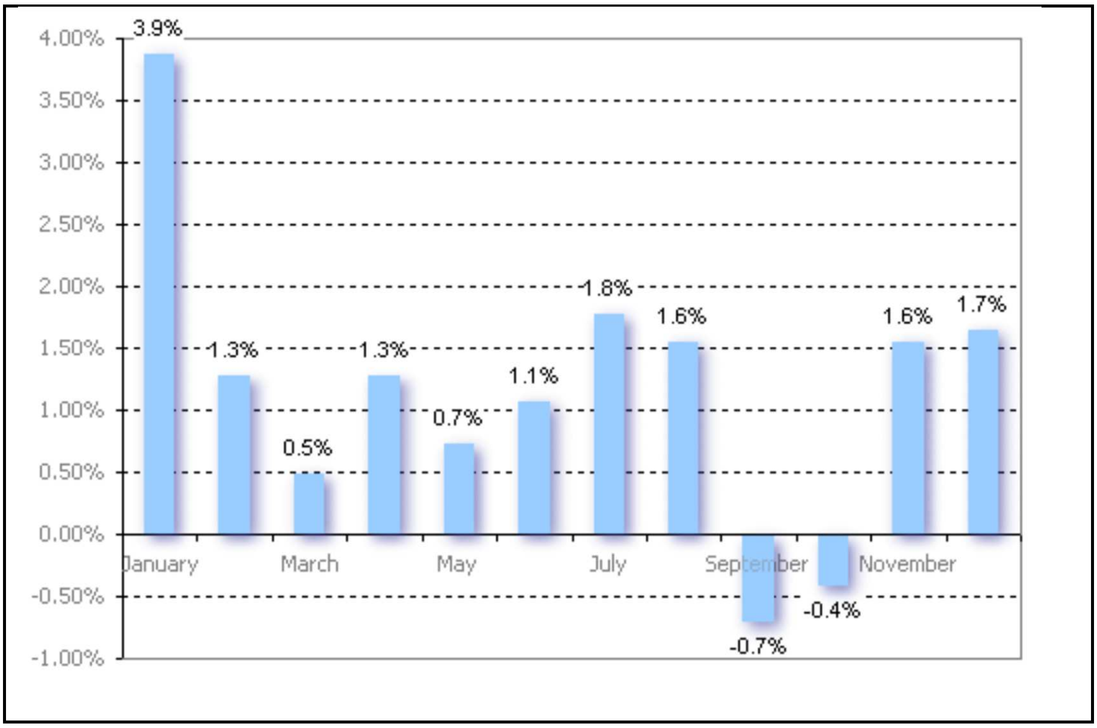


Figure 3.2.4.2.a; Returns by month of the year 1927–2001; Damodaran (2003)

The empirical literature has provided numerous papers highlighting significantly greater January returns compared to other months of the year, (Dzhabarov et. al., 2010 and Easterday et. al., 2009).

Numerous theories have been suggested to explain the JE. One of the most significant explanations put forward has been referred to as the TLS hypothesis (Wachtel, 1942; Branch, 1977 and Dyl, 1977). The hypothesis postulates that investors wait until the end of the financial year to sell poorly performing (`loser') stock/s, thereby realizing a capital loss which is offset against capital gains. The overall aim is to reduce tax liabilities. This leads to downward pressure on the stock prices of poorly performing stocks. Consequently, at the beginning of the new financial year, in the absence of selling pressure, the downward pressure on stock prices disappears and the stock prices gain their real market price. This phenomenon generates large abnormal stock returns at the turn of each U.S. tax year.

Rogalski et. al. state that the JE is correlated with the market capitalisation of stocks (i.e. the size effect). Small capitalisation stocks, according to the authors, are considered to have greater total, systematic and residual risk associated with them, particularly at the beginning of the calendar/financial year compared to the remainder of the year. Therefore, based on asset pricing theory the attached higher risk involved in investing in such stocks requires that investors be compensated with higher financial returns for making investments in these stocks.

Another explanation of the JE is based on what has been referred to as the company announcement hypothesis whereby January is characterised by the abnormally large release of usually positive company information, such as earnings. This causes a corresponding sharp increase in stock prices in early January and then a progressive decrease throughout the later part of the month.

The window dressing hypothesis (or institutional investor behaviour), argued by Haugen et. al. (1988) provides another explanation for the anomaly. The hypothesis posits that fund managers manipulate their performance to avoid highlighting poor investment decisions by selling loser stocks, usually smaller capitalisation stocks, and keep only winner stocks to manipulate perceived investment performance. At the turn of the year however, fund managers reverse earlier manipulative investment behaviour by selling winners and purchasing small stocks as part of their investment portfolio, with the outcome that this "window dressing" by fund managers leads to artificial downward pressure (and by implication low returns) in December and upward pressure and higher returns in the market in January.

Ogden (1990) stated that the JE may be the result of an increase in the financial capacity (liquidity) of investors - the liquidity hypothesis. An increase in investor liquidity occurs due to increased cash-flows caused by extra holiday payments, holiday gifts or annual bonuses which are then directly invested in the stock market. In the month of January demand for stocks increases as this is a core period for investors to develop and implement investment strategies and decisions.

3.2.4.3. January / TOTY Effect Literature in Detail

3.2.4.3.1. Australia

In the Australian stock market January and July have been shown to exhibit excess financial returns but only in equally weighted indices and not in value weighted indices, according to Gray et. al. (2007). July displays a more prominent outcome, which may also imply a tax-related influence.

3.2.4.3.2. Baltic region

Sander et. al. (2013) test for the presence of the January effect in three Baltic stock exchanges, the OMX Tallinn, the OMX Riga and the OMX Vilnius, (2000 - 2012). The authors state an advantage of using these smaller stock markets to investigate the presence of the January anomaly also enables authors to investigate the anomaly on a single stocks basis. A statistically significant January anomaly is supported across all three stock markets with the strongest outcome in the OMX Tallinn and the weakest in OMX Riga. At the individual stock level, the significance of the anomaly varied by both years and exchange and demonstrated that excess returns mostly evident on main list stocks, but not on secondary list stocks due to high bid-ask spreads.

3.2.4.3.3. Bangladesh

Ahsan et. al. (2013), based on twenty-five years of data from Dhaka Stock Exchange in Bangladesh, find no empirical support confirming the January anomaly. The authors do however note a significant positive return in June, thereby questioning the accuracy of the EMH. Ahsan et. al. (2013) note that July is the first month of the financial year in Bangladesh and therefore the absence of significant positive return in July also leads to a rejection of the TLS hypothesis as an explanation for the June seasonal anomaly. Consequently, the evidence regarding seasonal factors remains inconclusive.

3.2.4.3.4. China

Zhang et. al. (2008) tests for the validity of the January effect across multiple Chinese stock market indices, concluding neither a JE nor, specific to the Chinese stock exchanges, a February-Chinese New Year effect. Zhang et. al. (2008) though provide evidence for a significant and positive March effect, claiming this may be a result of “political window dressing" of the stock market.

The robustness of a March effect in Chinese stock markets, as noted by Zhang et. al. (2008), is confirmed by Su et. al. (2011). No evidence of th JE is found. Using both value-weighted and equal-weighted stock returns data on both Shanghai Stock Exchange (SHSE) and the Shenzhen Stock Exchange (SZSE) a significant and positive March effect is found for both A-share markets. In particular, adjusted equal-weighted data shows a stronger March effect than adjusted value-weighted data thereby supporting the theory that the TOTY effect is a small capitalization phenomenon.

3.2.4.3.5. Finland

Using daily data on the stock holdings and trades of all Finnish households and institutions from 1994 to 2000 Grinblatt et. al. (2004) confirm the outcomes reached by D'Mello et. al. (2003) and Chen et. al. (2004) - Finnish investors engage in TLS at the TOTY this being the primary cause of the JE. Grinblatt et. al. (2004) also concur with the previous authors rejecting the window dressing hypothesis but disagree with D'Mello et. al. (2003) stating that the JE is largely a small firm phenomenon. This highlights the contradictions in the anomalies research.

3.2.4.3.6. International Correlations

In a seminal international investigation of the JE across multiple stock markets Gultekin et. al. (1983) find the anomaly to be significant in the majority the major industrialized countries examined. In an early study focussing on eighteen emerging stock markets Fountas et. al. (2002) examine the JE and its relationship to the TLS. The authors find mixed results and confirm that the anomaly has essentially disappeared, while TLS cannot adequately explain the occurrence of the JE.

Testing the EMH and the JE for eight transition economies – the Czech Republic, Hungary, Lithuania, Poland, Romania, Russia, Slovakia and Slovenia, Asteriou et. al. (2006) find support for the JE for most of the countries sampled and significant evidence for Hungary, Poland, Romania and Slovakia, and support for TLS in relation to both Hungary and Romania. Gu (2006) observes the presence of the JE weakening in both large and small capitalisation firms across Canadian, French, German and Japanese stock markets, whilst being more apparent with large capitalisation firms in the UK. The January anomaly is linked with economic activity noting that it is weaker (stronger) during periods of weak (strong) real GDP growth and less (more) apparent for years with higher (lower) inflation.

Imhof et. al. (2008) consider the possibility that a stock market investor may use January returns in the U.S. to predict returns in other countries. Sourcing data from DataStream's value-weighted equity indices for the U.S. and five other countries, Australia, Japan, Hong Kong, Germany, and Switzerland, from 1973 to 2006. The results somewhat contradict Gray et. al. (2007) stating that holding period returns are significantly positive when Januarys are positive and not different than zero when

Januarys are negative. Additionally, when Januarys are positive in the U.S. they have predictive power in the five other sample countries, including Australia, even though Imhof et. al. (2008) focussed exclusively at value-weighted indices, while Gray et. al. (2007) observed no seasonal anomalies in value weighted indices in an Australian context.

3.2.4.3.7. Pakistan

Using time series data from the Karachi Stock Exchange and different time frames, Ahmad et. al. (2013): 2010 - 2013 and Hashmi (2013): 2004 - 2009 return conflicting results. While Ahmad et. al. (2013) find no evidence supporting the JE in the All Share Index of Karachi Stock Exchange, Hashmi (2013) utilizing daily stock index data provides statistical evidence of a positive JE during the sample period. This outcome further demonstrates the inconsistency of both the January anomaly and stock market efficiency as posited by the EMH.

3.2.4.3.8. Thailand

Tangjitprom (2011) examines numerous calendar anomalies in Thailand stock market, specifically the SET and SET50 indices. The result provide support for a December effect, with abnormal returns for both SET index and SET50 concentrated during the last week of December and the first week of January, which is attributed to the TOTY effect. It is observed that returns for the first half of the month are significantly higher than the remainder of the month for both SET index and SET50 index.

3.2.4.3.9. Ukraine

Using historical time series data obtained from Ukrainian stock and bond markets Depenchuk et. al. (2010) examine stock market returns to determine whether calendar anomalies, including the JE, are present and significant. The authors conclude that there is an absence of the anomaly in the Ukrainian indices confirming previous studies on the Eastern European financial markets which demonstrated mixed results (Tonchev et. al., 2004).

3.2.4.3.10. United States

Disagreeing with the conclusion reached by Keim (1983) Mehdian et. al. (2002) investigate the long-term stability of the JE across the Dow Jones Composite, NYSE

Composite and the SP500 (1964 to 1998) and determine whether the anomaly occurs in the first trading week of January or later in this month. The January anomaly is found to be structurally unstable over the period of time investigated with a significant structural break around the 1987 stock market crash. The authors conclude that up to 1998 January stock returns are significantly positive, but after the 1987 post stock market crash period they are statistically insignificant. Also, stock market returns, while negative, are statistically insignificant during first five trading days of month compared to the rest of the available trading days within the month. Brown et. al. (2004) contradict this outcome (and Fountas et. al, 2002). Using NYSE equal-weighted stock data (1941 to 2002) confirm the existence of the JE. The authors state that January acts as an indicator ("barometer") for overall stock market performance for the coming year, i.e. if stock market returns in January are positive overall returns for the remainder of the year will be positive.

D'Mello et. al. (2003) support the work of earlier research (Reinganum, 1983 and Roll, 1983), agreeing that TLS is the primary explanation for the existence of the anomaly. Furthermore, the authors find no evidence that small/low price firms with capital gains earn significantly higher returns than large/high price firms, and therefore neither firm size nor share price influence the January anomaly.

Chen et. al. (2004) also provide strong empirical support for TLS. Using a sample derived from common stocks traded on the NYSE, the American Stock Exchange (AMEX) and NASDAQ support is provided for both the TLS and tax gain selling hypotheses while concurrently dismissing the window dressing, portfolio rebalancing and the information release hypotheses.

Haug et. al. (2006) suggest that BF may also need to be considered. The authors state that the JE in large capitalisation stock returns is absent and support the notion that the anomalous JE is essentially confined to small capitalisation stocks phenomenon, contradicting D'Mello et. al. (2003). Rendon et. al (2007) conclude the JE is also present in U.S. futures markets. The magnitude of the JE, according to Moller et. al. (2008), has remained constant which is contrary to the conclusion reached by Mehdian et. al. (2002). The authors that overall trading volumes in the second part of January decrease quite substantially and therefore declining demand leads to lower abnormal returns in the second part of January rather than increased trading activity at the beginning of, or early part of, January. This has implications for the efficacy of both the TLS hypothesis and the window dressing hypothesis as explanations for the January anomaly.

In a study which examined numerous stock market anomalies, including the JE, in the S&P American Depository Receipts (ADRs) and the S&P 500 indices, Bouges et. al. (2009) are unable to provide any empirical evidence for the anomaly in either of the indices.

The dilemma regarding the efficacy of the JE is highlighted by the outcomes reached by Lynch et. al (2014) and Sikes (2014). Both authors support the existence of the anomaly though diverge on reasons for its existence. Lynch et. al. (2014) states the window dressing hypothesis, and not TLS or risk-shifting trading strategies, provides the strongest explanation for abnormal pension fund selling in small stocks with poor past performance during the final trading days in December. However, Sikes (2014) dismisses the window dressing hypothesis and attributes the January anomaly to TLS by tax-sensitive institutional investors.

3.2.4.4. Application to Current Research

Thaler (1987) noted (see pg. 199), that other researchers had observed that U.S. stock returns over the entire month of January were significantly greater compared to other months while also noting that "excess returns to small firms were temporally concentrated" (pg. 199) with half the returns occurring in January and half of the excess January returns observed within the first five days of month. Consequently, the current research will observe the January / TOTY effect as a short horizon anomaly, i.e. the period covering the end of December and the first week of January. This provides the opportunity for the current research to make a few unique contributions. Firstly, it tests the efficacy of the EMH using NSXA historical data to determine whether stock returns follow non-random patterns in relation to the month of January. Furthermore, the current research tests for the existence of the JE in stock returns in an overlooked Australian stock exchange. Hence, the importance of the current study as it may provide an opportunity to uncover stock return patterns and provide an explanation for the existence of the observed patterns. Therefore, the current research will hypothesize the following:

H_{8}: The average returns of NSXA sub-indices at the turn of the year are not statistically significant.

A final observation in this area is warranted based on the comments made by Thaler (1987). A reasonable distinction can be made between the time horizon over which the January and TOTY anomalies are observed, with the TOTY being a short horizon anomaly (i.e. the final days of December and the early days of January), while the January anomaly could reasonably be conceived as the entire month of January – a medium term horizon. Therefore, this distinction offers a unique perspective and possible opportunity for future research, (i.e. a test/s over each of the timeframes to determine whether there are any observable difference), which to the best knowledge of the researcher this has not been considered in previous empirical literature.

3.2.5. Turn-of-the-Month Effect

3.2.5.1. Primary Researchers

Ariel (1987) formally documented the TOM anomaly in financial research focussing on all equally and value weighted indices on the New York Stock Exchange (NYSE) for the period 1963 to 1981, (Figure 3.2.5.1 a).

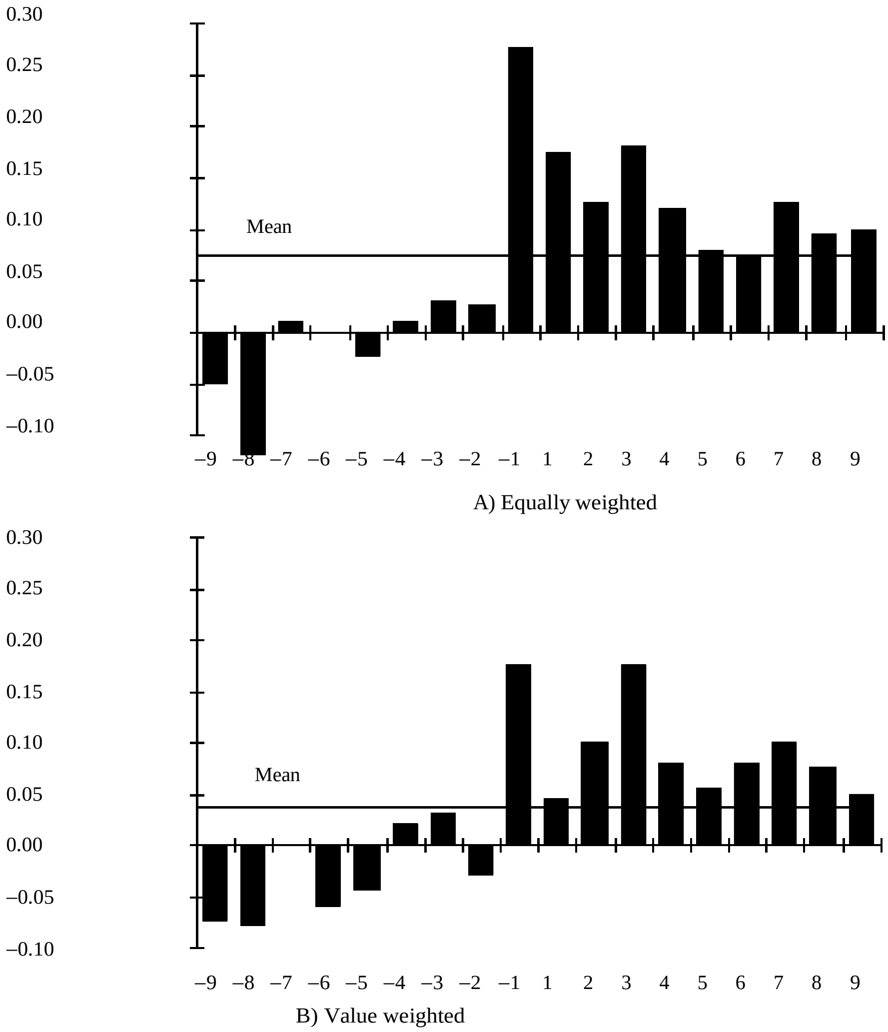


Figure 3.2.5.1 a; The U.S. Turn of the Month Effect, Mean Daily Percent Returns on Trading Days −9 to +9, 1963–1981: Ariel (1987).

Ariel (1987) states that all financial returns on the NYSE occur during the first half of the month, while the remainder of the month provides almost zero returns. Using a ninety-year period ranging from 1897 to 1986 Lakonishok et. al. (1988) find that at the turn of the month the Dow Jones index consistently increased an average of 0.475 percent compared to an average for any other four days of 0.061 percent. According to Lakonishok et al (1988) all positive returns on the Dow Jones index are concentrated, or accumulate, at the TOM period and the mean return on TOM trading days is approximately eight times greater than on any other trading day. Furthering this outcome, Ogden (1990) uses data from CRSP value-weighted and equally weighted indexes to investigate the pervasiveness of the TOM anomaly, finding that, particularly when there is a tightening in monetary policy, stock market returns at the TOM period are generally greater, the first research to make the link between the TOM anomaly and monetary policy.

3.2.5.2. Key Proposition

According to the TOM effect there is a tendency for stock prices to rise during the last two days of a month and the first three days of the following month. At the period around the turn of the month both large and small capitalised stocks display a consistent pattern of high returns.

Numerous explanations have been provided to explain the TOM anomaly. Three of the more generally accepted explanations have included: *the information release / company announcement hypothesis* – in which listed companies delay the release of bad news for the period towards the end of the month, while good news announcement occur toward the beginning of the month; *the month-end cash flow / liquidity hypothesis* – this states that income earned from salaries, bonuses and other sources, paid towards the end of the month, is then quickly reinvested into long-term financial assets around the turn of the month and *the portfolio rebalancing hypothesis* - where at the end of each month stock market participants choose to reinvest accrued dividends.

3.2.5.3. Turn-of-the-Month Effect Literature in Detail

3.2.5.3.1. Australia

Worthington (2010) tests for the presence of the TOTM and two other anomalies in Australian daily stock returns (1958 – 2005) from the ASX All Ordinaries Price Index. Evidence is found of a positive market impact on the second trading day of the month which the author notes may correspond to the lagged influence of US stock market activity. The structural stability of the TOTM anomaly remains positive even after the 1987 stock market crash.

3.2.5.3.2. Eastern Europe

Tonchev et. al. (2004) study multiple calendar anomalies including the TOTM effect, focussing on the daily closing values for stock indices from three Eastern European emerging stock markets - the Czech Republic, Slovakia and Slovenia. Overall, insignificant evidence is found supporting the TOTM anomaly across each of the stock markets. The Czech PX-50 index is found to be significantly different from zero at ten percent level and the mean return at the second last (-2) day of the month appearing to be negative and lower than the mean return on all non-turn of the month days.

3.2.5.3.3. Finland

Finding higher stock returns during the TOTM on the Helsinki Stock Exchange, Booth et. al. (2001) attribute this to a substantial increase in bid quotes by larger traders. The authors state that this outcome concurs with those reached by Ogden (1990) and Ziemba (1991) that increased market liquidity is the most significant determinant of the TOTM effect in stock returns.

3.2.5.3.4. Hong Kong

Moreover, McGuinness (2006) provides significant support for the TOTM anomaly in small capitalization value stocks on the Hong Kong Hang Seng Small Cap Index (HSSCI) (2000 – 2005). An average return of 1.5% is recorded from the close of trading on the penultimate day of business in a calendar month and the subsequent close post five business days, compared to recorded returns over the preceding five-day period of approximately 0.3% on average.

3.2.5.3.5. India

Using historical stock returns data from both developed (S&P 500) and developing (S&P CNX Nifty) stock markets Bodla et. al. (2006) investigate the TOTM anomaly, to determine if any pattern or relationship exists between the two markets. Furthermore, the authors assess the returns data across the period covering January 1998 to August 2005 and then segment the data into a further two sets, i.e., 1998 - 2001 and 2002 - 2005 to determine if there are specific short and long run effects. No evidence supporting the TOTM anomaly for the S&P 500 is discovered, implying market efficiency. In relation to the S&P CNX Nifty a long run TOTM effect (1998 - 2005) is supported at the one percent level, as well as for the second short run period (2002 – 2005). No significant evidence for the first short run period (1998 – 2001) is recorded. This may imply the need for the development of a long-term momentum for the anomaly to become valid.

Maher et. al. (2013) investigate the presence of a TOTM anomaly across multiple indices in India and its causes. Their results support the existence of the anomaly over specific turn of the month days, −1 to +2, across numerous Indian market indices. Maher et. al. (2013) observe a significant increase in buy side trading volumes at month's end of both foreign and domestic institutional traders. The authors posit that such activity leads to increasing stock prices, which may be supporting the emergence and persistence of the anomaly. The anomaly appears to fade during periods of negative stock market activity. The authors note that the most likely explanation for the anomaly is based on the portfolio-rebalancing hypothesis of Barone (1990), due to the behaviour of institutional investors at months end, rather than Ogden's liquidity hypothesis or the release of US macroeconomic news announcements.

3.2.5.3.6. Indonesia

Pandekar et. al. (2015) find significant evidence for the TOTM anomaly in the Indonesian Jakarta Composite Index. According the authors the anomaly is observed pre-four transaction days from the month's end (D -4) up to post-eight days of the following month (D +8), a much longer time horizon compared to the majority of studies. Pandekar et. al. (2015) conclude that the anomaly is not related to timing of salary payments, but is more likely the result of an increase in the purchase of stocks by investment managers to improve the performance of stock portfolios, i.e. window dressing.

3.2.5.3.7. International Correlations

Kunkel et. al. (2003) examine the stock markets of nineteen countries (eight European countries, six Far East countries, two North American countries, two Latin American countries and South Africa) (1988 – 2000), providing international evidence supporting the existence of the TOTM anomaly. The authors find that the 4-day TOTM period accounts for 87% of monthly returns, on average, in the stock markets of 15 countries where the anomaly exists. The global nature of the anomaly, the authors state, lends weight to dismissing data mining or sampling error claims.

Jalonen et. al. (2010) use 2-year and 10-year US treasury notes and German government bonds and the influence of macroeconomic news releases to study the TOTM effect using. The authors suggest that government bond returns exhibit only a modest TOTM effect which is much less pronounced than the documented effect in stock markets.

According to Jalonen et. al. (2010) the clustered release of macroeconomic news does not appear to be influential in determining the significance of the anomaly.

Georgantopoulos et. al. (2011) investigate several calendar anomalies, including the TOTM anomaly across four developing stock market indices: Romania - Vanguard, Bulgaria - SOFIX, Croatia - CROBEX and Turkey - ISE National 50 and the more established Greek Athens General Index, from 2000 to 2008. The authors provide evidence showing a lack of any significant support for the anomaly across all three emerging Balkan markets, moderate support is demonstrated in the Greek index, while significant evidence is provided for the existence of the anomaly in Turkey's ISE National 50. This may mean that regional emerging markets behave independently, rather than interdependently, and are not influenced by any spill over effects from more developed larger regional stock markets.

Extending the 35-country sample size of McConnell et. al. (2008) to 50 international stock markets, Khaled et. al. (2012) examine the TOTM anomaly. As with McConnell et. al. (2008) the authors find evidence of the anomaly across international markets, highlighting that the anomaly occurs irrespective of whether closing values in markets on the last day of the month are either positive or negative. In an international study involving 22 countries covering Akbulut et. al. (2015) show that the anomaly is present for 21 out of 23 REIT markets (which included an additional global REIT market) and mostly manifested itself on the last trading day of the month.

3.2.5.3.8. Jordan

Focussing on the Middle East developing stock market of Jordan, Al-Jarrah et. al. (2011) study the TOTM anomaly on the General Index of the Amman Stock Exchange. Al-Jarrah et. al. (2011) contradict the common findings of the studies conducted in other emerging markets. The authors do not detect the presence of the anomaly, implying that the Amman Stock Exchange is at least weak form efficient. Using OLS and GARCH regression analysis and a data set consisting of the daily and monthly returns on the Amman Stock Exchange (2002 – 2011) Alrabadi et. al. (2012) find strong evidence for the TOTM anomaly. Finally, they note that these results are not consistent with previous studies focussing on emerging markets in the Middle East, though do not provide any explanation for the contradiction.

3.2.5.3.9. Malta

The main aim of the study undertaken by Camilleri (2008) was to detect the TOTM effect on the Malta Stock Exchange and whether any detected seasonality was related to the flow of information. Using the Kruskal-Wallis test to test for variation in the daily returns of the stock it was observed that the TOTM effect was evident due to the pronounced volatility which occurred towards the end of each month. Camilleri (2008) attributes this outcome to two factors: 1) a tendency for companies to issue announcements towards the end of the month and 2) an increase in cash available for investment due to salaries payments, thereby supporting conclusions reached in previous academic literature.

3.2.5.3.10. Montenegro

Investigating whether the Montenegrin capital market is efficient, using closing daily values from the stock market index NEX20, with regards to the January, holiday and TOTM effects. Karadzic et. al. (2011) conclude that only the TOTM effect is significant. The TOTM anomaly was analysed using a very limited data set of only two years (2004 – 2008). The current research expands on this by using a broader timeline potentially strengthening the efficacy and reliability of any results. Overall Karadzic et. al. (2011) conclude that the absence of some tested calendar anomalies suggests that the Montenegrin stock market is partially efficient.

3.2.5.3.11. Pakistan

In a further paper which investigates anomalies in a developing stock market Saeed et. al. (2011) provide a detailed examination of daily equity return patterns on Pakistan's KSE100 index (1997 – 2010), focussing on multiple anomalies including the TOTM effect. The data is also further divided into four 3-year sub-samples to determine if there are any time varying factors. Significant support for the TOTM effect is found across the entire sample period only and not in each of the sub-samples, which the authors note may be due to data sampling error.

Also examining daily equity return patterns on the KSE 100 index across multiple time periods: i) thirteen years (1997 – 2010) and ii) eleven years excluding the 2005 and 2008 years in which Pakistan experienced major stock market declines, Sanaullah et. al. (2012) reveal that the TOTM anomaly is present and significant in the first data set while it not evident in the second data set. This may imply that the anomaly is dependent on significant events such as reactions to substantial economic changes.

3.2.5.3.12. Russia

Compton et. al. (2013) examine the Russian stock and bond markets for evidence of calendar anomalies including the TOTM effect. The authors compare stock market returns across multiple Russian financial markets: the Russian Trading System Index (RTS Index), the Moscow Interbank Currency Exchange (MICEX Index), the RUX Cbond Index and MICEX Corporate Total Return Bond Index (MICEX CBI) bond indices and for US markets - the S&P 500 stock index and the Dow Jones Corporate Bond Index. The RTS stock index, the MICEX stock index and the S&P 500 stock index all show evidence of the existence of the anomaly. Both Russian bond indices also demonstrate significant evidence of the presence of the anomaly, while the Dow Jones Corporate Bond Index displays higher returns during the TOTM period compared to the rest of the month, though the returns are insignificant at the 10 percent level.

3.2.5.3.13. Singapore

Wong et. al. (2006) examine several anomalies, including the TOTM effect, in Singapore. Using data from the Straits Times Index (1993 – 2005) the authors break the data into three specific sub-sets. For the entire period (1993 – 2005) TOTM trading days earn predictable higher returns, on average, than other trading days for the full period and the two sub-periods. However, for the pre- and post-Asian financial crisis periods (i.e. 1 January, 1993 – 31 December 1997 and 1 January, 1998 – 31 December, 2005) a significant decline of the anomaly was detected from the pre-crisis period to the post-crisis period, with the anomaly evident in the pre-crisis period but diminishing significantly thereafter. Variability of the anomaly, maybe due to increased awareness and the anomaly being arbitraged out of existence, which would lend support to the assumption that the behavioural characteristics of Singapore's stock market support the weak-form of the EMH.

3.2.5.3.14. Thailand

Tangjitprom, (2011) also finds strong support for the TOTM effect in both the overall Stock Exchange of Thailand (SET) index and the SET50 index, an index of the top 50 companies based on market capitalization. The average financial return during the

TOTM period, according to the author, was 0.1451%, eight times higher than average stock return. The author comments that using the actual financial returns can be seen as a proxy for patterns of investor - stock market behaviour.

3.2.5.3.15. Turkey

Bildik (2004) examines stock market returns and trading activity in Istanbul Stock Exchange (ISE) for the presence of numerous calendar anomalies including the TOTM effect. The author finds statistically and economically large and positive returns, particularly from -1 to + 4 days and particularly from -1 to +2, which generate more than twice of the average return of rest of the month thereby confirming the existence of the anomaly. Furthermore, it is observed that another significant TOTM anomaly exists within Turkish equity markets. Consistent positive and large returns (0.51%) are noted around the 15th day of the month. The author links this to the standardization in payment systems of public sector of Turkey in which public employees and bills of public services in Turkey are paid on day fifteen of each month and supporting therefore Ogden's (1990) month-end cash flow hypothesis.

The TOTM effect was studied by Oguzsoy et. al. (2006) focussing on the ISE National 100 and 30 Composite Indices between 1988 and 1999. The authors extend the research undertaken by Bildik (2004) finding that not only is there evidence to support the existence of the anomaly but that the days surrounding the TOTM appear to be more highly significant than the actual turn of the month period. Oguzsoy et. al. (2006) state that the standardised payment of the salaries of public servants on the 15th of each month may be a strong influence on why the anomaly is persistent, supporting the outcome reached by Bildik (2004) and agreeing with Ogden's (1990) month-end cash flow hypothesis.

In a study which also looked at the REIT sector, and confirmed the outcomes reached by Compton et. al. (2006) and Wiley et. al. (2009), Hepsen (2012) specifically focusses on numerous anomalies within the ISE REIT market from 2000 to 2010 using a parametric OLS regression model. The TOTM effect is found to be present and significant across the entire period, which the author states may be as a result of institutional structures within the ISE. Also investigating the TOTM anomaly in the Turkish REIT indices, Aksoy et. al. (2015) provide empirical support for the anomaly.

The authors examine the Turkish REIT indices (Borsa Istanbul 100 Index (XU100) and Borsa Istanbul REIT's Index (XGMYO) and conclude that the empirical evidence provides strong support for the existence of the anomaly across both indices.

3.2.5.3.16. United States

Using a new data set with more robust methodologies (according to the authors) and multiple econometric tests Compton et. al. (2006) examine the daily financial returns of five U.S. real estate investment trusts (REIT's) indices - the 50 REIT, the all-REIT, the equity REIT, the hybrid REIT and the mortgage REIT to determine the existence of the turn of the month anomaly. Using both robust parametric and nonparametric tests Compton et. al. (2006) find significant support for the anomaly across all five indices noting that the six-day TOTM period employed accounted for over 100 per cent of the monthly return, on average, for the three non-mortgage REITs, whilst negative returns were generated for the rest of the month. The authors conclude, stating that the pervasiveness of the TOTM anomaly can be seen across multiple financial markets including domestic and international stock markets and domestic bond and non-mortgage REIT markets.

Nikkinen et. al. (2007) provide substantial support for the existence of the TOTM in relation to the S&P 100 index based on the macroeconomic news announcement hypothesis. Using a sample period from 1995 to 2003 the authors highlight the consistency in stock returns around US macroeconomic news releases which cluster around the TOTM period. The authors refer to this as the macroeconomic announcement hypothesis, arguing that the anomaly is correlated with major macroeconomic announcements which generally occur in the first half of the month. Three explanations are offered to support this. A spike in trading activity occurs around the release of important announcements as the investors trade according to their expectations before and after the announcements. Next there appears to occur in the first half of the month, a systematic clustering of important macroeconomic news announcements. Finally, the authors state that there is an observable correlation between investors' expected risks and hence expected returns, as well as realized volatilities and returns and the timing of the scheduled macroeconomic releases.

Using CRSP time series data over an eighty-year interval (1897 to 2005) McConnell et. al. (2008) determine the presence of the TOTM anomaly in US stock market activity. The authors highlight that for the entire eighty-year interval positive excess market returns in US stocks were consolidated over the four-day period beginning from the final day of the month until the close of day three of the following month. Moreover, according to McConnell et. al. (2008), for the remaining sixteen-day trading period within the month the equity premium is inadequate and unprofitable when market risk is considered. The authors state that the anomaly is not confined to small-cap or low-priced stocks or calendar year-ends or calendar quarter-ends; that it is not caused by higher volatility of returns at the TOTM or related to an increase in the risk-free rate or interest rates in general at the TOTM. They confirm the presence of the anomaly in 30 of the 34 non - U.S. countries that were considered. Finally, McConnell et. al. (2008) state Ogden's (1990) month-end cash flow hypothesis cannot adequately explain why the anomaly exists. This conclusion also contradicts the explanations offered by Bildik (2004) and Oguzsoy et al (2006).

Wiley et. al. (2009) analyse the significance of the TOTM effect in the US REIT market and the influence of institutional investment, employing a sample of 238 REITs covering the period 1980 to 2004. Their work extends the research undertaken by Compton et. al. (2006) by examining both the existence of the anomaly and the factors influencing it. The authors find that changes in US legislation (the Omnibus Reconciliation Act of 1993 which relaxed the requirements on the level of institutional investment in REITs) had a significant impact on the anomaly, which led to a substantial increase in institutional ownership of REIT stocks - 23 percent prior to the Act compared to 49 percent from 1994 to 2004. Wiley et. al. (2009) note that the anomaly can only partially be attributed to the behaviour of institutional investment through window-dressing of their portfolios. Another factor influencing the stability of the anomaly is attributed to employees who receive their salaries on the last day of the month and planned contributions go directly to institutional investors. An additional interesting observation is made by the authors highlighting a shift in the days in which the turn of the month anomaly occurs from the generally accepted −1 to +4 days to −4 to +1 days. In another study which also focuses on a different data set, Bouges et. al. (2009) research the American Depository Receipts (ADR's) market to explore the significance of the turn of the month anomaly, as well as a number of other anomalies.

Bouges et. al. (2009) use the Standard & Poor's (S&P) ADR index returns for the period 1998–2004 and cross reference this with an analysis of S&P 500 index returns. No support for any anomalies for is found for S&P 500 index returns, though a significant support is demonstrated for only the TOTM effect is discovered in S&P ADR index returns.

Sharma et. al. (2014) use an industry or sector-specific methodology to examine the TOTM anomaly and determine whether the anomaly is heterogeneous, as opposed to homogenous, in nature. Using time series data based on 560 individual firms listed on the NYSE the authors conclude that the anomaly is firm and sector specific and therefore not homogenous in its impact but heterogeneous. Furthermore, they state the specific stock market sector influences the sign of the anomaly. Urquhart et. al (2014), using time series data obtained from the DJIA (1900 - 2013), investigate the presence of the TOTM anomaly (and three other well-established calendar anomalies) concluding with an alternative theoretical explanation. Evidence is provided supporting the anomaly particularly during specific time periods such as positive months, bear markets, expansions, market crashes, and democrat presidencies. Furthermore, the authors state that adaptive market theory provides a more robust explanation for the anomaly - and calendar anomalies in general - than the EMH.

3.2.5.4. Application to Current Research

The TOTM anomaly, as with the DOW anomaly, occurs over a quite short time-frame. This is important as it may influence the behaviour of investors to look for immediate arbitrage opportunities and increase short term financial gains. To the researcher's best knowledge there is a limited availability of empirical literature regarding the TOTM anomaly from an Australian perspective, (Agrawal et. al. 1994, Kunkel et. al. 2003 and Worthington 2010). Consequently, using NSXA data to revisit the TOM anomaly may contribute to our understanding of the anomaly. Therefore, the current research will hypothesize the following:

$H_{9:}$ *The average returns of NSXA sub-indices at the turn of each month are not statistically significant.*

3.2.6. End of Financial Year Effect

3.2.6.1. Primary Researchers

In one of the earlier studies to compare the implications of the JE across international markets, Brown et al. (1983) note the similarity in tax laws between Australia and the US and provide evidence of both a December - January seasonal and July - August seasonal in the Australian stock market, which has a June - July financial year. Therefore, according to the authors, the relationship between the U.S. tax year and the January seasonal is more likely to be based not on causation but rather correlation. Additionally, the authors note that while TLS may appear to provide a plausible explanation for the July seasonal, the existence of the January seasonal in the Australian market leads to an inconsistency in the evidence favouring the TLS argument.

3.2.6.2. Key Proposition

The JE has been well documented across US and other international stock markets. The most consistent and accepted explanation for the occurrence of this anomaly has been the tax loss selling hypothesis, which implies that the actual anomaly is a tax year-end anomaly rather than a calendar year-end anomaly. This is an important distinction which may influence the validity of arguments used to explain the anomaly, particularly in an Australian context which observes a July – June financial year. There may be the possibility that international stock markets which demonstrate a significant January effect, and observe a different end of financial date to the US economy, may simply be experiencing a "spill over" effect from internationally influential US stock markets, thereby diminishing, or minimising somewhat, the accuracy of the tax loss selling argument.

3.2.6.3. End of Financial Year Effect Literature in Detail

3.2.6.3.1. Australia

Calibrating the effect of Australia’s Capital Gains Tax (CGT) on share prices and market activity Brown et. al. (2010) conclude that the June/end of financial year (EOFY) effect in Australian equities is largely driven by tax-motivated individual investors taking advantage of capital gains tax requirements and TLS opportunities, with investors’ order placement strategies being particularly evident in the second half of June. The authors highlight that at an industry level, smaller mining and exploration companies are more vulnerable to TLS. Worthington (2010) finds no evidence in the

Australian stock market of the JE effect. Interestingly the author also finds no support for an EOFY effect. Using closing prices from the ASX (1958 to 2005) as the primary data source, Worthington (2010) examines several calendar anomalies concluding that the Australian stock market is characterised by a significant negative February and stronger September seasonal.

Using stock return data of 50 individual Australian company stocks across multiple sub - indices (1980 to 2010) Liu et. al. (2011) find significantly positive April and December financial returns for over half of the 50 companies investigated whilst October returns for most companies were negative - this being inconsistent with the outcome reached by Worthington (2010), who found that September stock market financial returns were the lowest. TLS is questioned by Liu et al (2011) noting that only three stocks display a July anomaly. The lack of support for either a January of July effect and partial support for the December anomaly may have some correlation with the results reached by He et. al. (2011), with a degree of cointegration between the TRA-induced November effect in US stocks and the December effect observed by Liu et. al. (2011). Using time series data for all stocks listed on the ASX, Zhong et. al. (2014) state that rather than being consistent throughout the year, anomaly returns are concentrated in only specific months - documenting both a January and July effect. The EOFY effect is attributed to tax-related trading and partially to Australian fund managers engaging in window dressing particularly in December. The authors state though that tax related trading cannot explain the January seasonal. The most likely explanation for the January anomaly is a spill over from December TLS in US markets. February and November seasonal are also observed on the ASX, which the authors state cannot be explained by either tax trading strategies or a spill over effect.

3.2.6.3.2. Bangladesh

According to the January effect stocks follow a predictable pattern where overall prices tend to decrease towards the end of the month of December and rebound in January, particularly during the first week. Using Bangladesh Dhaka Stock Exchange time series data, Ahsan et. al. (2013) find no support for a JE, though significant evidence of a June anomaly, thereby contradicting the premise established by the EMH. With July being the first month of the financial year in Bangladesh, Ahsan et. al. (2013) note the absence of significant positive returns in July and reject the proposition of an EOFY anomaly and the accuracy of the TLS hypothesis.

3.2.6.3.3. China

Gao et. al. (2005), using data obtained from both the Shanghai and Shenzhen stock exchanges, look for the presence of a monthly anomaly. This study presents a unique perspective due to the Chinese fiscal year beginning in January, but the calendar year ending in February while also recognising that there are no taxes on capital gains. The authors demonstrate that a monthly calendar anomaly is present in Chinese stock markets noting a February effect, with average stock market returns in March and April being substantially higher compared to other months. Gao et. al. (2005) see this as playing the same role as the December-January anomaly for US or European investors. The TLS hypothesis is rejected as an explanation by the authors due to their being no capital gains tax in China, while an argument is made for investor speculative strategies at the end of the calendar year, rather than the tax end year, potentially influencing the cause of the February anomaly.

3.2.6.3.4. India

Raj et. al. (2006) investigate the presence of seasonal effects, and consequently market efficiency, in the Indian stock using weekly and daily returns from both the Bombay and National Stock Exchanges. The conclusions contradict some of the outcomes found in other research. Raj et. al. (2006) fail to find a positive JE, instead demonstrating a significant April effect which the authors state can be explained by EOFY TLS, with the financial year ending at March. This implies no concurrent or spill-over effect from markets which specifically exhibit a JE, implying the anomaly is not chronologically based but rather on tax implications.

Siddiqui et. al. (2013) explore the MOTY anomaly in India's S&P CNX Nifty and the relevance of the TLS hypothesis. The authors focus on the anomaly from the perspective of a financial tax year anomaly rather than a calendar anomaly, noting that the Indian financial year ends in March and therefore explore a "March effect". This presents a small oversight, on behalf of the authors, in that the JE is modelled, in a US context, on the anomaly occurring after the end of the US financial year, which is in December. Therefore, Siddiqui et. al. (2013) should have investigated an April effect to determine any correlation with the TLS hypothesis and not a March effect. Considering this oversight, Siddiqui et. al. (2013) find no support for their stated March (April) effect and consequently no support for TLS.

3.2.6.3.5. International Correlations

Darrat et. al. (2011) investigate the monthly seasonal pattern of returns on 34 MSCI country indices and the MSCI world index (1988 to 2010). The authors imply, through their findings, that there is much conjecture surrounding the JE, failing to find any significant JE, with 31 of the 34 indices displaying a stronger "other-than-January month effects", with significantly positive returns noticed for December and April while June, August and September display significantly negative returns. Furthermore, the authors state that the results cannot be sufficiently attributed to the TLS hypothesis due to the variety of different financial calendar years amongst the sample countries investigated.

Chen (2013) examines the efficacy of TLS across four different countries - the USA, the UK, Australia and China - with different tax regimes and tax year ends. The implication of this is that the MOTY/TOTY anomaly (if it is shown to exist) is an outcome of tax planning rather than a calendar event. The author finds support for TLS. The empirical evidence suggests that seasonal effects, due to TLS, occur in the UK in both January and April - the tax year end being 4 April for small companies and 31 December for medium and large-sized companies; in January in the USA - where the tax year ends in December and in July in Australia - where the tax year ends in June. No significant seasonal effect is observed in the Chinese stock market, which does not have any legislated capital gains tax applied to either companies or investors in the stock market.

3.2.6.3.6. Mauritius

Bundoo (2008) focuses on the emerging stock market of Mauritius, the SEM, to determine whether calendar anomalies are evident. A significant September effect is observed. Bundoo (2008) explains this outcome by stating that the financial year for companies ends on the 30th of June, with companies having a maximum of three months to file and release audited accounts. Therefore, a substantial spike in the number of companies releasing their audited accounts to the media occurs in the first or second week of September, leading to a corresponding spike in September returns. Consequently, Bundoo (2008) states "good news" earnings announcements have a direct influence on the observed September effect.

3.2.6.3.7. Syria

Mouselli et. al. (2016) focus on a newly established stock exchange, the Damascus Securities Exchange to test of MOTY effect. The authors explain that the Damascus Securities Exchange commenced trading at the beginning of 2010. This provides a potentially unique perspective due to the immaturity of the exchange and the possibility of stock market participants being unfamiliar with the anomalies literature. Such a relatively new stock market should be expected to display market trading efficiency. Mouselli et. al. (2016) explain that the EOFY (December) coincides with the calendar year in the Syrian economy. Therefore, it would be expected that if a monthly anomaly is evident it should occur in January according to the academic literature. However, the results of this paper preclude the existence of a January anomaly given that January returns are negative and insignificantly different from zero, while it is observed that the only positive and significant monthly returns are documented in May, suggesting a May effect. While Mouselli et. al. (2016) cannot provide a conclusive explanation for the existence of the May effect, they state that this is the month when most firms at Damascus Securities Exchange pay dividends and that this may be influencing investor behaviour and market trading activity.

3.2.6.3.8. United Kingdom

Another study which reached a similar conclusion to Brown et. al. (1983), rejecting the efficacy of the TLS argument, was Hillier et. al. (2002) looking at the UK stock market, with the tax year ending in April. Using a dataset consisting of all stocks traded on the London Stock Exchange (1986 to 1997), Hillier et. al. (2002) examine the JE/TOTY effect, finding the anomaly to be significant across stocks of all sizes, though inconsistent throughout the period investigated. The authors then test for the presence for the JE, based on TLS being the primary cause, at the UK April tax year end, finding evidence of excess abnormal share price returns, though not impacting upon excess abnormal stock price returns in January. Additionally, the calendar TOTY effect remains significantly positive and has a stronger impact on average returns than the tax year-end effect, which may imply some degree of co-integration between US and UK stock markets. Finally, the authors state that there is a TOTY effect in company returns that is unrelated to either tax-loss selling or insider trading activity.

3.2.6.3.9. United States

Complicating the outcome reached by Darrat et. al. (2011), He et. al. (2011) suggests that the January anomaly has disappeared and is now replaced by a November anomaly in US markets. This may explain the strong December returns noticed by Darrat et. al. (2011) which could be due to spill over or cointegration effects from US equities markets, rather than any EOFY effect. This is due to the Tax Reform Act (TRA) legislation having made two fundamental changes in financial accounting for US mutual funds - a change in the financial year end from 31 December to 31 October and the removal of the preferential tax treatment on capital gains. He et. al. (2011) postulate that if TLS is influencing the JE, the TRA of 1986 may have led to a change in the anomaly. Based on stock portfolio capitalisation the authors demonstrate support for the November effect post the 1986 TRA. In the pre-TRA period, large and small capitalized stock markets displayed strong JE type behaviour which correlated with the size anomaly. The November effect is independent of the size effect with the anomaly being influential in the stock market activity of both large and small capitalized stock markets.

3.2.6.4. Application to Current Research

The current study will endeavour to overcome, or circumvent, this potential discrepancy and provide a slightly clearer picture by investigating stock market behaviour in economies which observe an end of financial year date which is different to the US economy. This will enable a separation of calendar year and tax year end effects, providing a more precise explanation of the anomaly, if it is shown to exist. Therefore, the current research will hypothesize the following:

$H_{10:}$ The average return of NSXA sub-indices at the end of the Australian financial year is not statistically significant.

3.2.7. Holiday Effect

3.2.7.1. Primary Researchers

Numerous studies have documented the pre-holiday anomaly. In a seminal work using time series data obtained from the DJIA over a 90-year period Lakonishok et. al. (1988) find persistent anomalous returns around holidays and for several other periods. The authors demonstrate preholiday rates of return 23 times larger than the regular daily rate of return, while also explaining that holidays account for about 50 percent of the price increase in the DJ Index and that it would be unlikely that the observed anomaly occurred due to chance. Supporting Lakonishok et. al. (1988), Pettengill (1989) observes a holiday effect (HE) using data obtained from the S&P indices for the period from 1962 through to 1986.

3.2.7.2. Key Proposition

The HE, first observed in the 1930's, has been established as one of the most predictable and persistent of all the anomalies in the anomaly literature. The HE (sometimes referred to as a pre-holiday effect) refers to the strong tendency for abnormally high stock returns to accumulate immediately prior to the closure of stock markets before a holiday period. Numerous studies have documented the inverse relationship that appears to exist between firm size and the holiday effect, replicating the weekend and January effects.

Prior research has assumed that calendar anomalies are generally stable over time, irrespective of the internationalisation occurring between contemporary equity markets. Chong et. al. (2005) consider this assumption in a paper which examines whether there has been a decline in the HE for the U.S., U.K. and HK stock markets. The authors demonstrate that the impact of the effect has declined for each of the stocks markets, but only significantly in the U.S. and conclude that the typically positive pre-holiday effect reversed and became negative from 1991 to 1997 and subsequently was eliminated between 1997 and 2003. Contradicting this, Cao et. al. (2009) conclude that the HE is persistent in the NZ market being inversely related to firm size with the entire effect limited only to small firms and not observed for medium to large firms. Furthermore, the authors state that contrary to international empirical literature, the anomaly appears to have increased over time. The illiquidity of smaller stocks and the reluctance of small investors to buy prior to major market closures are considered as the most probable factors influencing the anomaly.

3.2.7.3. HE Literature in Detail

3.2.7.3.1. Africa

Using OLS regression and examining both the mean and conditional variance Alagidede (2008) investigates the HE across multiple African stock markets: the Nigerian NSE All Share Index, Kenyan NSE20 index, Tunisian Tunnindex, Moroccan MASI index, the South African FTSE/JSE All Share index, Egypt's CASE30 Share Index and ZSE Industrial index from Zimbabwe. Apart from South Africa, where the author finds a high and significant HE in stock returns, the anomaly is not detected for the other stock markets. This outcome may imply a degree of structural instability with regards to the anomaly as each of the stock markets investigated share common holidays, for example January 1 New Year's Day.

3.2.7.3.2. Central/Eastern Europe

Dodd et. al. (2011) focus on fourteen emerging Central and Eastern European stock markets (1991 to 2010) to determine whether there is any support for a HE. Empirical support is documented demonstrating the existence of both pre- and post-holiday anomalies for ten of the Central and Eastern European (CEE) stock markets, with the strongest pre-holiday effects occurring around New Year and Christmas. The research highlights the systemic nature of the anomaly, the results demonstrating that 23 out of 30 companies have lower transaction volumes the day immediately prior to the holiday. This result is consistent with the outcome reached by Cao et. al. (2009) who concluded that transaction volumes declined in the immediate pre-holiday period. Dodd et. al. (2011) state that the pre-holiday effect is most pronounced in the earlier years of the sample period and weaken over the forthcoming years. Compatible with Chong et al. (2005) and Marquering et. al. (2006), the researchers state the weakening influence of the anomaly is consistent with Central and Eastern European stock markets operating according to efficient market principles. Dodd et. al. (2011) state BF theories may offer the best explanation for the anomaly, with the emotions and attitudes of investors influencing their trading decisions around the holiday period.

3.2.7.3.3. China

Mitchell et. al. (2006) examine stock market financial returns in both the China A and B stock markets to determine the presence and significance of the HE. While the authors find evidence supporting the presence of the anomaly, they note that the anomalies effect is variable dependent on the type of stock. The HE is observed in the B stock markets around both cultural and non-cultural public holidays, and the post-holiday behaviour of (negative) returns being consistent with other international markets. In contrast, the anomaly is only strongly significant in both of the segmented A stock markets for the cultural state holidays around the Chinese Lunar New Year. Additionally, returns in the post-holiday period after the Chinese Lunar New Year tend to be positive.

In a study of stock market anomalies in mainland Chinese stock markets Cao et. al. (2007) analyse several calendar anomalies, including the HE, in each of the four Chinese markets, principally the Shanghai and Shenzhen A and B markets (1994 to 2006). The four holidays which are investigated include: the Spring Festival, Labour Day, National Day and New Year's Day. Concurring with Mitchell et. al. (2006), the authors provide highly significant evidence of a Spring Festival HE in each of the A and B Shanghai and Shenzhen markets. Additionally, the anomaly is shown to not only be statistically significant, but also economically significant. While Mitchell et. al. (2006) find that a significant HE exists in each of the B stock markets around both cultural and non-cultural public holidays, Cao et. al. (2007) contradict this stating that stock market financial returns for each of the four Chinese stock markets display insignificant seasonal behaviour around the other three holidays during which the stock markets are closed.

3.2.7.3.4. Europe

Applying simulation methods Carchano et. al. (2015) analyse both the statistical and the economic significance of the HE on the major European futures stock indices: the German DAX 30, the French CAC 40, the Spanish IBEX 35, as well as the Eurostoxx 50 to account for any specific pan- European effect. The authors focus only common European observed holidays: New Year's Day, Good Friday, Easter Monday, Labour Day, Christmas Day and Boxing Day. The research provides empirical support for the existence of statistically and economically abnormal positive pan-European, not country specific, pre- and post-holiday returns. The researchers state the results are not due to higher than normal levels of volatility - as trading volatility appears to reduce prior to the holiday period and increase post-holiday period - but possibly due to investors' preference to avoid offloading stocks around European holidays.

3.2.7.3.5. Greece

Coutts e.t al. (2000) evaluate the Athens Stock Exchange composite index (1986 to 1996) for several anomalies including the HE. The authors specifically focus on the banking, insurance and leasing indices, as well as the overall index. While the HE appears across each of the indices, only the banking and insurance sectors and the overall index provide a significant outcome. All four indices experience pre-holiday returns which are 6 to 13 times the mean returns for the remaining days of the year.

3.2.7.3.6. Gulf Co-operation Council

Exploring seasonality effects, Bley et. al. (2010) analyse historic daily stock market prices of SHUAA Capital indices (2000 to 2009) for the six-member countries of the Gulf Cooperation Council (GCC) region - Bahrain, Kuwait, Qatar, Oman, Saudi Arabia, and the United Arab Emirates - focussing on the most important Islamic holidays and two specific western country holidays, Christmas and New Year. Bley et. al. (2010) confirms the existence of the HE across the GCC region though its magnitude is country specific. Significant stock market returns are reported for the Middle Eastern religious holidays which according to the authors are driven by investor cultural backgrounds and religious beliefs in each individual country sampled, while Christmas and New Year holiday returns are reported as insignificant. The impact of country specific cultural backgrounds and/or religious beliefs mentioned by Bley et. al. (2010) supports the conclusion reached by Cao et. al. (2009).

3.2.7.3.7. International Correlations

Dumitriu et. al. (2012) investigate the presence of the HE before and during the global financial crisis across a group of 28 stock exchanges, divided into established and emerging stock markets. Time series data is divided into two groups to reflect the pre- and post-crisis periods: 2000 to 2008 (the pre-crisis period) and 2008 to 2011 (the post-crisis period). The mixed results obtained demonstrate the evolution of the anomaly and its stability. Summarizing the results:

1) No support for a pre- or post-HE during any time period is observed for seven of the indices - AEX General, Hang Seng, Straits Times, S&P TSX Composite, Swiss Market, Standard & Poor and the All Ordinaries, and 4 of the emerging stock market indices - CROBEX, BSE 30, KLSE Composite and TA 100, an outcome which would be indicative of weak form efficiency and support for the EMH;

2) A pre-HE existed in three indices prior to the financial the crisis which consequently evaporated during the crisis - the ATX, CAC 40 and FTSE 100, and across 4 emerging stock market indices - BET-C, Bovespa, Seoul Composite and IPC. This outcome may demonstrate evidence which is more is more consistent with the EMH;

3) For the Taiwan Weighted index, a pre-HE appeared only during the crisis;

4) Before the financial crisis post-HE were observed for four indices - BEL-20, ATX, CAC 40 and Nikkei 225, while during the crisis the anomaly disappeared for Nikkei 225 and appeared for FTSE 100;

5) In the post financial crisis period the anomaly appeared for five other indices - the Jakarta Composite, Shanghai Composite, BUX and Athex Composite Share Price Index. and MerVal and

6) Two indices, PX Index and BET-C, exhibited post-HE before the crisis which consequently disappeared during the crisis.

Overall the mixed results imply a degree of structural instability in the anomaly which may be a result of the various indices being weak from efficient and following EMH principles.

3.2.7.3.8. Palestine

In a research paper focussing the Palestine Securities Exchange a small emerging Middle Eastern stock market, Abu-Rub et. al. (2011) verify the impact of numerous holidays on stock prices and behaviour. The authors provide empirical evidence demonstrating that higher stock prices occur on the day immediately prior to holidays compared with low stock prices on the day post holidays. Interestingly a distinction is investigated between the impact of national holidays compared to religious holidays with a significant finding that prices were trading higher on days prior to religious holidays compared to national and weekend holidays.

3.2.7.3.9. Portugal

Gama et. al. (2013) demonstrate whether the holiday anomaly is a market closure effect or a ‘holiday spirit’ effect using a sample based on an equal-weighted average of the fifty Portuguese firms as well as five industry portfolios, focussing on nine holidays specific to Portugal. A statistically significant negative liquidity effect and an economically and statistically significant positive price effect during Portuguese-specific national holidays relative to a typical trading day is discovered. Furthermore, these effects are a result of trading activity of smaller sized stocks. The authors postulate that investor psychology, particularly their mood, are the key driver for the results obtained. Consequently, in the immediate preholiday period stock prices increase due to positive sentiments felt by stock traders’ which manifests into either buying pressure or reluctance to sell.

3.2.7.3.10. South America

Using a GARCH econometric approach Blandon (2010) finds no evidence of a HE across two Latibex indices. This paper investigates calendar anomalies in the Spanish Latibex and Latibex Top indices, an international index for Latin American securities from Brazil, Mexico, Chile, Peru, Argentina and Puerto Rico. A possible explanation for the outcome, according to Blandon (2010), is that a composite index with shares from several different markets may behave differently and dilute the impact of an anomaly, in this instance the HE, compared to what may occur in the individual stock markets of the countries that make up the Latibex index.

3.2.7.3.11. Turkey

Aydoğan et. al. (2003) investigate the presence of calendar anomalies focussing on the Turkish foreign exchange market (1986 to 1994). The authors focus only on the relationship, if any, between the free market and official exchange rates of the Turkish lira, the US dollar and the German mark because all other currencies contribute little to the volume of Turkish foreign exchange transactions. A HE is only observed in the form of lower free market German mark returns before holidays. Aydogan et. al. (2003) state that this outcome may be due wage earners engaging in currency substitution behaviour preferring to trade in German currency.

Akyol (2011) provides a unique perspective in a study which examines intraday stock returns in the Istanbul Stock Exchange around non-trading periods, namely weekends and holidays, by utilizing the exchange’s structure of two trading sessions. Overall the analysis reveals a positive pre-HE, while it is demonstrated that the duration of the holiday is positively correlated with magnitude of the return pattern around holidays. Morning and afternoon trading sessions variably influence the pattern of returns. In relation to long holidays pre-holiday morning session returns are more positive compared to short holidays. In the immediate post-holiday period stock market returns over the morning session are less positive. The researcher highlights the significance of relationship between uncertainty (investor psychology) and the length of non-trading periods.

3.2.7.3.12. United States

Marquering et. al. (2006) examine how well-known anomalies have behaved over time since their initial publication in the academic literature, i.e., do anomalies disappear or reverse after they have been published in academic journals? A number of anomalies including the HE are considered. Overall Marquering et. al. (2006) state that anomalies are much less pronounced after being documented in the academic literature. The authors note the strong presence of the HE in DJIA returns during the early 1970s, weakening substantially in the 1980s. After the publication of the seminal paper by Lakonishok et. al. (1988), and a few other influential academic papers, there was an initial spike in the HE, which then began to substantially diminish and eventually disappear, what is often referred to as a “reverse holiday effect”.

Bouges et. al. (2009) test for the presence of a pre-HE in ADR returns. Average daily returns are computed for both the S&P ADR and the S&P 500 indices (which is used for comparison purposes) covering the period from 1998 to 2004. ADR's allow US investors to have exposure to the stocks of foreign corporations while still being able to invest locally using US currency. No pre-HE in either of the indices is established according to the authors, which may lend some weight to the conclusion reached by Marquering et. al. (2006) that widespread awareness of the anomaly has caused it to disappear.

3.2.7.4. Application to Current Research

The contradictory evidence presents an opportunity to further investigate the HE through the lens of a new dataset, the NSXA. With the overall market capitalisation of the NSXA being much smaller compared to the ASX, this may provide further insight into the behaviour of the anomaly and confirm findings such as Cao et. al. (2009). Consequently, the current research will hypothesize the following:

$H_{11:}$ The average return of NSXA sub-indices are not influenced by national holidays.

3.2.8. Event Variables

3.2.8.1. Primary Researchers

One of the earliest published research papers which investigated the impact of an event was undertaken by Dolley (1933) which looked the relationship between the announcement of a stock split and the movement in stock prices. The seminal event studies papers were undertaken by Ball et. al. (1968) who considered the information content of a publicly listed company's earning and Fama et. al. (1969) who considered the effects of stock splits.

3.2.8.2. Key Proposition

An event study attempts to determine if there is any correlation between the impact of a specific event and the behaviour of individual stocks or a stock market leading to abnormal financial returns. An event can include either macro or micro economic and/or financial variables, political / regulatory factors, any significant unanticipated event such as a weather event or sporting or cultural events. Event studies have generally fallen into two categories: 1) market efficiency based studies which assess the speed of market reactions to new information and 2) information usefulness studies which assess the impact of news announcements on company returns. Event studies rely on three major assumptions: 1) the event was new or unanticipated, 2) any confounding effects were not present during the event window and (3) financial markets are efficient. Theoretically it may be expected the effects of an event will be reflected immediately in a stock's value. The measurement of abnormal stock returns is the fundamental rationale at the core of an event study.

3.2.8.3. Events Literature in Detail

3.2.8.3.1. Australia

Worthington (2007) examines the Melbourne Cup horse racing event and the impact on returns on the ASX. Comparing Tuesday stock market returns throughout the month of November, the day and month the event takes place, the author notes an asymmetric relationship between the event and return behaviour. Significantly higher Melbourne Cup day returns were observed compared to returns on other Tuesdays in November, as well as Tuesdays in all other months indicating the significance of sporting exuberance over stock market behaviour.

Worthington (2009) looks at the influence of political cycles on average Australian stock market returns from 1901 to 2005, reaching a similar conclusion to Bohl et al (2006). The difference between market returns in non-Labour and Labour governments is shown to be insignificant from 1950 onwards, with only a weak association prior to this period that non-Labour governments had a higher market returns compared to Labour governments.

3.2.8.3.2. Egypt

Nezerwe (2013) examines the relationship between the 2005 and 2012 Egyptian presidential elections, specifically the ninety-day event window around the elections, and stock returns on the Egyptian Stock Exchange. The results showed that both elections had a direct positive impact on stock returns in the Egyptian Stock Exchange.

3.2.8.3.3. Greece

Whereas Veraros et. al. (2004) report a positive outcome on the Athens Stock Exchange resulting from Greece's successful nomination to hold the 2004 Olympics, Floros

(2010) examines the relationship between hosting the Athens Olympic games and its impact on the general index of the Athens Stock Exchange. The author finds no significant financial impact on the Athens Stock Exchange from holding the games. These outcomes may indicate support for stock market efficiency as the initial announcement has a short lived positive impact which quickly dissipates once the news is absorbed by stock market participants.

3.2.8.3.4. India

Mishra et. al. (2010) studied the impact of the Indian national cricket team's performance on India's National Stock Exchange main index, the CNX Nifty, for the period 1995 to 2005. Their results are supportive of the conclusion reached by Edmans et al (2007), providing empirical support for the relationship between the Indian national cricket teams' performance and its effect on stock market returns. No statistical significance was attributed to wins while losses resulted in a significant negative movement in stock market returns, with the magnitude of the negative movement being even more substantial when Indian player Sachin Tendulkar was involved.

3.2.8.3.5. International Correlations

Veraros et. al. (2004) find a statistically significant positive impact on the overall Athens Stock Exchange overall, and on infrastructure-related stocks specifically, after the news announcement awarding the 2004 Olympic Games to Greece. However, according to Veraros et. al. (2004), the primary loser country Italy displayed no significant effect in relation to returns on the Milan Stock Exchange.

The relationship between presidential election results and stock market performance is investigated by Nippani et. al. (2005), focussing specifically on the delayed results from the 2000 US presidential election on the leading stock indices from Canada - the Toronto 300 Composite and Mexico - the I.P.C. All-Share index. The aim of the research was twofold: to determine if political elections influences stock market performance and assess the level of co-integration, if any, between each of the stock markets. The authors document that the political uncertainty caused by the delay in the declaration of a winner was reflected in stock market prices, with stock prices being negatively affected by the election uncertainty. Additionally, the authors state that this outcome mirrored what occurred in US stock markets and therefore demonstrated the robust nature of co-integration between cross border stock markets.

Using a sample of 27 industrialized nations stock markets obtained from the Morgan Stanley Capital International World Index Białkowski et. al. (2006) investigate whether national elections induce higher stock market volatility. Overall, the researchers demonstrate that political elections may engender uncertainty in financial markets as national elections induce periods of increased volatility in stock market returns, particularly before elections, while risk premiums remain relatively modest.

Edmans et. al. (2007) use international soccer (and other sporting codes) results as a mood variable to investigate the effect of investor sentiment on stock market returns and predictability in 39 countries. It is found that losses in the various sporting codes leads to an economically and statistically significant negative effect on the losing country's stock market, with the magnitude of the effect being greatest for soccer losses, while the outcome is greatest for small capitalised stocks. According to the authors elimination from a major international soccer tournament is associated with a next-day return on national stock market indices that is 38 basis points lower than average. Correspondingly, there is no significant association between sporting wins and stock market return patterns.

Klein et. al. (2009) test for a relation between soccer match results and numerous international stock indices returns during the period 1990–2006. The authors find no significant association between sporting results/sentiment and stock market performance across each of the indices investigated, thereby contradicting results obtained by previous research such as Veraros et. al. (2004) and Worthington (2007) as well as questioning previous research methodologies such as Edmans et. al. (2007).
Employing a cross-section of 81 winning countries Martins et. al. (2011) investigate the impact of the announcement of large international sporting and cultural events such as the Summer and Winter Olympic Games, the World Football Cup, the European Football Cup and World and Specialized Exhibitions on the stock markets of host countries. Contradicting the conclusions reached in previous studies (Veraros et. al., 2004 and Edmans et. al., 2007) on average stock price reaction upon the announcements is found to be insignificant. The researchers also measure stock price reaction across

numerous other event-windows finding inconclusive results. Unlike Chen et. al. (2005) and Chiang et. al. (2009), Martins et. al. (2011) find no evidence supporting the relationship between events and specific indices/sectoral impacts.

An et. al. (2012) using time series data (1950 to 2006) examine stock return volatility for 16 countries pre- and post and during an election period. According to the authors robust predictable patterns appear with volatility declining as election months approach, rapid increases in stock market volatility during and immediately after the election period, which is consistent with Bialkowski's et. al. (2006) reported findings, with a return to stability during the post-election period. This pattern of behaviour occurs irrespective of the political affiliation of the winning political party. Ehrmann et. al. (2012) use high frequency minute-by-minute trading data from the stock exchanges of nine European countries, four Latin American countries and one country each from North America and Africa to determine the effects of shifts in investor attention caused by a major sporting event such as the FIFA 2010 World Cup games. Three specific findings are noted: 1) trading activity across all stock exchanges in the data set declined sharply (by 55 percent) and if the national team was involved the decline was 45 percent; 2) market activity immediately pre-match and 45 minutes post-match was substantially lower and 3) goals scored by either team led to an even stronger decline in the number of trades and offered quotes. Finally, Ehrmann et. al. (2012) state that such behaviour had an asymmetric contribution to stock price formation.

Akhter et. al. (2015) study the impact of the Zul-Hijjah religious event on both stock market return and volatility of the six Islamic countries and their indices - Pakistan, Turkey, Indonesia, Malaysia, Egypt and Morocco. Negative stock market returns are observed only for the Malaysian stock exchange, while in relation to volatility a direct relationship is demonstrated between the religious event and the Turkish, Moroccan and Egyptian stock markets. Also investigating the impact of religious events on financial markets Al-Ississ (2015) studies the effect of the Ramadan holy day on the daily returns of ten Muslim financial markets over the period January 1995 to August 2012. The results show that for the two most influential holy day categories, Odd-Days and Ramadan 27th, the holy day effect holds, for the most part, on an individual country basis. Stock market returns on Ramadan’s last five odd days are positive in six of the ten countries, negative in Turkey and not significant in Morocco, Malaysia and Qatar.

Returns on Ramadan 27th are positive and significant for all countries except for Morocco and Qatar which are insignificant.

3.2.8.3.6. Israel

Zach (2003) focuses on the period between 1993 and 1997 to provide empirical support demonstrating that stock returns on the Israeli Stock Exchange were stronger and more volatile on days following political events compared to non-event days, with more extreme returns observed following any news relating to the peace process between Israel and Palestine. The paper highlights that returns on stocks that are cross-listed (both in Israel and in the US) exhibit a similar behaviour. This outcome demonstrates that political events can directly influence stock market behaviour within borders and across borders leading to a degree of predictability.

3.2.8.3.7. Pakistan

Taimur et. al. (2015) research the impact of political events (1998 to 2009) on the Pakistan KSE-100 Index returns. Political events were reported to have a short time impact on stock returns, with favourable political events influencing stock returns for a period only up to five days, while unfavourable events influencing stock returns from the next day after the event to the fifth day. The short-lived nature of political events as observed by Taimur et. al. (2015) is supportive of the conclusion reached by Bohl et. al. (2006).

3.2.8.3.8. Singapore

In a study which supported Chen et. al. (2005), Chiang et. al. (2009) examine the relationships between a number of macroeconomic and non-macroeconomic variables and hotel stock returns on the Singapore Stock Exchange. Chiang et. al. (2009) indicate that unexpected non-macroeconomic events (such as the US 911 terrorist attack, the Bali bombing, the Iraqi War, the SARS outbreak or the Japanese tsunami crisis) were highly significant in determining hotel stock returns, while expected events had no predicative powers. The authors state that this outcome provides at least partial confirmation for the EMH. Furthermore, macroeconomic news announcements proved to have less significant explanatory power in relation to explaining hotel stock returns compared to unexpected non-macroeconomic events.

3.2.8.3.9. Taiwan

Chen et. al. (2005) focus specifically on Taiwanese hotel stocks and test the degree to which macroeconomic and non-macroeconomic variables influence returns and behaviour and provide a comparison of the significance of the two variables. This study confirmed that non-macroeconomic variables were significantly more influential than macroeconomic variables in impacting stock returns. According to Chen et. al. (2005) events such the 9/11 terrorist attacks and the SARS outbreak had a significant negative impact on Taiwanese hotel stock returns. The authors state that investors' appetite for risk, particularly with regards to the impact on the cash flows from holding hotel stocks, could be seen as the major cause for the negative stock performance.

3.2.8.3.10. Turkey

Using Istanbul Stock Exchange (ISE) 100 index return data Mandaci (2003) evaluates the impact of four general elections on stock market behaviour: 20 November 1991; 24 December 1995; 18 April 1999 and 3 November 2002 – with index returns analysed fifteen days before and after the general elections. In the window just prior to and post the election the author observes statistically significant abnormal returns. However, for most of the days prior to and following elections, a statistically meaningful abnormal return was not observed.

In a research paper looking at the impact of political and economic news on the mean and volatility of stock returns, Ilkucan et. al. (2004) provide significant support demonstrating the immediacy with which stock markets react. Focussing on intraday data (i.e. 15-minute returns pre- and post-announcement) from the ISE 100 index and dividing news announcements into four specific categories: domestic economic, foreign economic, domestic political and foreign political the authors detail how different events affect stock market behaviour. The immediate pre- and post-time periods are used as the authors believe this is enough time for investors to become aware of any new announcements and react accordingly, as well as ensuring that any stock market reaction is not affected by some other overlapping factor. An asymmetric relationship is found between domestic political news and both mean and volatility of returns, while domestic economic and foreign political news announcements have no impact. Significant increases in mean stock returns, though not volatility, are observed based on foreign economic news announcements. The immediacy of the impact and its relationship to political events provides some support to the outcome reached by Mandaci (2003).

Focussing on exchange rates rather than stock market behaviour Demir et. al. (2014) provide a causal link between an event such as a national soccer game and financial market behaviour. Demir et. al. (2014) compare the impact of three local soccer clubs playing in international tournaments compared to the Turkish national team on the predictability of exchange rate movements. The period covered is from 2003 to 2010. The influence of local teams is found to be negligible whilst robust evidence is provided for the ability of the national team to influence exchange rate movements after a win. Irrespective of who plays, draws and losses are seen to be insignificant in influencing exchange rate outcomes. According to the authors psychological variables may have an equally important influence over exchange rate behaviour as do the implications of the EMH. Sevil et. al. (2015) examine stock returns and sport sentiment on the Turkish BIST stock market index. The authors discover a positive and significant association between national match days and stock returns, concluding that sport sentiment is effective predictor of returns on the BIST.

3.2.8.3.11. United States

Bohl et. al. (2006) question the long-term validity of election cycles to influence and predict stock market behaviour. Using monthly data over an extended period, 1953 to 2003, the authors use a real-time modelling approach to investigate the efficacy of U.S. political stock market anomalies for forecasting excess stock returns. Specifically, their research paper test two stock market anomalies: the Democratic premium - in which it is assumed that that excess stock returns are accrued under Democratic presidencies compared to Republican presidencies and the presidential cycle effect - which denotes that during the second half of a presidential election cycle excess stock returns are achievable. Overall it is found that the financial impact of U.S. political stock market anomalies is only short-term, thereby not contradicting the EMH. Bohl et. al. (2006) state that political variables do not systematically affect an investor’s market-timing ability and that political variables do not systematically improve forecasts of excess stock market returns. The empirical findings of Li et. al. (2006) support the conclusion reached by Bialkowski et. al. (2006) in that political elections have the potential to create uncertainty in stock markets leading to predictable return outcome, thereby contradicting Bohl et. al (2006). Li et. al. (2006) study US presidential elections (1964 to 2000) to determine if there is any correlation between the election period and stock market returns and volatility. Empirical evidence is provided demonstrating that when the outcome of the election is unclear there is a corresponding increase in stock prices. Furthermore, an indecisive presidential preference polls leads to an increase in stock market volatility.

Jones et. al. (2009) investigate the relationship between stock market performance and numerous U.S. elections using monthly stock returns over a period of 104 years. Unlike studies such as Nippani et. al. (2005), Białkowski et. al. (2006), and Bohl et. al. (2006), no long or short-term association is found between U.S. presidential elections and stock market performance. As well no support is provided for the relationship between the predictability of stock returns and timing within the election cycle or what is referred to as the second-half effect.

Kaplanski et. al. (2010) investigate the effect of the World Cup soccer tournament US stock returns and reach a similar conclusion Edmans et. al. (2007) with an asymmetric relationship between the event and stock market returns. Specifically, Kaplanski et. al. (2010) demonstrate that US stock average returns are significantly lower (- 2.58 percent) during the World Cup soccer tournament compared to other trading day average returns (+1.21 percent) over the same period. The authors also state that this outcome is also economically exploitable using specific trading strategies. Ejara et. al. (2012) determine the extent to which election polling information is incorporated into stock prices. Focussing on the 2008 presidential election between Barack Obama and John McCain and using daily returns data obtained the S&P500 index, the NASDAQ index and CRSP Value Weighted and CRSP equally weighted indices, the authors postulate that U.S. stock markets reactions to the prospect of Barack Obama winning the election would be negative and positive for John McCain. The authors' results demonstrate a consistent pattern in which the stock market reacted negatively (positively) when Obama (McCain) had poll advantage over McCain (Obama).

3.2.8.4. Application to Current Research

Methodologies in event studies have either adopted short horizon or long horizons. While short horizon methodologies have been straightforward (the method adopted in the current research), the analysis of long-run abnormal returns based on events has been considered problematic, particularly in relation to joint test problems. A large body of empirical research has examined the correlation between numerous types of event variables and stock market behaviour, though in an Australian context this has been both more limited and with an emphasis on economic and political events, (Białkowski 2008 and Worthington 2006, 2008). The current research will fill this gap by focussing on three specific major sporting events which could be considered part of the Australian cultural fabric due to their acceptance and history. As well, the current study will also examine the role of political events (i.e. elections) providing the opportunity to compare the two types of events and their impact, if any. Finally, the current research will also examine the impact of U.S. presidential elections on the NSXA to determine if there is any spill over effect, an area that, to the best knowledge of the current research, has not previously been formally investigated in an Australian context. Therefore, the current research will hypothesize the following:

The average return of NSXA sub-indices are not influenced by:

$H_{12:}$ *the Australian federal elections or*

$H_{13:}$ *the U.S. Presidential elections.*

The average return of NSXA sub-indices are not influenced by the following sporting events:

$H_{14:}$ *the AFL Grand Final;*

$H_{15:}$ *the NRL Grand Final or*

$H_{16:}$ *the Melbourne Cup.*

3.3. Limitations of the existing literature and the motivation for the present thesis

The predictability of stock market behaviour, with a specific focus on anomalies, has received abundant attention from academics, professionals and individual investors examining ways to financially exploit opportunities created by anomalies. Much attention has focused on arbitrage opportunities which consider transaction costs to create profitable trading strategies. There is almost an infinite amount of conjecture within the academic literature and professional practice over whether anomalies offer any profitable arbitrage opportunities. There are innumerable studies on the efficacy of anomalies and the predictability of stock market outcomes which have focussed on both the stock markets of developed and emerging economies/markets and furthermore within the Australian economy (Brown et al. 1983; Brown et. al. 2010; Gray et. al. 2007; Heaton et. al. 2011 and Worthington 2009 and 2010). However, what does not appear to have been fully explored, to the best understanding of the researcher, is stock market behaviour of an emerging stock exchange within a developed economy, i.e. a relatively recently established stock exchange. This is the context of the current research, which will examine anomalous behaviour within the NSXA, a much smaller (compared to the ASX), less reported and more recently established stock exchange in the Australian economy/marketplace.

While a plethora of studies currently exists within the anomalies field their coverage is far from exhaustive, particularly from an Australian context it is quite surprising that there has been a total neglect to consider anomalous behaviour using a new data set - closing stock values of companies listed on the NSXA. This paper aims to address this void in the literature. A multi-factor model, consisting of calendar, seasonal, behavioural and macroeconomic anomalies, is used to determine the predictability of behaviour on the NSXA. While the NSXA has a total market capitalisation equivalent to approximately 13 percent of the ASX an investigation based on this particular stock exchange may shed further insight into the power of anomalies and the efficacy of efficient markets.

Given the paucity in the existing literature the following research questions provide a further contribution to the current anomalies literature:

1) Does the theory relating to efficient market apply to an "alternative" stock market - the NSXA?

2) If efficient market theories are demonstrated to not be entirely valid does this mean that anomalous stock market behaviour and trading strategies can be exploited to obtain superior financial returns?

The current research employs one of the most comprehensive conceptual frameworks to ensure a both a complete understanding of the degree of impact, if any, of anomalies and which anomalies are more influential in influencing stock market behaviour. To the researcher's knowledge, this is a pioneer study as it is the first to implement such a comprehensive model and a unique historical data source to investigate the behavioural aspects of a stock market.

3.4. Conceptual framework

The conceptual framework (Figure 3.4.a) in the current study is established by mapping between the theoretical foundations and the identified gaps in the literature. The conceptual framework addresses the research questions relating to the anomalous behaviour in an emerging stock exchange. The issue regarding the role played by anomalies in the behaviour of an efficient stock market are represented in the conceptual framework. The current research goes further than previous studies in evaluating the relationship between efficient markets and anomalies by adopting one of the most comprehensive theoretical models which underpins the conceptual framework.

Figure 3.4.a provides a framework within which the key variables in this research are investigated. The literature review in chapter 2 provides the background explaining the theories in the conceptual framework. These theories question the reliability of the EMH due to the prevalence of several anomalies, such as those shown in the conceptual framework. The anomalies in the conceptual framework, which have been discussed in detail throughout chapter three the empirical evidence review, presents a challenge to the core premise of the EMH, which states that stock markets follow a random pattern, by highlighting a degree of predictability in stock market behaviour. This study

adopts a broad approach in relation to the number of variables and their specific influence on a small emerging stock exchange, i.e. the link between these two factors. The research aims to answer the research questions relating to the existence of stock market anomalies and the factors which may be underpinning them.

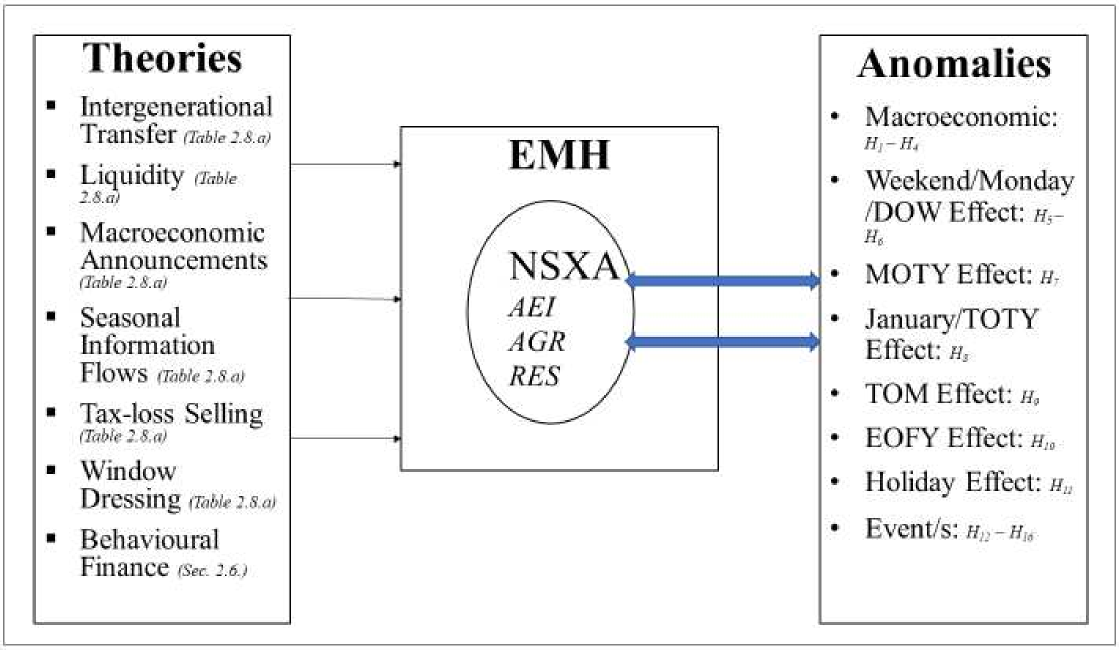


Figure 3.4.a; Conceptual framework (*LEGEND*: DOW – Day of the week; MOTY – Month of the year; TOTY – Turn of the year; TOM – Turn of the month; EOFY – End of the financial year)

3.5. Summary

The aim of the current chapter was to present a synthesis of the literature in relation to a number of stock market anomalies and their role in the behaviour of stock markets. The chapter provides a comprehensive discussion of the research literature, including some of the seminal arguments, relating to the predictability of stock market behaviour. What is inherent in much of the literature is that the debate over the practical relevance of anomalies and the ability to develop financially profitable arbitrage opportunities is open to conjecture.

A review of the literature reveals several significant themes including:

1. The efficacy of the EMH, while not being dismissed, is open to question and challenge.

2. Many scholarly articles do not see anomalous behaviour as refuting the core concepts within the efficient markets theory, but as a natural outcome of stock market participants acting rationally.

3. While many anomalies remain, they are considered more a statistical artefact rather than an economically exploitable opportunity.

4. The academic literature which highlights the link between anomalies and arbitrage opportunities tends to focus on emerging or less developed stock markets.

5. Several anomalies have been studied and observed in other types of financial markets, such as futures and currency markets.

The subsequent chapter will provide an overview of the NSXA and will be followed by a chapter explaining the research design and methodology in detail.

4. CONTEXT OF THE STUDY

4.1. Introduction

The NSXA, based in Newcastle, New South Wales Australia, is owned and operated by NSX Limited, which listed on the ASX on 13 January 2005. A formal application was made to change the name of the Newcastle Stock Exchange of the National Stock Exchange of Australia on 20 December 2006, which was subsequently approved. The NSXA provides both Australian and overseas companies the opportunity to list on the exchange providing specific listing rule requirements are met. Trading is undertaken via an electronic on time and price priority platform using technology developed by the NASDAQ. Settlement of securities is undertaken electronically, with settlement required on a T+3-day basis for electronic settlement, while certified securities are settled on a T+5 basis. Both the NSXA and SIMVSE financial exchanges are supervised by the Australian Securities and Investment Commission and are subject to annual reviews as required by the *Australian Corporations Act* 2001(Cth).

4.2. History

The origins of the NSXA can be traced back to the establishment of the Newcastle Stock Exchange in 1937. As many as 300 local and regional companies were listed on the Newcastle Stock Exchange, with some, such as Brambles, Coal and Allied Ltd and Steggles Holdings Ltd growing to become significant businesses. Other companies such as Becton were originally listed on the NSXA, before migrating to the ASX. After a period of dormancy, the exchange was re-established in February 2000, growing to become the second largest listing stock exchange in Australia. The NSXA was officially reopened in March 2000. On 21 December 2006 the NSX changed its name to the National Stock Exchange of Australia Limited. The NSXA acquired the Bendigo Stock Exchange (BSX) on 12 April 2005, though subsequently closed it in June 2012 and replaced the BSX with the SIM Venture Securities Exchange. The objective of this strategy was to offer a specialist stock exchange specifically for stocks in the clean technology / environmental sector. To date this strategy appears to have proven ineffective as the SIMSVE currently has no listed stocks. The NSX has operated several other exchanges, such as the Taxi Market and National License Market and the Water Exchange, with very limited success.

4.3. Current Activities

The NSXA is currently the only operational listing alternative to the ASX in the Australian economy. Thirteen IPO's were concluded in 2015 on the NSXA official list in 2015, an increase of 86 percent over 2014 and representing 10 percent of all new listings in the Australian marketplace. Of the new listings on the NSXA in 2015, 70 percent were international companies domiciled in countries including Malaysia, China, the United States and New Zealand.

The NSX, through the NSXA, provides a point of differentiation to the ASX for companies wishing to take their companies public based on offering three listing models:

1) Conventional – the standard market trading model with no trading restrictions. This model is the most popular with companies as it represents the standard and most well-known and accepted form of stock trading. An investor is able to invest and trade in any stock at any time during business hours with the conventional model.

2) Closed market – investors are restricted to a particular group specified by the listed company. This model is favoured by companies with a restricted membership type ownership base. The NSX document "All about listing on the NSXA" provides some examples of such companies including: Australian United Retailers (Foodworks), Ricegrowers Ltd (Sunrice) and Sugar Terminals Ltd.

3) Trading windows – according to this method trading occurs only twice per year for six weeks after semi and annual reporting. The aim of such restrictive trading is to focus liquidity around periods where news occurs and away from quiet periods. The trading windows model is currently restricted to property based managed investment schemes.

Additionally, the NSX's trading platform is host to the South Pacific Stock Exchange, Fiji's national stock exchange.

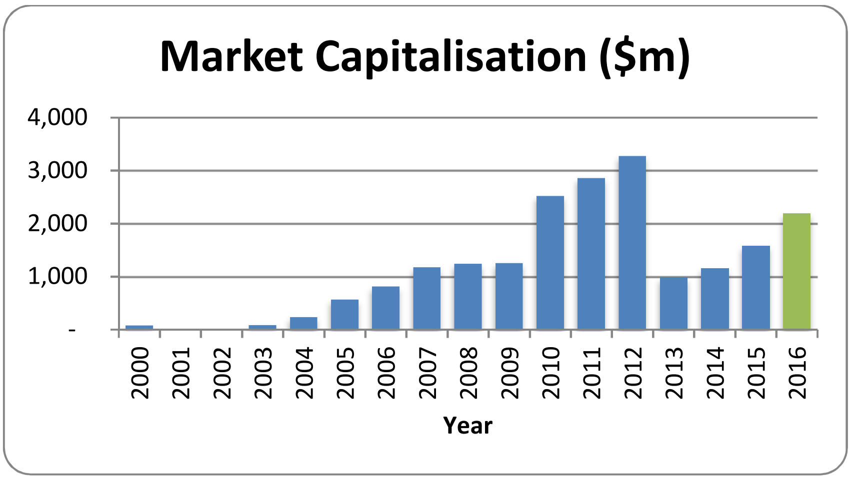
The following tables and graphs provide a summary of some of the main features of the NSXA. What they demonstrate is that while the overall number of listed securities on the NSXA is small (particularly in comparison to the ASX) the market capitalisation of securities on average is becoming larger. For example, while between 2013 and 2015 there was approximately a 23 percent reduction in the number of listed securities, there was a corresponding increase in the market capitalisation of securities of 50 percent. This implies a concentration of securities towards larger companies and financial instruments.

Table 4.3.a; NSXA and SIMSVE securities listing history

CALENDAR YEAR	2011	2012	2013	2014	2015
Fully Paid Ordinary	79	69	64	65	69
Partly Paid Ordinary	1	1	1	1	1
Debt Securities	47	50	46	38	18
Preference Securities	2	1	5	3	3
Company Issued Options	8	5	5	2	3
Property Trusts	1	2	2	1	1
Total Listed Securities	138	128	123	110	95
Delisted Securities	18	40	14	14	29

Notes: the increase in delisted securities in 2012 due to one-time migration of BSX securities to NSXA and expiry of debt securities to NSX and expiry of debt securities.2015 figures are annualised estimates.

Source: NSX Annual Report 2015, pg. 6



Graph 4.3.a; Average volume of shares traded per day (shares, million) (Source: NSX Annual Report 2015, pg. 9)

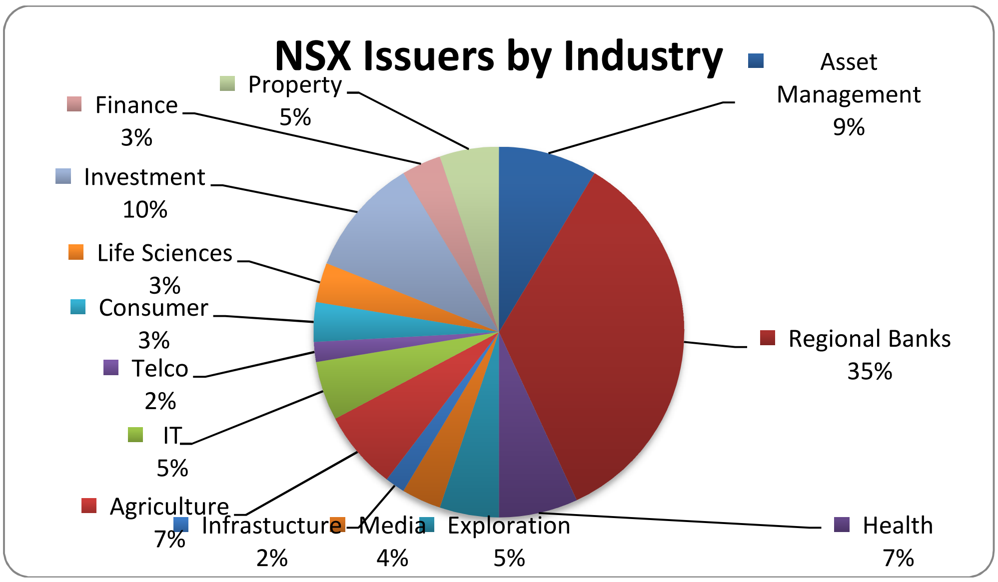
This concentration is also seen in the level of activity with fewer, but larger volume of trades. This may provide an indication of the type of investor that is attracted to the NSXA, i.e. those with a more speculative focus.

Table 4.3.b; NSXA and SIMSVE trading statistics.

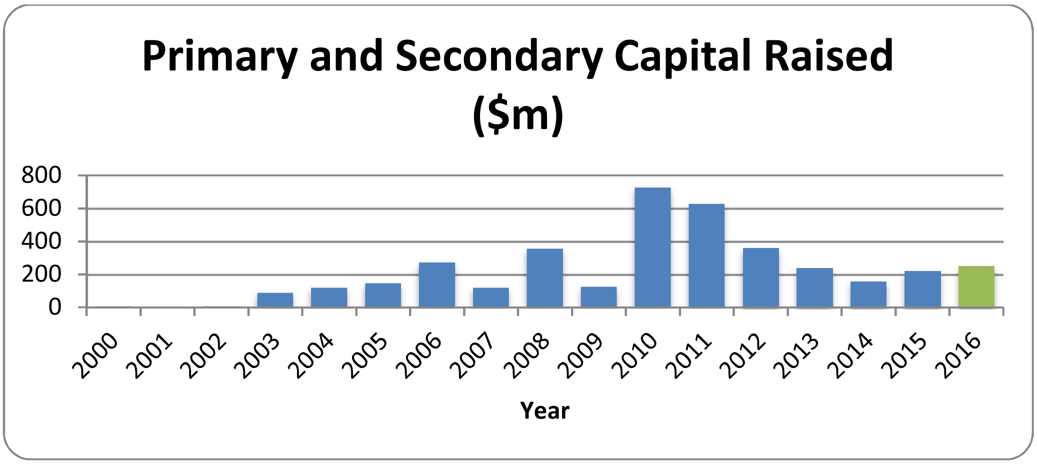
CALENDAR YEAR	2011	2012	2013	2014	2015
Listed Securities	138	128	123	110	95
Market Capitalisation ($' mill.)	2,857	3,552	1,058	911	1,580
Vol. Traded ('000 shares)	209,390	262,546	292,768	112,583	27,357
Value Traded ($' 000)	106,864	291,366	70,781	20,354	7,233
Trades (no.)	2,533	3,370	1,384	1,145	966
Avg. Vol. per Trade ('000 shares)	82.7	77.9	211.5	98.3	28.3
Avg. Value per Trade ($' 000)	42.2	86.5	51.1	17.8	7.5
Avg. Price per Share ($)	0.51	1.11	0.24	0.18	026
Announcements (no.)	4,870	4,360	4,463	2,386	2,011
Note: 2015 figures are an annualised estimate.					

(Source: NSX Annual Report 2015, pg. 6)

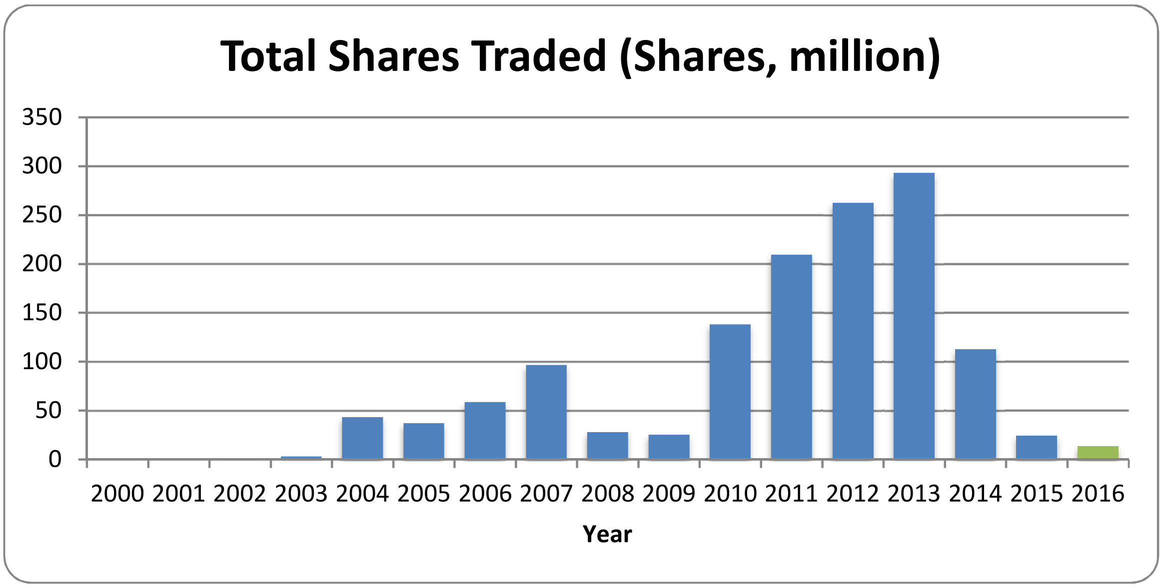
Graph 4.3.b provides an industry sector breakdown. The largest individual sector is made up of regional banks, which are essentially community initiated local banking organizations. The level of sector diversification, once the regional banks are removed, is quite diverse with no specific sector being particularly dominant.



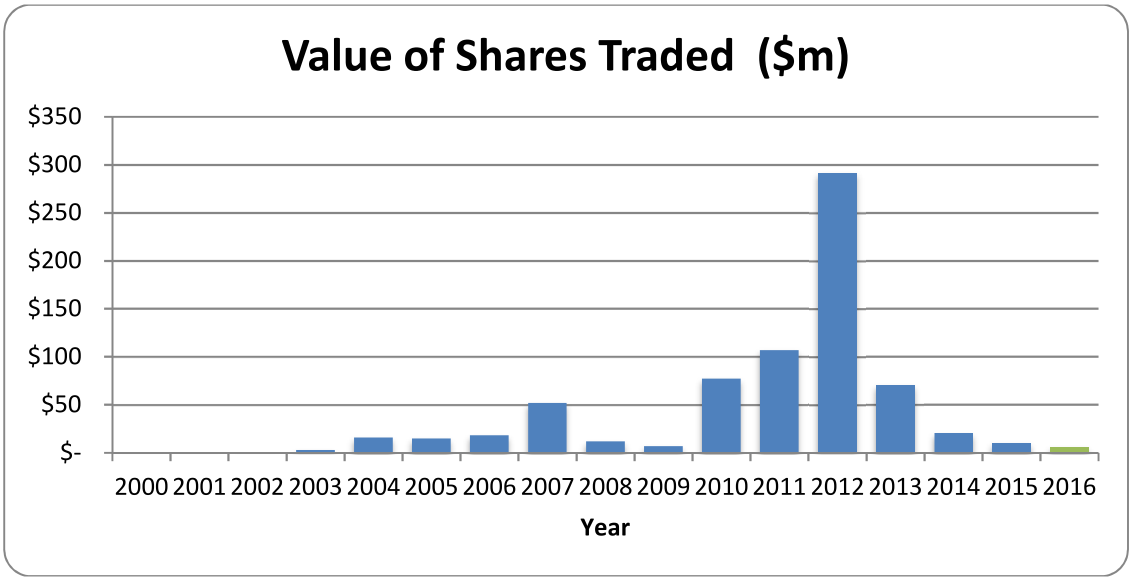
Graph 4.3.b; Industry groups as categorised by the NSX. (Source: NSX Annual Report 2015, pg. 7)



Graph 4.3.c; Primary and secondary capital raised ($m). The green bar for 2016 represents actual capital raised during the calendar year 2016 both as primary capital (that is at the time of float) and secondary capital (that is additional capital raised by Issuers). (Source: NSX Annual Report 2015, pg. 7)



Graph 4.3.d; Total shares traded (shares, millions). The green bar for 2016 total shares traded represents an annualised estimate of the total number of trades for the calendar year 2016. (Source: NSX Annual Report 2015, pg. 8).



Graph 4.3.e; Value of shares traded ($ millions). The green bar for 2016 total value of shares traded represents an annualised estimate of the total value of shares traded for the calendar year 2016. (Source: NSX Annual Report 2015, pg. 8)

4.4. Comparison between the NSX and the ASX

The NSX and the ASX operate under the same Australian market licence requirements as regulated by the Australian Securities and Investment Commission (ASIC) in Australian law, which means that companies which list under either exchange have the same legal standing. An NSX listed company is an Australian listed company recognised by the Corporations Act the same as an ASX listed company. According to the information available from the NSX website the unique benefits of listing on the NSXA include:

Lower costs - a more competitive fee structure compared to the ASX. The NSX claims that annual fees are approximately fifty percent less compared to the ASX equivalent.

Uncomplicated Rules - simplified listing rules which, according to the NSX are principle-based and one third the length of the ASX's. The NSX states this provides its listed companies with lower costs, less complexity and greater opportunity for companies to focus on their operational management.

Table 4.4.a; Comparison of key listing criteria between the ASX and the NSX

Admission Criteria	ASX	NSX
No. shareholders	Min.500 investors @ $2,000 Or Min. 400 investors @ $2,000 and 25% held by unrelated parties	Min. 50 investors @ $2,000 And 25% held by unrelated parties
Company Size - Profit test	$1 million net profit over past 3 years +and $400,000 net profit over last 12 months	2-year adequate track record Or Issue underwritten by an underwriter
Company Size - Asset test	$2 million Net Tangible Assets Or $10 million market capitalisation	$500,0000 minimum market capitalisation
Minimum market price	$0.20c	No minimum listing price

(Source: https://www.nsxa.com.au/companies_pre_listed/asx_vs_nsx).

According to the information provided on NSX website a significant proportion of new listings are non-Australian foreign companies or domestic holding companies of foreign assets (All about listing on the NSXA, pg. 2). Furthermore, the NSX claims that listing on the NSXA provides the possibility to also list on the NSX (for Asia) and Frankfurt (for Europe) and quoted on the OTC Markets (for the US) for less than just listing on a tier one market (All about listing on the NSXA, pg. 9), with NSXA listed companies are also quoted on Frankfurt Stock Exchange, Oslo Access, and OTC Pink and OTCQX. (All about listing on the NSXA, pg. 10).

An additional benefit claimed by the NSX for investors is that it provides real time data completely free to data providers, issuer websites and brokers, allowing investors to obtain real time NSXA securities prices free. NSX's listing criteria is designed to especially appeal to innovative, growth style early stage growth companies.

4.5. Why companies may choose to list on the NSXA?

NSXA focuses on small and medium enterprises. The NSXA offers a unique set of rules, processes, prices and a network, it claims, is more suited to the SME sector and growth companies. The principle based listing rules adopted dramatically reduces the work required to become and stay listed compared to equity rules, according to the NSXA. The benefit is less administrative complexity and therefore lower costs. The NSXA targets companies seeking to become public with a market capitalisation up to

$1 billion, with a focus on companies up to $100 million, (*Who does the NSX suit?* 2015). According to an article published in the Australian Business Review on 7 July 2010 smaller stock exchanges such as the NSXA may be relatively unknown though experts believe they can provide profitable investment opportunities similar to the ASX. The article quotes the chief executive of the Australian Shareholders Association's, Mr Stuart Wilson, "There are often some hidden gems of companies at an excellent price in such stock exchanges".

The article highlights some of the fundamental disadvantages of alternative stock exchanges, such as the NSXA, including illiquidity due to such markets being fairly small. This would have trading implications. Illiquidity is usually associated with smaller capitalisation stocks, which can influence market behaviour through anomalies such as the small firm affect. Amihud (2002) notes that "…market illiquidity affects over time the ex-ante stock excess return" (pg. 29). Using data on NYSE stocks for the period 1964-1997, illiquidity is shown to have a positive effect on expected stock return both cross sectionally and over time. Also, corporate governance standards may also be weaker than in more established exchanges such as the ASX, due to the size of listed companies, though the article states that a similar issue exists within the ASX for micro and small companies listed on its exchange.

5. DEVELOPMENT of the CONCEPTUAL FRAMEWORK

5.1. Introduction

This chapter explains the development and rationale of the hypotheses based on the literature reviews. The overall aim of the chapter is to build the conceptual framework based on the theoretical foundations and consequently operationalised it into statistical hypotheses. As discussed in the literature review the presence of anomalies, in whichever context, violates the weak form of market efficiency because stock prices cannot be considered random and can be predicted based on past behaviour, even if only from a statistical perspective.

This section describes the sixteen hypotheses that were empirically tested in this research. Although some have been tested in previous literature, based on the extensive literature review, this thesis systematically reviewed relevant literature review to determine whether such an extensive model has been employed. To the best of the current researchers' knowledge, there is no published study exploring anomalies from this perspective. The structure of the current chapter is as follows: the next section provides a rationale for the research objectives followed by a detailed discussion of the hypotheses across each of the three broad categories of independent variables. This is followed by the chapter summary.

5.2. Rationale

The presence of anomalies violates the assumptions for market efficiency theories. Anomalies provide the possibility for any investor, particularly institutional investors, with access to algorithmic trading tools, with the prospect to exploit any mispricing opportunities. The existence of any form of stock market anomaly provides some evidence for either inefficiency in stock markets providing profit opportunities or discrepancies in the underlying asset pricing model. While the various types of anomalies provide an opportunity to potentially predict stock market behaviour, anomalies themselves have proved elusive, often appearing to disappear, reverse or attenuate dependant on the level of attention directed towards any specific anomaly. What appears to be evident from the anomalies literature is that while highly developed stock markets are generally operationally efficient, less well developed or reported stock markets provide at least some support for market inefficiency and therefore arbitrage opportunities.

Numerous researchers have noted the concern of data mining of time series stock market data (Lakonishok et. al., 1988; Lo et. al., 1990; Sullivan et. al., 2001) and therefore the potential strength of anomalies. Consequently, predictable behaviour of stock markets may be simply due to sampling error with the same data set continually being used or reassessed by multiple researchers leading to similar results. Therefore, a strong test for any type of stock market anomaly is to obtain fresh time series data from a previously overlooked stock market/s. Critically important to investors and academics are understanding the allocative efficiency of stock markets specifically, and financial markets generally. The literature demonstrates that the anomalies research has focussed on the major highly liquid stock exchanges within individual countries. In the Australian context, this means the ASX. However, a scarcity of research exists relating to the efficiency of smaller, alternative stock markets, particularly those that exist within the same jurisdiction as more recognized competitors. This current research addresses this gap by examining time series data from the NSXA.

The existence of stock market anomalies, though, however significant, can be seen as a deviation from market efficiency as expressed by the rules of the EMH. Also, the fundamental causes of the numerous anomalies is open to conjecture and debate and therefore no conclusive explanations have been posited.

The most suitable definition of "efficiency" is a core challenge in the study of what constitutes an efficient stock market. At issue within the literature is the continual "refinement" of "efficiency" definition, which is criticized by researchers who question the efficacy of the EMH. This is because such "refinement" is interpreted as a moving feast to counteract the growing body of evidence supporting the existence of stock market anomalies. According to Fama (1965) efficient markets contained the following factors: competition between rational profit maximizing investors, prediction of future financial values of individual stocks and open, free and equal access to current information for all investors (p. 76). Furthermore, Fama noted that fluctuation in a stock price as a consequence of random walks represents an acceptable estimate of intrinsic value, adjusting with market activity (p. 40). Shiller, a critic of the EMH, refutes Fama's statement of intrinsic value, referring to Fama's statement as a significant error in the history of economic thought (1984, p. 459).

Another implication of the market efficiency theory is that as all investors have equal access to information and therefore the recommendation of stockbrokers does not provide investors with the opportunity to generate abnormal returns. This is refuted by Grossman and Stiglitz (1980) who argue that perfect market efficiency is inconceivable and contradictory in nature. They note if stock prices fully account for all information and the cost of gathering information is excessive, then there is no incentive for investors to seek information for the purpose of trading. Consequently, stock markets must be informationally inefficient as information is not reflected in prices.

The existence of anomalies, irrespective of their strength, calls into question the empirical validity of efficient financial markets theory and violates the premise of random walks. Financial market research is abundant with such anomalous evidence. Numerous anomalies have now been exposed which suggests that stock market behaviour and returns are to some degree predictable. This study is primarily inspired by the aim of gaining a greater and more sophisticated level of knowledge into the functioning of the stock markets by examining numerous types of anomalies and attempting to determine their relevance and significance. The current research is motivated by a strong personal interest in the topic and the perceived gaps in the current literature.

A more robust understanding of financial markets' informational and allocative efficiency is critical to all financial market participants. The rationality of financial market participants, and the markets themselves, is a given axiom within financial theory. The existence of anomalies provides evidence to the contrary and therefore may require a reassessment of existing models and accepted theories. Ongoing challenges to the efficient markets theory may eventually necessitate a new paradigm which fully considers the observed patterns of behaviour. The development of computerised trading algorithms and strategies by institutional investors implies that standard financial theory’s assertion that returns are unpredictable is being challenged in the real world.

Therefore, the overall aim of the current research is to empirically examine the efficacy of the EMH, its relationship to a number of anomalies and apply this to a new dataset – the NSXA. Additionally, the role that financial/economic variables can assume in predicting stock market behaviour will also be incorporated into the model, an approach not previously adopted. The principle objectives of the research were highlighted in the introductory chapter.

The research hypotheses to be tested are formally stated in the following section. The hypotheses have been developed within the context of the conceptual framework and the theoretical arguments from the literature review. The detailed literature review has informed the research with respect to the key variables which influence stock market behaviour. The hypotheses developed in this chapter test whether these variables are significant when applied to a new data set and the extent of their influence.

5.3. Hypothesis development

5.3.1 Macroeconomic Variables

The overall impact of macroeconomic indicators on stock market activity in most countries is significant. Analysis of stock market activity by institutional investors, for example, often includes reference to major macroeconomic variables such as, though not limited to: inflation rates / CPI, interest rates or exchange rates. An individual investor may use such information to increase their level of understanding of overall market conditions, implement appropriate strategies and thus decrease their exposure to risk.

Efficient markets account for such publicly reported economic variables almost instantaneously and build this into stock prices thereby negating any arbitrage opportunities. In direct contradiction to this the academic literature has provided ongoing evidence that key macroeconomic variables appear to provide opportunities to predict the time series of stock returns and therefore theoretically arbitrage / profit opportunities or risk minimization strategies. For example, studies that have examined the link between interest rate announcements and stock market behaviour have demonstrated an inverse relationship (Hamrita et. al. 2011; Mukherjee et. al. 1995;

Narayan et. al. 2012). As interest rates increase stock prices generally fall as alternative investment options become more attractive.

Although many studies have investigated the relationship between macroeconomic variables and their impact on stock market activity using broad, well understood and reported indicators, the current research has deliberately chosen to focus on variables which generally are of more immediate value and relevant to institutional investors: the government bond rate; the cash rate; the bank bill rate and currency movements. This may provide clearer insight into whether any changes in trading activity, and therefore predictability, on the NSXA and its sub-indices are specifically due to the actions/activity of institutional investors. An examination of the role played by macroeconomic variables provides the opportunity to test the semi-strong form of the EMH. This rationale establishes the basis for the macroeconomic hypothesis.

5.3.2 Calendar Variables

The EMH presupposes that stock markets are rational and therefore all available market information is reflected in the current stock price. As new information is released into the market, the investment community responds accordingly and stock prices adjust. The interplay between information, investor reaction and stock prices is why the EMH is one of the most important paradigms within traditional finance theory. Relevant information, which stock markets react and adjust to include: past information (the weak form of the EMH), publicly available information (the semi strong form of the EMH) and private information (the strong form of the EMH).

The implication of weak form efficiency is that stock price movements are random (the random walk hypothesis) and therefore fluctuations in price are independent of each other. Therefore, using past information to make judgements about future stock prices, and generate abnormal returns, is not possible. Investment strategies which rely both on publicly available information as well as historical data (referred to as fundamental analysis) to generate abnormal returns would be ineffectual based on the semi strong form of the EMH. The strong form of market efficiency notes that current stock prices incorporate all information i.e., historical, public and private information and therefore private information used by “insiders” to generate arbitrage opportunities are ineffectual.

Anomalies present a challenge to the EMH as they imply that stock markets are inefficient. Three broad categories of anomalies exist: fundamental; technical and calendar/seasonal anomalies. Some anomalies may only occur only once and disappear, while others are more persistent. Calendar anomalies provide a direct contradiction of weak form efficiency, as the premise of weak form efficiency is that stock prices automatically incorporate all historical information and therefore prediction based on such information is impossible.

While the literature has acknowledged the presence of anomalies, conjecture remains as to whether they can be exploited to generate abnormal financial returns. As investors endeavour to trade off anomalies and exploit them to develop profitable outcomes, this causes the anomaly to diminish in its significance. The literature has also highlighted the impact transaction costs in negating abnormal profit opportunities. While such arguments are valid, their efficacy is diminished in the face of increasingly sophisticated automated trading technologies, which are providing opportunities to some financial market participants to rapidly and efficiently respond to possible arbitrage opportunities created by anomalies and exploit them even if only for very specific periods of time.

An examination of the role played by calendar anomalies within the context of the NSXA provides the opportunity to test the weak form of the EMH and establishes the rationale calendar hypotheses in the current research.

5.3.3 Events

The event study methodology is able to assist researchers understand the financial effect of changes in corporate policy. The application of this method allows the researcher to understand whether there is a valid link between abnormal stock price returns and an unexpected event or event outcome. This allows the researcher to extrapolate the significance of the event on stock prices. The selective application of accounting practices provides managers with the opportunity or ability to manipulate profits, thereby reducing the ability to accurately assess a firm’s true performance. The event study methodology, to some degree, circumvents this by removing the need to examine such accounting-based measures of profit and focus on the impact of an event on the firm's stock price. Consequently, an event study, which is based on stock price changes, should measure the financial outcome of a change in, for example, corporate policy, leadership, or ownership more reliably as opposed to an accounting returns methodology. The straightforward nature of implementing an event based study is also considered to be another advantage of the methodology, with the data collection focussing exclusively on the event date/s and stock prices.

The academic literature has demonstrated that the cross-section of stock returns can be predicted based on numerous characteristics. Previous studies examining the EMH in semi-strong form have focussed on the time delay between the release of new information and stock price reactions. The primary research area in this sphere is the event study. The principal concept behind an event study is to examine the aggregate stock performance over a specific time frame, this being either side of an explicit event. The formative research papers on events focussed on accounting/finance data and were published by Ball et. al. (1968) (using company earnings announcements as the event proxy) and Fama et. al. (1969) (using stock splits as the event proxy). A principal conclusion of both papers was that stock markets factor in such information ahead of time and consequently adjust prices accordingly. Fama et. al. (1969) highlight that stock splits appear to take place following a period in which the stocks financial returns were significantly positive. The overall market interpretation of the stock split is that there is an increased prospect of significantly increased dividend payments in the future. Therefore, the increase in a stock's price during the split period can be explained by investor psychology (i.e. an expectation regarding future earning of the firm) rather than any inherent effect of the split itself. The Fama et. al. (1969) research paper took an information perspective which highlighted the relationship between information, the market's reaction and stock market returns.

Niederhoffer (1971) adopted a different approach and focussed on political events rather than financial events to determine their influence over stock market activity and prices. The author noted that post two event days there was a negative movement in stocks prices followed by a strong positive movement in stock prices post two to five days, implying an overreaction. World events (such as the Cuban missile crisis) brought about a substantial movement in the S&P 500, with financial returns post world event generally being greater in absolute value compared to financial returns on other days. Moser et. al. (2014) looked at the interaction between events that had both political and economic impacts (i.e. an announcement of a regional trade agreement) and stock market activity. The authors concluded that this lead to a positive movement in stock markets, particularly within developing economies/stock markets.

The role of political events in explaining stock market variation goes beyond the potential implications on variables such as future cash-flows, to include the level of uncertainty created by such events in stock markets. Using an event-study approach Kim et. al. (1994) scrutinize movements in the Hong Kong stock market and their relation to political events, demonstrating that political developments have a significant impact on stock prices. Zach (2003) finds that daily returns on the Tel Aviv Stock Exchange following political events are more extreme (larger in absolute value) than returns on days that do not follow political events.

The events hypotheses being considered for the current research provide a synthesis of political and sporting events within the context of one study. This is important as this may provide a behavioural insight into the existence, if any, of anomalous behaviour within stock markets. The rational for this is that both political events, such as elections, and sporting events have connected with them an emotive element – a reinforcement of the investors' expectations. Therefore, an outcome which the investor considers positive may translate over to their investment choices and behaviour, particularly in relation to stock market investment. Furthermore, political events can be judged to also affect investors in a broader economic policy context, therefore an exploration of both types of events may reveal some finer detail on how events may influence financial markets. This provides the justification for events hypotheses.

5.4. Summary

This chapter has elaborated on the evolution of all of the hypotheses that will be assessed to test the existence of anomalies and, consequently, the efficacy of the EMH. Three broad categories of variables were developed to provide a comprehensive assessment of the role, if any, played by anomalies in determining stock market behaviour. This also offers the unique opportunity to test the strength of each of the variables against each other to determine if any particular variable is more influential in predicting stock market behaviour. Based on the academic literature, it is expected that the variables which underpins each of the hypotheses will vary in their degree of significance. The ensuing chapter will discuss the research methodology used in the current study and the econometric technique employed to test the hypotheses.

6. RESEARCH METHODOLOGY

6.1. Introduction

The aim of this chapter is to provide details of the research methodology which was employed to collect and analyse the research data and test the hypotheses. This chapter also provides a detailed explanation the statistical technique used, which has been consistently featured in the literature. Ordinary least squares regression has been the statistical method used to evaluate the hypotheses. The application of quantitative analysis increases the validity of the results and the explanation of why anomalies may exist and what may be underlying them. The table below is a subjective random sample of the recent empirical literature, which highlights the tendency to favour the use of a regression approach in analysing the anomalies phenomenon.

This chapter will include a discussion of the following: Section 6.2 discusses the research objectives, Section 6.3 clarifies the research design and the source of the dataset, Section 6.4 explains the econometric model used in the current research and an elaboration of each of the variables, Section 6.5 provides a brief explanation of the data analysis method employed in the current research and Section 6.6 concludes the chapter.

6.2. Research Design and Data

This section outlines the basic research design which was developed and implemented to test the hypotheses. The goal of the research design was to provide the framework for the collection, classification and analysis of the data. The study is explanatory in nature and is intended to investigate: 1) the validity of efficient markets theory and 2) which variables, if any, influence the behaviour of stock prices. Ultimately, the aim of the research is to verify if any relationship exists between a number of specific anomalies and stock market activity. This research uses time series panel data to test the hypotheses and answer the research questions.

Table 6.1.a; Brief overview of statistical test/s employed in the empirical literature

ANOMALY	AUTHOR	STATISTICAL TEST
Weekend / Monday	Morey et. al. (2012)	Exponential General Autoregressive Conditional Heteroskedasticity (EGARCH) regression
	Nippani et. al. (2011)	T-statistic; regression
	Bohl et. al. (2010)	OLS regression
DOW	Çinko et. al. (2015)	OLS regression
	Hafeez et. al. (2014)	OLS, correlation; descriptive statistics
	Chan et. al. (2012)	EGARCH
MOTY	Angelovska (2014)	OLS regression
	Darrat et. al. (2013)	Generalized Autoregressive Conditional Heteroskedasticity (GARCH)
	Panait (2013)	Linear regression; GARCH-M
Jan. - TOTY	Ahmad (2014)	Regression
	Sikes (2014)	OLS regression
	Depenchuk et. al. (2010)	OLS regression
TOTM	Compton et. al. (2013)	OLS regression test; non-parametric tests - sign test; Wilcoxon signed-rank test
	Karadžić et. al. (2011)	Regression
	Depenchuk et. al. (2010)	OLS regression; non-parametric t-test; Wilcoxon signed rank
EOFY – Australia	Zhong et. al. (2014)	Descriptive statistics

ANOMALY	AUTHOR	STATISTICAL TEST
	Liu et. al. (2011)	Descriptive statistics; T-tests
	Brown et. al. (2010)	Descriptive statistics; Linear regression
Holiday	Carchano et. al. (2015)	Percentile-t bootstrap; Monte Carlo simulation
	Wu (2013)	T-test
	Akyol (2011)	Integrated Generalized Autoregressive Conditionally Heteroscedastic (IGARCH)
Events - Elections	Nezerwe (2013)	OLS regression
	An et. al. (2012)	Panel regressions
	Jones et. al. (2009)	Multiple regression
Events - Sports	Demir et. al. (2014)	OLS regression
	Ehrmann et. al. (2012)	Median regressions; Tobit regressions
	Floros (2010)	OLS regression; GARCH
Macroeconomic	Ouma et. al. (2014)	OLS regression
	Haroon et. al (2013)	Coefficient correlation; regression
	Ray (2012)	Multiple regression

6.2.1 Study Setting

The current research undertook a systematic review requiring an extensive search and analysis of the literature to determine the common themes. The literature search involved using several academic databases available on Victoria University Library's website, for example Academic Search Premier, Business Search Complete, Emerald Fulltext, Expanded Academic ASAP and Sage Premier databases. Additionally, further scholarly literature was obtained via an internet search of Google Scholar. Stemming from this a theoretical framework was developed to determine whether these themes could be sustained by scholarly principles and theories embodied in academic finance theory.

The next stage of the research design involved collecting secondary data for explanatory purposes. Data consisted of the NSXA daily closing values and were obtained directly from the NSXA website, which maintains an historical dataset of all closing values across the main index and several sub-indices. Data was collected covering the period from 23 November 2007 to 17 May 2013. The sample period was influenced by the availability of data available from the NSXA website at the time the data was collected. The data collected consisted of time series information, thereby implying a longitudinal study. The macroeconomic independent variable data were collected from the website of the Reserve Bank of Australia (see: http://www.rba.gov.au/statistics/historical-data.html). The research procedures used aim test for any association between the dependent variable (daily closing values) and several independent variables to determine any anomalous behaviour. The statistical procedures employed are primarily econometrics based methods using ordinary least squares (OLS) regression to test each of the hypotheses.

6.3. Econometric Model and Variables

The econometric model employed in the current research has adopted a unique perspective based on numerous factors:

1) reference to new dataset previously not considered in an Australian research context;

2) incorporating a multitude of variables within the one model. This provides for a comparison of each of the independent variables to determine if any particular variable/s are potentially more influential in determining or predicting stock market behaviour;

3) the incorporation of multiple variables tested across three separate indices - the main index and two sub-indices - within the NSXA and

4) integration of the three broad, but distinct, categories of variables- a) macroeconomic variables, b) standard calendar anomalies & 3) event based variables.

The model employed can be seen as an amalgam or derivation of models developed in the previous empirical research: Depenchuk et. al. (2010) – calendar anomalies; Butt et. al. (2010) – macroeconomic indicators; Mishra et. al. (2010) – sporting events

A full explanation of the model is provided below:

NSXAEI / NSXAGR / NSXRES = β_1AGBR2yri + β_2AGBR3yri + β_3AGBR5yri + β_4AGBR10yri + β_5CRInteri + β_6BAB30di + β_7BAB90di + β_8BAB180di + β_9USDi + β_{10}TWIi + β_{11}EURi + β_{12}YENi + β_{13}GBRPi + β_{14}SFranci + β_{15}NZDi + β_{16}CANDi + β_{17}HKDi + β_{18}SingDi + β_{19}RINGTi + β_{20}TaiDi + β_{21}SKWoni + β_{22}IndonRi + β_{23}RMBi + β_{24}Moni + β_{25}Tuesi + β_{26}Wedi + β_{27}Thursi + β_{28}Frii + β_{29}Jani + β_{30}Febi + β_{31}Mari + β_{32}Apri + β_{33}Mayi + β_{34}Juni + β_{35}Juli + β_{36}Augi + β_{37}Septi + β_{38}Octi + β_{39}Novi + β_{40}Deci + β_{41}JanPre2i + β_{42}JanPre1i + β_{43}JanPst1i + β_{44}JanPst2i + β_{45}JanPst3i + β_{46}JanPst4i + β_{47}JanPst5i + β_{48}JanPst6i + β_{49}JanPst7i + β_{50}JanPst8i + β_{51}JanPst9i + β_{52}JanPst10i + β_{53}TOMPre1i + β_{54}TOMPst1i + β_{55}TOMPst2i + β_{56}TOMPst3i + β_{57}TOMPst4i + β_{58}EOFYAPre3i + β_{59}EOFYAPre2i + β_{60}EOFYAPre1i + β_{61}EOFYAPst1i + β_{62}EOFYAPST2i + β_{63}ALLHolPre2i + β_{64}ALLHolPre1i + β_{65}ALLHolPst1i + β_{66}AusFedEPre1i + β_{67}AusFedEPst1i + β_{68}AusFedEPst2i + β_{69}USPrsEPre3i + β_{70}USPrsEPre2i + β_{71}USPrsEPre1i + β_{72}USPrsEPst1i + β_{73}USPrsEPst2i + β_{74}AFLPre3i + β_{75}AFLPre2i + β_{76}AFLPre1i + β_{77}AFLPst1i +

β_{78}AFLPst2i + β_{79}NRLPre3i + β_{80}NRLPre2i + β_{81}NRLPre1i + β_{82}NRLPst1i + β_{83}NRLPst2i + β_{84}MCPre3i + β_{85}MCPre2i + β_{86}MCPre1i + β_{87}MCPst1i + β_{88}MCPst2i + ε i

where,

NSXAEI = National Stock Exchange All Equities Index

NSXAGR = National Stock Exchange Agricultural Index

NSXRES = National Stock Exchange Resources Index

Table 6.3.a; Description of independent variable terms

Independent Variable Definitions	
Variable	*Definition*
AGBR	Australian government bond rate
CR	Cash rate
BAB	Bank accepted bills
USD	US dollar
TWI	Trade weighted index
EUR	Euro
YEN	Japanese yen
GBRP	UK pound sterling
SFranc	Swiss franc
NZD	New Zealand dollar
CAND	Canadian dollar
HKD	Hong Kong dollar
SingD	Singapore dollar
RINGT	Malaysian Ringgit
TaiD	Taiwanese dollar
SKWon	South Korean won
IndonR	Indonesian rupiah
RMB	Chinese Renminbi
βDays of week	Mon., Tues., Wed., Thurs. and Fri., where each dummy variable is coded into 0 and 1
βMonths of the year	Jan., Feb., Mar., Apr., May, Jun., Jul., Aug., Sept., Oct., Nov., and Dec., where each dummy variable is coded into 0 and 1
βJan Pre	Number of days prior to the commencement of January and were each dummy variable is coded into 0 and 1
βJan Pst	Number of days post the commencement of January and were each dummy variable is coded into 0 and 1
βTOM Pre	Number of days prior to the commencement of the new month and where each dummy variable is coded into 0 and 1 and 1
βTOM Pst	Number of days post the commencement of the new month and where each dummy variable is coded into 0 and 1
βEOFYA Pre	Number of days prior to the commencement of the new Aust financial year and where each dummy variable is coded into 0 and 1
βEOFYA Pst	Number of days post the commencement of the new Aust financial year and where each dummy variable is coded into 0 and 1

Independent Variable Definitions	
Variable	*Definition*
βALLHol Pre	Number of days prior to the commencement of an Australian public holiday and where each dummy variable is coded into 0 and 1
βALLHol Pst	Number of days post the commencement of an Australian public holiday and where each dummy variable is coded into 0
βAusFedE Pre	Number of days prior to the commencement of an Aust federal election and where each dummy variable is coded into 0 and 1
βAusFedE Pst	Number of days post the commencement of an Australian federal election and where each dummy variable is coded into 0 and 1
βUSPrsE Pre	Number of days prior to the commencement of a US Presidential election and where each dummy variable is coded into 0 and 1
βUSPrsE Pst	Number of days post the commencement of a US Presidential election and where each dummy variable is coded into 0 and 1
βAFL Pre	Number of days prior to the commencement of the AFL grand final and where each dummy variable is coded into 0 and 1
β AFL Pst	Number of days post the commencement of the AFL grand final and where each dummy variable is coded into 0 and 1
βNRL Pre	Number of days prior to the commencement of the NRL grand final and where each dummy variable is coded into 0 and 1
βNRL Pst	Number of days post the commencement of the NRL grand final and where each dummy variable is coded into 0 and 1
βMC Pre	Number of days prior to the commencement of the Melbourne Cup and where each dummy variable is coded into 0 and 1
βMC Pst	Number of days post the commencement of the Melbourne Cup and where each dummy variable is coded into 0 and 1
ε i	Error term

(Source – financial and currency terms: https://www.rba.gov.au/statistics/historical-data.html).

6.3.1 Dependent Variable

To ensure uniformity with previous literature, daily closing stock market returns were used as the dependent variable, see for example: calendar anomalies – Cinko et. al. (2015); macroeconomic – Quadir (2012); events – Martins et. al. (2011). The time frame over which closing prices have been observed in previous research has varied greatly. Steeley (2001) uses a seven-year period when examining the weekend effect, Hafeez et al. (2014) uses multiple timelines based on which independent variable is being tested, Jacobsen et al. (2013) use a 317-year index of monthly UK stock prices while Worthington (2009) examines the political cycles in Australian stock returns from 1901–2005. The time frame for the collection of time series data in the current research was dictated by the availability of the data from the NSX website. The NSX maintains a propriety, openly accessible, historical closing stock market values database. The lack of consistency regarding a generally accepted timeframe over which dependent variable observations should be collected, in itself may have implications for the ability to generalize the validity of outcomes.

6.3.2 Independent Variables

The independent variables used in this study have been used both as dummy variables (in the case of calendar and event variables) and factor variables (in the case of the macroeconomic variables). The current research has followed the accepted practice from previous research in the selection of the independent calendar and event variables. For example, events based studies have primarily focussed on political (i.e. national elections) and sporting events: Mandaci (2003) general elections on the Istanbul Stock Exchange; Nippani (2005) US presidential elections in bordering countries; Klein et al. (2009) interaction between football match results and national stock index returns; Mishra et al. (2010) the performance of the Indian national cricket team in one-day games and its influence on the Indian National Stock Exchange.

The current study deviates slightly in the selection of macroeconomic variables, focussing on what could be referred to as quite specific “technical” variables (Australian government bond rates, bank bill rates, cash interbank rate, bank accepted bill rates and individual foreign currency rates), rather than more broad variables such as inflation and unemployment rates, money supply, industrial production or GDP, used in the previous research literature: Gan et al. (2006) – inflation, broad exchange rate, GDP, short and long term interest rates; Menike (2006) - US-Sri Lanka exchange rate, inflation and interest rates and the money supply; Acikalin et al. (2008) GDP, the Turkish lira/US dollar exchange rate, interest rates & the current account balance; Pyeman et al. (2009) interest, inflation & exchange rates and money supply and Ouma et al. (2014) money supply (M2), exchange, inflation (CPI) & interest rates.

It could be considered that professional or institutional stock market investors may pay closer attention to a broader range of economic variables in comparison to the individual investor. Therefore, variables such as bond rates or bank accepted bill rates may be more relevant or influential for professional or institutional stock market investor's factors when considering stock market investment strategies and therefore behaviour compared to the individual investor. This may provide some further insight into any anomalous behaviour in stock market activity and which category of investor is primarily causing the anomalous behaviour.

6.4. Data Analysis Methods

Both the historical time series data from the NSXA and the independent variable data were collected and transformed into an Excel spreadsheet format to allow for transformation using a specific statistical analysis software program, Stata. Data analysis was undertaken using the Stata statistical software program. Stata is a propriety general-purpose statistical software package whose capabilities include statistical analysis and regression. It is commonly used within the fields of academic research covering business, economics, econometrics and finance. While there are numerous econometric software analytical programs available for academic research purposes, this software program was selected simply because it was made available at the time the current research was undertaken. As stated previously the NSX maintains its own index of daily closing values on its main board (the All Equities Index) and a number of sub-indices. The data is open and freely available for download via an Excel spreadsheet format.

Within econometric analysis the most widely use technique in the empirical literature related to this topic is the multiple linear regression model and its estimation method ordinary least squares (OLS). To address the research question, multiple OLS linear regression was used to test each of the hypotheses. Ordinary least-squares (OLS) regression is a generalized linear modelling technique that may be applied to either single or multiple independent variables and also categorical independent variables that have been appropriately coded (Hutcheson, 2011). The objective of OLS is to closely "fit" a function with the data, which it achieves by lessening the sum of squared errors from the data. The main assumption of the multiple linear regression model is that there is a linear relationship between a dependent variable (y_i) and a set of independent variables (x_{ik}).

NSXA historical returns were imported into STATA 10 as the dependent variable, as were the independent calendar, events and macroeconomic variables (represented as dummy variables). The output generated from the software was then assessed for validity/significance based on the strength of the model (R^2 values) and each independent variable (p value < or > 0.05 - significance level).

6.5. Statistical Rationale

Multiple regression analysis based on OLS estimation was applied in order to estimate the coefficients of the independent variables in the research model. The observed research results followed the standard multiple regression approach in relation to the p-value: 1) when the p-value is less than the significance level (set at α=0.05 in the current research) reject the null hypothesis (H_0) and accept the alternative hypothesis, i.e. the general implication is that there is some degree of predictability in stock market behaviour and 2) when the p-value is greater than the significance level (set at α=0.05 in the current research) do not reject the null hypothesis (H_0) with the general implication being that there is no evidence to support predictability in stock market behaviour. The next section will elaborate on the results obtained from the descriptive statistical analysis employed and set the foundation for discussion of the linear regression results.

6.6. Summary

This chapter has provided an overview of the research methodology, the model and variables adopted in the research. A description of how the sample set was selected was described as well as the independent variables. Justification was also provided of why the dependent and independent variables were selected, as well as the statistical process used in this research. The ensuing chapter will clarify, in detail, the output obtained from descriptive statistics prior to commencing a comprehensive analysis of the results.

7. RESULTS

7.1. Introduction

The overall aim of the current quantitative research is to investigate whether there any parallel relationship/s between the closing daily values on the overall NSXA (and two of its subindices) and three specific categories of independent variables - calendar variables, macroeconomic variables and event variables and consequently the impact of this on the validity of the EMH. NSXA closing daily values were collected covering the period 23 November 2007 to 17 May 2013. Arbitrarily, the sample size should be sufficient to prevent any bias or the likelihood of a Type II error and therefore improve the efficacy of the results.

Consistent with the previous empirical research (Blandon, 2010; Bouges et. al. 2009) conducted in this area a multi-factor model was employed. In order to account for the multiple parameters associated with the hypotheses, an F-test and linear regression were employed to establish the efficacy of the evidence that each of the independent variables had zero coefficients at a five percent level of significance ($\alpha = 0.05$).

The fundamental questions posed by the current research were to: 1) determine whether the efficient markets theory could validly be applied to what could be seen as an alternative stock exchange within Australia - the NSXA and 2) if the validity of efficient markets theory is open to conjecture would this imply that trading strategies could be developed leading to superior financial returns? The overall null hypothesis (H_0) was that a number of independent variables would have no significant effect on NSXA daily closing values, while the alternative hypothesis stated that the tested independent variables are significant and have an effect on NSXA daily closing values. To test each of the hypotheses the level of significance was set at the five percent (5%) level. The sample size consisted of 1,369 daily observations, thereby improving the validity the test and additionally reducing the potential for a Type II error to occur. This substantially decreased the likelihood of mistakenly accepting an incorrect null hypothesis.

The focus of this chapter is an analysis and interpretation of the results, leading to a discussion of outcomes. The use of a lengthy time series data set improved the dependability of the independent variables. I subsequently calculated the changes in the independent variables using the extended time period to enable a more powerful analysis of the behaviour of stock returns on the NSXA and its primary sub-indices.

To validate the overall hypothesis, the null hypothesis (H_0) and the alternative hypotheses (H_1 to H_{16}) test the assertion that H_0; $\beta_1, \beta_2, \beta_3 \ldots B_{88} = 0$ and that a minimum of one of the coefficients does not equate to zero. In this research, the hypotheses were specified and represented mathematically based on the research questions where: β_1 to β_{23} (the macroeconomic independent variables); β_{24} to β_{65} (the calendar independent variables) and β_{66} to β_{88} (the event independent variables) were representative of the regressor coefficients.

7.2. Brief explanation of the independent variables

The following section will briefly elaborate on each of the independent variables and why they were considered in the context of the current research. Following this will be a detailed analysis of the descriptive statistics employed, with the final section providing a summary.

7.2.1. Macroeconomic Variables

This research lists 23 separate macroeconomic independent variables grouped into two broad categories: i) interest rate variables - eight in total and ii) currency based variables - fifteen in total. Numerous studies have used similar variables: Wongbangpo et. al., 2002; Rapach et. al., 2005; Gan et. al., 2006; Menike, 2006 and Acikalin et. al., 2008. The current research though deviated from previous studies when examining the influence of interest rate variables by placing greater focus on what could be considered more technical variables, rather than commonly used interest rate announcements in previous research. The technical variables used included: bank accepted bills (with maturities of two, three, five and ten years); the cash rate interbank rate and bank accepted bills (with maturities of thirty, ninety and one hundred and eighty days). The rational for using such variable was that announcements providing this type of information may be used as a reference for very specific types of investors such as institutional or professional investors rather than the average individual investor. This may provide an alternative insight into the relationship, if any, between such announcements and stock market behaviour.

7.2.1.1. Australian Government Bonds

Australian Government Bonds are debt securities issued over the medium to long-term by the Australian Government. Attached to the security is an annual rate of interest fixed over the life of the security, referred to as the coupon interest rate, which are made every six months. When the bond reaches the stated maturity date, the purchaser of the bond receives a final coupon interest payment and the original value (or face value) of the bond. The Australian Government is legally obligated to make these payments. Institutional and other large investors choose to invest in government bonds because they provide stable, regular income paid by the Australian Government and have high liquidity attached to them.

Government bonds are not traded on an exchange and are typically traded in large parcels, putting them beyond the reach of many investors. On the Australian Securities Exchange (ASX), Treasury Bonds are traded in the form of CHESS Depositary Interests (CDIs) known as Exchange-traded Treasury Bonds (ETBs). ETB's have the appeal and convenience of being electronically bought and sold through the ASX in small or large parcels.

7.2.1.2. Interbank Overnight Cash rate

The Reserve Bank Board's operational target for monetary policy is set by the Interbank Overnight Cash Rate (Cash Rate). It is calculated as the weighted average of the interest rate at which overnight unsecured funds are transacted in the domestic interbank market, also referred to as the cash market. Interbank Overnight Cash Rate is used as the reference rate for Australian dollar overnight indexed swaps (OIS) and the ASX's 30-day interbank cash rate futures contract, making it a significant financial benchmark in the Australian financial markets. The Reserve Bank also publishes a Cash Rate Total Return Index (TRI), which members of the public can use as a benchmark with a (near) risk-free rate of return. The Total Return Index measures the performance of an investment earning the Cash Rate, where interest is reinvested.

7.2.1.3. Bank Accepted Bills

A bank accepted bill is a bill of exchange, as defined by the Bills of Exchange Act 1909. Bank bills can be seen as a type of IOU which promise to pay a specific amount (referred to as the face value) at a specific date in the future (the maturity date). Bank bills are very similar to cheque in the way they operate / are used. Bank accepted bills are guaranteed (or accepted) by an Australian bank, who undertakes that at the bills maturity will pay its face value and any accrued interest.

Bank bills can be bought or sold with maturities ranging from seven to 185 days. These are often referred to as ‘Variable (or Floating) Rate Bills’ because, when the Bank Bills mature, and if rolled over for a further term, the interest rate is reset at the rate applicable for the next term of the Bank Bills.

7.2.1.4. Currencies

The current research also focusses on the relationship between international currencies and stock market outcomes, the rationale for this being that virtually all nations (and therefore implicit in this national stock markets) are reliant on global trade to support local economic activity. The Australian economy has historically been strongly dependent on international trade, initially with a focus on agriculture but in more recent times across multiple sectors. This has seen a strong focus on international currencies and how movements in these can impact local economic activity. The table below from the Australian Department of Foreign Affairs and Trade highlights Australia's main export categories as of 2014. These categories would be represented in each of the indices examined in the current research.

Table 7.2.1.4.a; Australia's top 10 goods & services exports, 2014, (A$ million)

RANK	COMMODITY	VALUE	% SHARE
	Total	*326,862*	
1	Iron ores & concentrates	66,008	20.2
2	Coal	37,999	11.6
3	Natural gas	17,743	5.4
4	Education-related travel services	17,037	5.2
5	Personal travel (excl education) services	14,227	4.4
6	Gold	13,460	4.1
7	Crude petroleum	10,564	3.2
8	Beef, f.c.f.	7,751	2.4
9	Aluminium ores & conc (incl alumina)	6,336	1.9
10	Wheat	5,920	1.8

Source: http://dfat.gov.au/trade/resources/trade-at-a-glance/pages/top-goods-services.aspx

Australia’s largest merchandise export market remained the United Kingdom up to 1965-66. Japan became the largest market in 1966-67, and remained so until the late 2000s when it was overtaken by China. From the 1960s Asia rapidly grew as a destination for Australian exports, while Europe declined, with exports to Asia in 2014-15 accounting for over 80 per cent of total merchandise exports. The table below, from the Australian Department of Foreign Affairs and Trade webpage,
"Australia's Top 10 two-way trading partners", highlights the extent to which Australia’s deepening economic relationship with the Asia-Pacific region is reflected across a number of countries within the region — in other words, the degree to which economic and cultural connectedness has led to financial connectedness, or integration.

Table 7.2.1.4.b; Australia's top 10 two-way goods & services trading partners, 2014 (A$ million)

RANK	COUNTRY	GOODS	SERVICES	TOTAL	%SHARE
	Total two-way trade	*533,264*	*130,555*	*663,819*	
1	China	142,078	10,390	152,468	23.0
2	Japan	65,431	4,787	70,218	10.6
3	United States	40,635	19,807	60,442	9.1
4	Republic of Korea	32,424	2,202	34,626	5.2
5	Singapore	21,128	9,059	30,187	4.5
6	New Zealand	16,083	7,384	23,467	3.5
7	United Kingdom	9,920	10,868	20,788	3.1
8	Malaysia	17,394	3,188	20,582	3.1
9	Thailand	16,106	2,872	18,978	2.9
10	Germany	13,725	3,000	16,725	2.5

Source: –http://dfat.gov.au/trade/resources/trade-at-a-glance/pages/html/two-way-trading-partners.aspx

The currencies selected in the current research were based on the published information above. This report noted that in order of significance Australia's most important trading partners included: China, Japan, the United States of America, the Republic of Korea, Singapore, New Zealand, the United Kingdom, Malaysia, Thailand and Germany. The current research has therefore explored how the changes between currencies of these economies and the Australian dollar may influence behaviour and outcomes on the National Stock Exchange and its indices.

7.2.2. Calendar Variables

The current research has essentially followed previous anomalies research when considering which calendar variables to test. All the calendar variables considered could be seen as the "standard" variables which have been explored on a regular basis.

It was determined that to ensure a degree of consistency between the current research and previous studies that there would be no deviation in the selection of independent calendar variables. What is unique in the current research is the breadth of calendar variable considered within a single piece of research. This was undertaken to determine if any particular calendar variable displayed a greater degree of significance compared to other calendar variables.

7.2.3. Event Variables

The event variables considered in the current research were generally in alignment with what has been studied in previous work. The rationale for considering political and sporting events is the psychological impact of such events on investor's mood and therefore behaviour, and determine if this transpires into investment decisions or choices.

7.3. Descriptive analysis

The following section will provide a brief description of some of the main factors from the descriptive statistics tables. Due to the limitations in capacity to review all tables, some have been placed in the appendix at the end of the research for the reader to explore.

Table 7.3.a provides the descriptive data output in relation to the day of the week independent variable across each of the indices, (the full table - Table 7.3.a.1 is presented in the appendix). Focussing on the NSX - AEI, the first observation is that the number of entries ranges from 257 (being on a Monday and the least) through to 276 (being on a Friday). The same results are obtained for the NSX - AGR and NSX - RES. Overall, the inference is that there is no specific day of the week which would carry greater influence or weight due to greater representation. The means, i.e., the average of the data values, across each of the days of the week, is reasonably consistent, implying no specific observable behavioural pattern. No particular day appears to provide an observable closing value which is highly differentiated from the others. Again, while not significantly to dissimilar to the other days of the week, the standard deviation is greater for Mondays compared to each other day, implying some minor degree of increased volatility.

The symmetry of the distribution, as represented by skewness and kurtosis, shows a fairly normal distribution. Kurtosis provides a measure of the heaviness of the tails in the data distribution, i.e., the peakiness of the data. For data which are normally distributed data the kurtosis equates to zero. As with skewness, if the value of kurtosis is too big or too small, there is concern about the normality of the distribution. The data in the table show demonstrate a minor leptokurtic distribution. Each of the skewness values is marginally negative, highlighting that the data are not symmetrical and skewed to the left.

Looking at the data for NSX - AGR, the mean values again are quite consistent with Tuesday having the lowest mean and Monday the highest, though the difference is minimal, with less than a one percent variation. Unlike the NSX-AEI, the NSX-AGR displays a slightly negative (or platykurtic) pattern in the distribution of the data, while the data is also marginally negatively skewed, similarly to the NSX-AEI. The results for the NSX-RES provide a similar pattern to the NSX-AGR: consistent means, platykurtic distribution and marginally negatively skewed data.

Table 7.3.a; NSX - AEI, AGR and RES, descriptive statistics output for DOW data

DAY of the WEEK					
NSX-AEI					
	Mon	Tues	Wed	Thurs	Fri
Mean	1222.883	1226.062	1226.398	1229.452	1226.332
Standard Error	10.6104	10.196	10.000	9.824	10.044
Standard Deviation	170.099	168.780	167.637	164.985	166.871
Sample Variance	28933.733	28486.907	28102.315	27220.137	27845.974
Kurtosis	0.15861388	0.236	0.268	0.354	0.295
Skewness	-1.362	-1.394	-1.404	-1.430	-1.407
Count	257	274	281	282	276
Confidence Level (95.0%)	20.894	20.073	19.685	19.339	19.773
NSX-AGR					
Mean	913.647	909.634	911.694	910.094	910.637
Standard Error	9.527	9.279	9.106	9.107	9.219
Standard Deviation	152.743	153.605	152.650	152.943	153.157
Sample Variance	23330.696	23594.744	23302.107	23391.785	23457.334
Kurtosis	-0.593	-0.676	-0.621	-0.652	-0.655
Skewness	-0.852	-0.806	-0.838	-0.829	-0.820
Count	257	274	281	282	276
Confidence Level (95.0%)	18.763	18.268	17.925	17.927	18.148
NSX-RES					
Mean	712.344	714.137	712.324	715.115	711.004
Standard Error	9.388	8.955	8.852	8.858	9.066
Standard Deviation	150.505	148.235	148.389	148.761	150.617
Sample Variance	22651.804	21973.753	22019.538	22129.949	22685.492
Kurtosis	-0.253	-0.098	-0.265	-0.223	-0.308
Skewness	-0.470	-0.554	-0.599	-0.602	-0.536
Count	257	274	281	282	276
Confidence Level (95.0%)	18.488	17.630	17.425	17.437	17.847

Table 7.3.b provides the descriptive data output in relation to the month of the year independent variable across each of the indices, (the full table - Table 7.3.b.1 is presented in the appendix). The number of monthly observations across each of the three indices varies quite substantially, with the lowest occurring in June (MOTY6) at 103 to March (MOTY3) totalling 128. This may provide a contributory factor in the significance of the of the regression output to be explained later in this section. The mean closing values across each of the months for the NSX-AEI shows a substantial degree of variability, which could also imply volatility. December (MOTY12) has the lowest average closing value (1165.468) while March (MOTY3) displays the highest closing value (1263.533). A similar outcome is observed in relation to the variability of the standard deviation across each of the months, with the month of December (MOTY12, 191.247) followed by January (MOTY1, 178.460) having the highest figures and March (MOTY3, 131.190) the lowest. The table also demonstrates that the distribution of the closing values are marginally leptokurtic and relatively negatively skewed.

The mean returns for both the NSX-AGR and NSX-RES highlight a substantial disparity in the range between the highest and lowest average closing value. The lowest mean closing value in the NSX-AGR occurs in August (MOTY8, 847.091), while the highest mean return is represented in the month of April (MOTY4, 944.217), while the lowest and highest mean closing values on the NSX-RES are February (MOTY2, 653.533) and June (MOTY6, 763.671). This variability in outcomes is reflected in the results achieved in the multiple regression output, which will be discussed later. Furthermore, the standard deviations for each of the indices also demonstrates a substantial level of volatility across several of the months. For example, the standard deviation for the NSX-RES ranges from 89.505 (MOTY7) to 193.148 (MOTY4). The distribution of the closing values in both indices is generally skewed to the left (negative).

Table 7.3.c provides the descriptive data output in relation to the January turn of the year independent variable across each of the indices. Due to the small sample size (i.e. 6 observations) across all the pre- and post-sample days, it was considered that the output was not sufficiently robust to provide any validity. The table has been provided in the appendix for the reader to review and assess.

Turn of the month descriptive data is displayed in Table 7.3.d, (the full table - Table 7.3.d.1 is presented in the appendix). As can be seen from the table the data are arranged to represent pre-1 day and post-4 days. There are a consistent 66 entries across each of the independent variables. There is minimal variability of the means across each of the indices. A similar outcome is observed for the respective standard deviations. The NSX-AEI displays a variable distribution which is mildly leptokurtic, while both the NSX-AGR and NSX-RES are mildly platykurtic. All three indices exhibit a negatively skewed distribution.

Table 7.3.e provides the descriptive data output in relation to the Australian end of the financial year independent variable across each of the indices. Due to the small sample size (i.e. 5 observations) across each of the independent variables, it was considered that the validity of the output was not sufficiently robust to warrant discussion. Any future research focussing on this specific calendar anomaly may need to consider a longer time frame in the data to improve validity. The table has been provided in the appendix for the reader to review and assess.

Table 7.3.b; NSX - AEI, AGR and RES, descriptive statistics output for MOTY data

MONTH of the YEAR												
NSX-AEI												
	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
Mean	1196.603	1240.951	1263.553	1253.804	1246.001	1240.537	1228.786	1234.454	1227.604	1213.330	1202.898	1165.648
Standard Error	16.291	12.164	11.595	13.247	14.365	16.599	16.467	16.726	17.001	17.216	17.287	17.458
Standard Deviation	178.460	134.356	131.190	142.677	156.711	168.462	173.498	171.392	176.676	176.415	183.773	191.247
Sample Variance	31848.280	18051.751	17210.912	20356.815	24558.434	28379.630	30101.729	29375.380	31214.462	31122.452	33772.847	36575.734
Kurtosis	-0.3243	1.085	1.314	0.347	0.160	0.433	0.123	0.535	0.100	0.0307	0.014	-0.984
Skewness	-1.1423	-1.682	-1.663	-1.397	-1.337	-1.524	-1.443	-1.577	-1.403	-1.381	-1.343	-0.873
Count	120	122	128	116	119	103	111	105	108	105	113	120
Confidence Level (95.0%)	32.258	24.082	22.945	26.240	28.448	32.924	32.635	33.168	33.701	34.140	34.253	34.569
NSX-AGR												
Mean	933.095	929.079	931.231	944.217	920.783	886.299	873.982	847.091	867.787	909.765	936.577	935.5957
Standard Error	13.676	12.586	12.575	13.107	14.255	14.723	14.473	14.938	15.058	15.238	14.275	14.371
Standard Deviation	149.814	139.024	142.271	141.172	155.511	149.429	152.486	153.076	156.491	156.152	151.745	157.433
Sample Variance	22444.414	19327.866	20241.166	19929.679	24183.743	22329.279	23252.188	23432.385	24489.478	24383.594	23026.773	24785.339
Kurtosis	0.1743	0.669	0.274	0.557	-0.487	-0.792	-1.189	-1.689	-1.617	-0.791	-0.062	-0.0979
Skewness	-1.047	-1.416	-1.283	-1.249	-0.574	-0.335	-0.385	-0.472	-0.387	-0.962	-1.250	-1.061
Count	120	122	128	116	119	103	111	105	108	105	113	120
Confidence Level (95.0%)	27.080	24.918	24.883	25.963	28.230	29.204	28.682	29.624	29.851	30.219	28.284	28.457
NSX-RES												
Mean	685.913	653.533	709.128	731.499	740.254	763.671	745.113	735.473	724.801	701.661	674.068	702.85535
Standard Error	14.050	11.486	13.778	17.933	16.413	9.447	8.495	9.550	12.599	15.480	14.778	14.906
Standard Deviation	153.913	126.872	155.881	193.148	179.048	95.880	89.505	97.865	130.939	158.623	157.097	163.297
Sample Variance	23689.307	16096.513	24298.973	37306.376	32058.236	9193.050	8011.2817	9577.752	17145.198	25161.555	24679.758	26666.212
Kurtosis	-1.224	-1.039	0.319	-0.277	0.993	-1.118	-1.364	-1.617	-1.398	-1.519	-0.554	-1.122
Skewness	-0.309	-0.365	-1.056	-0.693	-1.146	-0.217	-0.283	-0.101	-0.348	-0.221	0.266	-0.216
Count	120	122	128	116	119	103	111	105	108	105	113	120
Confidence Level (95.0%)	27.820	22.740	27.264	35.522	32.502	18.738	16.836	18.939	24.977	30.697	29.281	29.517

Table 7.3.d; NSX - AEI, AGR and RES, descriptive statistics output for TOTM data

TURN of the MONTH					
	TOTMPre1 day	TOTMPst1 day	TOTMPst2 day	TOTMPst3 day	TOTMPst4 day
NSX-AEI					
Mean	1226.676	1225.968	1225.671	1225.804	1226.411
Standard Error	20.862	20.860	20.767	20.652	20.7198
Standard Deviation	169.491	169.467	168.716	167.782	168.328
Sample Variance	28727.323	28719.214	28465.103	28150.939	28334.494
Kurtosis	0.302	0.330	0.357	0.332	0.341
Skewness	-1.410	-1.424	-1.427	-1.420	-1.423
Count	66	66	66	66	66
Confidence Level (95.0%)	41.666	41.660	41.475	41.246	41.380
NSX-AGR					
Mean	912.263	910.845	909.845	908.858	910.162
Standard Error	18.721	18.788	18.945	19.023	18.980
Standard Deviation	152.095	152.638	153.915	154.551	154.195
Sample Variance	23132.963	23298.557	23689.8705	23886.139	23776.211
Kurtosis	-0.530	-0.591	-0.631	-0.679	-0.678
Skewness	-0.867	-0.855	-0.835	-0.817	-0.823
Count	66	66	66	66	66
Confidence Level (95.0%)	37.389	37.523	37.837	37.993	37.905
NSX-RES					
Mean	715.987	714.297	713.322	714.482	715.683
Standard Error	18.490	18.471	18.399	18.460	18.584
Standard Deviation	150.221	150.059	149.476	149.975	150.983
Sample Variance	22566.437	22517.987	22343.335	22492.624	22795.945
Kurtosis	-0.237	-0.323	-0.120	-0.055	-0.095
Skewness	-0.621	-0.624	-0.709	-0.683	-0.640
Count	66	66	66	66	66
Confidence Level (95.0%)	36.929	36.889	36.746	36.868	37.116

The descriptive data provided for the holiday effect anomaly, as seen in Table 7.3.f, do not provide any distinguishing factors across each of the indices, (the full table - Table 7.3.f.1 is presented in the appendix). Firstly, the count across each of the independent variables is quite equitable. The means and standard deviations are reasonably uniform with no dramatic outlier/s present. The spread of the results, as demonstrated by the kurtosis and skewness, is relatively homogenous, with the results being both platykurtic and highly negatively skewed.

Table 7.3.f; NSX - AEI, AGR and RES, descriptive statistics output for Australian holiday's data

HOLIDAYS			
	HOLPre2 days	HOLPre1 day	HOLPst1 day
NSX-AEI			
Mean	1217.479	1211.147	1210.514
Standard Error	31.156	30.871	30.788
Standard Deviation	178.981	180.008	179.528
Sample Variance	32034.222	32402.908	32230.373
Kurtosis	-0.137	-0.435	-0.432
Skewness	-1.247	-1.131	-1.134
Count	33	34	34
Confidence Level (95.0%)	63.463	62.807	62.640
NSX-AGR			
Mean	926.485	926.036	923.951
Standard Error	26.279	25.519	25.448
Standard Deviation	150.962	148.800	148.388
Sample Variance	22789.678	22141.588	22019.079
Kurtosis	-0.035	0.030	0.0007
Skewness	-0.952	-0.955	-0.922
Count	33	34	34
Confidence Level (95.0%)	53.528	51.918	51.775
NSX=RES			
Mean	721.040	725.628	725.073
Standard Error	26.724	26.119	25.960
Standard Deviation	153.522	152.299	151.376
Sample Variance	23569.168	23194.988	22914.930
Kurtosis	-0.293	-0.175	-0.207
Skewness	-0.719	-0.717	-0.760
Count	33	34	34
Confidence Level (95.0%)	54.436	53.139	52.817

Unlike the previous tables where the sample count was very small, the descriptive data relating to Australian federal elections in Table 7.3.g below also show a very sample size (2), though the results provide a significant outcome, particularly relating to the regression analysis, (the full table - Table 7.3.g.1 is presented in the appendix). The summary statistics for both the NSXAEI and NSXAGR are generally insignificant, while the NSXRES statistics show a very wide degree of variability across each of the days for the mean and standard deviation. Additionally, to be discussed later in the chapter, the regression output for both the NSXAGR and NSXRES display significant outcomes, with strong implications with regards to predictability.

Table 7.3.g; NSX - AEI, AGR and RES, descriptive statistics output for Australian federal elections data

AUSTRALIAN FEDERAL ELECTION			
	AFEPre1 day	AFEPst1 day	AFEPost2 day
NSX-AEI			
Mean	1163.344	1170.832	1178.569
Standard Error	163.344	155.857	148.119
Standard Deviation	231.004	220.415	209.472
Sample Variance	53362.851	48582.808	43878.772
Kurtosis	#DIV/0!	#DIV/0!	#DIV/0!
Skewness	#DIV/0!	#DIV/0!	#DIV/0!
Sum	2326.689	2341.664	2357.139
Count	2	2	2
Confidence Level (95.0%)	2075.488	1980.350	1882.036
NSX-AGR			
Mean	981.220	981.220	981.220
Standard Error	18.779	18.779	18.779
Standard Deviation	26.558	26.558	26.558
Sample Variance	705.339	705.339	705.339
Kurtosis	#DIV/0!	#DIV/0!	#DIV/0!
Skewness	#DIV/0!	#DIV/0!	#DIV/0!
Sum	1962.441	1962.441	1962.441
Count	2	2	2
Confidence Level (95.0%)	238.616	238.616	238.616
NSX-RES			
Mean	900.161	941.144	957.538
Standard Error	99.839	140.822	157.216
Standard Deviation	141.193	199.153	222.336
Sample Variance	19935.651	39661.953	49433.741
Kurtosis	#DIV/0!	#DIV/0!	#DIV/0!
Skewness	#DIV/0!	#DIV/0!	#DIV/0!
Sum	1800.322	1882.289	1915.076
Count	2	2	2
Confidence Level (95.0%)	1268.574	1789.319	1997.618
VERY SMALL NO. IV'S IN SAMPLE			

The descriptive data relating to the US presidential elections, see Table 7.3.h demonstrate minimal variability across each of the independent variables, in relation to their means and standard deviations. The very small count (2) across each of the independent variables may have influenced the validity of the outcome. This may explain why the regression results were not significant. The table has been provided in the appendix for the reader to review and assess.

Tables 7.3.i, 7.3.j and 7.3.k provide the summary statistics in relation to events including the AFL Grand Final, the NRL Grand Final and the Melbourne Cup, (the full tables - Tables 7.3.i.1, 7.3.j.1 and 7.3.k.1 are presented in the appendix). These may be viewed as iconic events which have very large public followings and interest. This is why they were considered as possible events which may have some degree of personal, psychological or social impact on the individual and thereby influence their short-term investment behaviour, leading to a discernible pattern in overall returns on the NSX and its numerous indices.

Unlike other studies which have demonstrated a positive link between major, or national, sporting events and the predictability of stock market returns (Edmans et. al., 2007; Sevil and Polat, 2015 & Worthington, 2007) the current research did not find any significant outcome in either the summary statistics or the regression output linking stock market returns with each specifically tested event. The outcome in the current research, again, may have been due to the very limited nature of the recorded data.

Table 7.3.i; NSX - AEI, AGR and RES, descriptive statistics output for the AFL Grand Final

AFL GRAND FINAL					
	AFLGFPre3 day	AFLGFPre2 day	AFLGFPre1 day	AFLGFPst1 day	AFLGFPst2 day
NSX-AEI					
Mean	1246.996	1247.670	1246.134	1246.718	1244.511
Standard Error	74.635	73.547	73.271	73.434	72.769
Standard Deviation	182.818	180.153	179.478	179.877	178.248
Sample Variance	33422.707	32455.144	32212.667	32356.0321	31772.361
Kurtosis	5.164	5.130	5.110	5.087	5.207
Skewness	-2.2531	-2.246	-2.241	-2.235	-2.262
Count	6	6	6	6	6
Confidence Level (95.0%)	191.856	189.059	188.351	188.770	187.059
NSX-AGR					
Mean	893.056	893.056	893.056	896.880	892.061
Standard Error	63.621	63.621	63.621	65.537	64.319
Standard Deviation	155.839	155.839	155.839	160.532	157.550
Sample Variance	24286.007	24286.007	24286.007	25770.740	24822.304
Kurtosis	-1.121	-1.121	-1.121	-1.100	-1.005
Skewness	-0.917	-0.917	-0.917	-0.813	-0.764
Count	6	6	6	6	6
Confidence Level (95.0%)	163.543	163.543	163.543	168.468	165.339
NSX-RES					
Mean	737.993	744.224	741.316	740.594	737.216
Standard Error	61.637	65.048	66.428	66.259	64.733
Standard Deviation	150.979	159.336	162.716	162.300	158.563
Sample Variance	22794.790	25388.225	26476.558	26341.542	25142.249
Kurtosis	-0.600	-0.839	-0.922	-0.914	-1.010
Skewness	-1.0517	-0.923	-0.913	-0.905	-0.816
Count	6	6	6	6	6
Confidence Level (95.0%)	158.443	167.213	170.760	170.324	166.401
SMALL NO. IV'S IN SAMPLE					

Table 7.3.j; NSX - AEI, AGR and RES, descriptive statistics output for the NRL Grand Final

NRL GRAND FINAL					
	NRLGFPre3 day	NRLGFPre2 day	NRLGFPre1 day	NRLGFPst1 day	NRLGFPst2 day
NSX-AEI					
Mean	1230.496	1224.189	1222.056	1222.392	1226.668
Standard Error	88.303	86.392	85.821	85.936	86.392
Standard Deviation	197.452	193.178	191.901	192.160	193.180
Sample Variance	38987.585	37318.033	36826.304	36925.830	37318.650
Kurtosis	4.174	4.315	4.325	4.312	4.268
Skewness	-2.032	-2.066	-2.070	-2.066	-2.056
Count	5	5	5	5	5
Confidence Level (95.0%)	245.169	239.863	238.277	238.599	239.865
NSX-AGR					
Mean	877.085	877.085	877.085	873.872	868.090
Standard Error	81.910	81.910	81.910	80.079	78.151
Standard Deviation	183.157	183.157	183.157	179.062	174.752
Sample Variance	33546.729	33546.729	33546.729	32063.442	30538.344
Kurtosis	-2.735	-2.735	-2.735	-2.835	-2.686
Skewness	-0.441	-0.441	-0.441	-0.500	-0.444
Count	5	5	5	5	5
Confidence Level (95.0%)	227.420	227.420	227.420	222.335	216.983
NSX-RES					
Mean	729.753	728.438	725.382	725.382	740.035
Standard Error	76.750	77.286	78.982	78.982	84.624
Standard Deviation	171.620	172.818	176.611	176.611	189.226
Sample Variance	29453.531	29866.282	31191.489	31191.489	35806.661
Kurtosis	-1.815	-1.966	-2.067	-2.067	-2.374
Skewness	-0.611	-0.586	-0.577	-0.577	-0.463
Count	5	5	5	5	5
Confidence Level (95.0%)	213.094	214.582	219.291	219.291	234.955
SMALL NO. IV'S IN SAMPLE					

MELBOURNE CUP					
	MCPre3 day	MCPre2 day	MCPre1 day	MCPst1 day	MCPst2 day
NSX-AEI					
Mean	1208.8434	1207.271	1207.360	1207.196	1209.64
Standard Error	89.164	89.512	92.590	92.623	90.501
Standard Deviation	199.378	200.157	207.037	207.112	202.367
Sample Variance	39751.767	40062.832	42864.700	42895.580	40952.681
Kurtosis	4.722	4.741	4.674	4.640	4.614
Skewness	-2.164	-2.169	-2.153	-2.145	-2.138
Count	5	5	5	5	5
Confidence Level (95.0%)	247.561	248.527	257.071	257.164	251.272
NSX-AGR					
Mean	934.790	934.790	933.526	933.526	933.526
Standard Error	75.712	75.712	75.325	75.325	75.325
Standard Deviation	169.299	169.299	168.432	168.432	168.432
Sample Variance	28662.254	28662.254	28369.433	28369.433	28369.433
Kurtosis	3.291	3.291	3.326	3.326	3.326
Skewness	-1.839	-1.839	-1.844	-1.844	-1.844
Count	5	5	5	5	5
Confidence Level (95.0%)	210.212	210.212	209.136	209.136	209.136
NSX-RES					
Mean	672.150	667.044	669.843	669.834	670.021
Standard Error	73.241	73.414	72.794	74.133	74.186
Standard Deviation	163.773	164.159	162.772	165.767	165.886
Sample Variance	26821.781	26948.415	26494.939	27478.954	27518.276
Kurtosis	-1.730	-1.709	-1.533	-1.570	-1.582
Skewness	-0.178	-0.083	-0.129	-0.190	-0.193
Count	5	5	5	5	5
Confidence Level (95.0%)	203.351	203.831	202.108	205.827	205.975
SMALL NO. IV'S IN SAMPLE					

Table 7.3.k; NSX - AEI, AGR and RES, descriptive statistics output for the Melbourne Cup

7.4. Empirical analysis

7.4.1. Introduction

The principle objective of this section is to present a comprehensive analysis of the data and the results of testing the various hypotheses. Overall, the results demonstrate a mixed outcome, with some of the results supporting the premise established by the EMH, while other results provide significant evidence that stock market returns are predictable, thereby questioning the validity of the EMH. The chapter examines the results of the analysis which highlights the impact of the independent variables (i.e. anomalous factors) as being mixed and highly variable. The results for OLS regression is provided for comparison.

The results were obtained using the STATA statistical software computer program and data were presented in Excel format and then converted to Word format by the researcher. The original STATA output can be made available upon request.

7.4.2. NSX-AEI Data Regression Results

Ordinary least squares (OLS) regression was used to compute the role and influence played by the independent variables in the model. OLS regression is a generalized linear modelling technique that may be used to model a single response variable which has been recorded on at least an interval scale. OLS regression may be applied to independent variables which are either single or multiple explanatory variables in nature. This statistical procedure can be used to compute accurately and properly coded categorical explanatory variables (Hutcheson 2011).

Table 7.4.2.a below is a condensed version with the control variables removed and provides the regression results for all significant independent variables considered in the research based on the NSX All Equities Index (NSX-AEI) data. The full table, (Table 7.4.2.a.1), can be found in the appendix. The first observation that can be noticed is that there are 35 significant variables from a total number of observations 1369. The large number of observations provides for more reliability in the regression output, minimizing the potential for data mining or dredging.

A determinant of whether the model provides an acceptable fit is the F-test of overall significance. The p-value for the F-test was analysed against a .05 significance level to assess the fit of the model. The lower the p-value compared to the level of significance the greater the level of significance that the regression model fits the data, (Frost 2015). The p-value for the F-test in Table 7.4.2.a is equal to zero, implying the model is significant and valid.

The R-squared statistic is an indicator of whether the data fits the regression line. R-squared is an overall measure of the strength of association. The R-squared value always falls between 0 and 100%, with a lower score indicating a lack of explanatory power in the model while a score of 100 percent explains all the variability of the response data around its mean, (Frost 2013). Therefore, the higher the R-squared number, the greater the model fits the data. Table 7.4.2.a indicates that the R-squared value equates to 0.936, demonstrating a strong fit between the model and the data. The implication of this outcome is that the model explains 93.6 percent of the variance in the dependent variable, i.e., NSX-AEI closing values.

A slightly stronger measure of model fit, compared to the R-squared value, is adjusted R-squared. Adjust R squared accounts for any model with multiple predictors or independent variables, (Frost 2013). The adjusted R-squared value in Table 7.4.2.a equals 0.932, which is only marginally lower than the R-squared outcome (0.936).

Focussing initially on the interest rate variables within the macroeconomic group of independent variables, the outcomes are somewhat inconsistent. Both the 5-year Australian government bond rate and the interbank cash rate were not significant based on their respective statistical values (see Table 7.4.2.a.1) implying that neither of these variables are significantly associated with closing value behaviour on the NSX-AEI. Of the remaining values within this cohort of independent variables, all display significant T and p-values, with the three most significant variables being, in rank order: 1) 180-day bank accepted bill (BAB180days; T-statistic - 11.37, p-value < 0.05); 2) Australian government bond rate (AGBR3yrs; T-statistic - -10.92, p-value < 0.05) and 3) Australian government bond rate (AGBR2yrs; T-statistic - 9.97, p-value < 0.05). It should be noted, that the implication of a negative T-statistic is a negative relationship between the independent variable (i.e. AGBR3yrs) and the dependent variable (i.e. NSX-AEI closing value) and vice versa for a positive T-statistic. Consequently, it can be stated that a reliable determinant of the closing values on the NSX-AEI is a 180-day bank accepted bill rate followed by three and two-year government bond rates.

The next group of macroeconomic independent variables is the numerous currencies. As was discussed earlier in the research the detailed list of currencies adopted in the current research was based on the level of trade between Australia and its international counterparts. One advantage of such an approach is that it offers the opportunity to see if any country is potentially more influential with respect to trading behaviour on the NSX-AEI. Table 7.4.2.a.1 lists fourteen currencies plus the trade weighted index (TWI). Three currencies in this group (Canadian dollar, Hong Kong dollar and Chinese Yuan) provide results which are not significant. Of the remaining (see table below) the Euro (T-statistic - 14.27, p-value < 0.05) and the Swiss Franc (T-statistic - -6.97, p-value < 0.05) are the most statistically significant. The conclusion that can be drawn from this outcome is that a strong association exists between the closing value of the NSX-AEI and the Euro and Swiss Franc currencies.

The next category of independent variables are the calendar variables. These include the: day of the week (DOW), month of the year (MOTY), January turn of the year (JTOTY), turn of the month (TOTM), end of financial year Australia (EOFYA) and holidays (HOL). As can be seen in Table 7.4.2.a.1 the DOW, the TOTM, the EOFYA and HOL variables are not significant and therefore cannot be considered predictor variables. Each of these independent variables display T-statistic which are close to, or, zero and p-values greater than 0.05 (i.e. $p > 0.05$), an indicator of poor association with the dependent variable. Therefore, it can be concluded that the NSX-AEI does not contain within it a DOW, TOTM, EOFYA or HOL anomaly, according to the available data.

Table 7.4.2.a; NSX-AEI Regression Results Significant Independent Variables

NSX-AEI Regression Results Significant Independent Variables						
Source	SS	df	MS	Number obs = 1369		
				F (87, 1281) = 216.93		
Model	35917838.5	87	412848.718	Prob > F = 0		
Residual	2437922.93	1281	1903.140	R-squared = 0.936		
				Adj R-squared = 0.932		
Total	38355761.4	1368	28037.837	Root MSE = 43.625		
Ind. Variable	Coef.	Std. Err.	t	P>t	95% Conf. Interval	
AGBR2yrs	366.660	36.7915	9.97	0	294.482	438.838
AGBR3yrs	-593.047	54.319	-10.92	0	-699.613	-486.482
AGBR10yrs	207.637	21.037	9.87	0	166.365	248.909
BAB30days	-173.354	25.487	-6.8	0	-223.356	-123.352
BAB90days	-250.871	30.469	-8.23	0	-310.648	-191.095
BAB180days	290.635	25.566	11.37	0	240.478	340.792
USD	2065.75	384.524	5.37	0	1311.384	2820.116
TWI	-83.188	13.513	-6.16	0	-109.7	-56.677
EUR	2689.049	188.396	14.27	0	2319.45	3058.648
JPY	4.040	1.639	2.46	0.014	0.824	7.256
GBP	-650.645	131.608	-4.94	0	-908.837	-392.453
CHFSwissFranc	-669.443	96.024	-6.97	0	-857.825	-481.060
NZD	410.681	66.630	6.16	0	279.963	541.398
SGD	917.680	197.727	4.64	0	529.775	1305.586
MYR	101.835	51.610	1.97	0.049	0.585	203.085
TWD	31.617	6.169	5.12	0	19.513	43.722
KRW	-0.188	0.091	-2.07	0.038	-0.367	-0.010
IDR	-0.051	0.009	-5.43	0	-0.069	-0.032
CNY	66.0571	37.226	1.77	0.076	-6.975	139.089
MOTY1	39.044	8.023	4.87	0	23.303	54.786
MOTY2	23.694	6.611	3.58	0	10.723	36.664
MOTY3	53.7307	7.531	7.13	0	38.954	68.506
MOTY4	78.184	7.8904	9.91	0	62.704	93.663
MOTY5	56.628	7.590	7.46	0	41.737	71.520
MOTY6	29.504	7.855	3.76	0	14.093	44.915
MOTY9	21.778	7.339	2.97	0.003	7.379	36.177

MOTY10	18.359	6.994	2.62	0.009	4.637	32.082
JTOTYPost3day	-49.494	19.764	-2.5	0.012	-88.268	9.311
JTOTYPost4day	-54.127	19.764	-2.74	0.006	-92.901	-10.720
JTOTYPost5day	-56.543	18.873	-3	0.003	-93.569	-15.353
JTOTYPost6day	-55.382	18.872	-2.93	0.003	-92.405	-19.517
JTOTYPost7day	-55.801	18.854	-2.96	0.003	-92.790	-18.358
JTOTYPost8day	-53.420	18.834	-2.84	0.005	-90.371	-18.813
JTOTYPost9day	-56.534	20.520	-2.76	0.006	-96.791	-16.469
JTOTYPost10day	-49.059	18.839	-2.6	0.009	-86.018	-16.277

Of the remaining values within this cohort of independent variables (i.e. MOTY and JTOTY), mixed results are observed. Focussing initially on the MOTY independent variables, neither July (MOTY7), August (MOTY8) nor December (MOTY12) are significant. The lack of significance associated with July (MOTY7) could be correlated with lack of significance observed for the EOFYA. Alternately, all other months in this category demonstrate a strong level of significance.

From the data January (MOTY1) through to June (MOTY6) and September (MOTY9) and October (MOTY10) show strong levels of significance in both T-statistic and p-values. A partial January anomaly is evident in the NSX-AEI, based on the outcome achieved for MOTY1 (T-statistic - 4.87, p-value < 0.05). This is because while not the most significant outcome in this group the regression data points to a significant outcome. According to the January anomaly, January stock market returns, particularly for small stocks, exceed all other months. Compared to the ASX, the average market capitalisation of listed companies on the NSXA would be considered small, which supports the theory relating to the January anomaly and the outcome observed in the current research. If this outcome is viewed in relation to the JTOTY data from JTOTYPost4day through to JTOTYPost10day the statistical outcome is significant, while this is reversed prior to this, i.e. JTOTYPre2day to JTOTYPost3day. The implication is that the progression of the January anomaly may begin from day 4 onwards.

The most significant outcomes occur during April (MOTY4: T-statistic - 9.91, p-value < 0.05) followed by May (MOTY5: T-statistic - 7.46, p-value < 0.05) and then March (MOTY3: T-statistic - 7.13, p-value < 0.05). Furthermore, June (MOTY6), which is also the final month of the Australian financial year, demonstrates a significant outcome, though this is reversed for the month of July (MOTY7).

Addressing the JTOTY data a lack of statistical significance is observed for JTOTYPre2days through to JTOTYPost3day. Therefore, no observable patterns of behaviour exist just prior to the end of the calendar year and the first 3 days of the New Year. A reversal of this outcome occurs from JTOTYPost4day to JTOTYPost10day, with each day in this period exhibiting a statistically significant outcome. If this outcome is viewed in conjunction with the statistically significant outcome for the MOTY1, it could be assumed that the partial January anomaly commences to take shape from the fourth day of the new calendar trading year. The most significant outcome is observed for JTOTYPost5day (T-statistic – -3, p-value < 0.05), followed by JTOTYPost7day (T-statistic – -2.96, p-value < 0.05) and then JTOTYPost6day (T-statistic – -2.93, p-value < 0.05). A correlation may be drawn between this outcome and investors beginning to return to the market after the immediate Christmas – New Year period and reconfiguring their stock portfolios or portfolio rebalancing. Overall, the implication is that in relation to MOTY and JTOTY the NSX-AEI demonstrates informational inefficiency, therefore questioning the efficacy, or accuracy, of the EMH. This outcome would suggest some degree of inefficiency in the NSX-AEI, as an efficiently operating stock market would by nature make this anomaly irrelevant.

The next group of independent calendar variables includes: the turn of the month (i.e. TOTMPre1day – TOTMPost4day), the Australian end of financial year (i.e. EOFYAPre3day – EOFYAPost2day) and holidays (i.e. HOLPre2days – HOLPost1day). As can be observed from Table 7.4.2.a.1 these variables, lack statistical significance, the implication being that during these periods of the year the NSX-AEI is operating efficiently, as posited by the EMH.

Several studies have highlighted the significant relationship that exists between sporting/cultural events (Edmans et al (2007), Kaplanski et al (2010) and Mishra et al (2010)) and political events (Mandaci (2003), Nippani et al (2005) and, Li et al (2006)) with the ability of such events to influence stock market activity and act as predictors. The current research also pursued an investigation of the relationship between such events and closing values on the NSX. The variables that were considered included political and sporting events, specifically: Australian federal elections (i.e. AFEPre1day - AFEPost2day), American presidential elections (i.e. USPEPre3day - USPEPost2day), the Australian Football League grand final (i.e. AFLGFPre3day - AFLGFPost2day), the National Rugby League grand final (i.e. NRLGFPre3day - NRLGFPost2day) and the Melbourne Cup horse race (MCPost2day - MCPre3day). Table 7.4.2.a.1 illustrates that each of these variables is statistically insignificant and does not support any association between the variable and stock market activity on the NSX-AEI. Again, the implication is that for these specific events the NSX-AEI is operating efficiently, as posited by the EMH.

7.4.3. NSX-AEI Data Piecewise Regression Results

To test the robustness of the results obtained in Table 7.4.3.a further statistical tests were undertaken. The aim was to determine the efficacy and reliability of the results. Stepwise regression was one approach which was considered, though rejected. Stepwise regression, by eliminating the insignificant regression coefficients, provides the opportunity to produce a concise model. This could be manipulating the model to fit the data and improperly influencing the R-squared value. Furthermore, a stepwise regression methodology leads to mis-specified F and p-values and inaccurate confidence interval values.

Taking into considerations each of these concerns, stepwise regression could be a process of data mining or dredging. An alternative approach adopted in the current research was to employ a piecewise regression approach, also referred to as segmented regression. Piecewise regression does not remove any of the independent variables, but simply breaks (referred to as "breakpoints" in the literature) the model (i.e. the independent variables) into a more compartmentalised format. The use of piecewise regression has been common in the financial research anomalies literature, see: Anderson et. al. (2009), Malcolm et. al. (2012), Ball, and Shivakumar (2006), Chan et. al. (2005), Chang et. al. (2009).

Table 7.4.3.a provides the significant piecewise regression results for the independent macroeconomic variables (the full table - Table 7.4.3.a.1 – can be viewed in the appendix). As with Table 7.4.2.a.1, which provides the regression results with all independent variables considered, the p-value for the F-test was analysed against a .05 significance level to assess the fit of the model. As can be seen from the table the p-value for the F-test is equal to zero, the implication of which is that the model is significant and valid. This outcome replicates the results achieved in Table 7.4.2.a.1.

The R-squared statistic in Table 7.4.3.a indicates a strong association between the model and the data (R-squared = 0.921). The implication of this outcome is that the model explains 92.1 percent of the variance in the dependent variable, i.e., NSX-AEI closing values. The adjusted R squared, which is considered a slightly stronger measure of model fit compared to the R-squared value. As can be seen in Table 7.4.3.a the adjusted R-squared value equals 0.919.

Table 7.4.3.a replicates the results observed in Table 7.4.2.a.1 in relation to the most significant macroeconomic independent variables (i.e. AGBR3yrs, BAB180days and Euro). The direction of the results for each of these is also the same. Additionally, it can be observed that in the piecewise regression output below (here forth referred to as simply "piecewise") all the AGBR variables are significant, while the AGBR5yrs rate is not significant in the table in Table 7.4.2.a.1. Furthermore, focussing on the currencies, the Swiss Franc, which in Table 7.4.2.a.1

is the second most influential independent currency variable, falls to third and is surpassed by the Singapore dollar (SDR) when piecewise regression is employed.

Table 7.4.3.a; NSX-AEI Piecewise Regression Results Significant Macroeconomic Variables

NSX-AEI Piecewise Regression Results Significant Macroeconomic Variables						
Source	SS	df	MS	Number of obs = 1370		
				F (23, 1346) = 684.2		
Model	35342037.8	23	1536610.34	Prob > F = 0		
Residual	3022894.47	1346	2245.835	R-squared = 0.921		
				Adj R-squared = 0.919		
Total	38364932.3	1369	28024.055	Root MSE = 47.39		
Ind. Var.	Coef.	Std. Err.	t	P>t	95% Conf. Interval	
AGBR2yrs	266.243	37.508	7.1	0	192.661	339.825
AGBR3yrs	-552.033	54.984	-10.04	0	-659.898	-444.169
AGBR5yrs	130.580	45.587	2.86	0.004	41.150	220.011
AGBR10yrs	167.994	21.244	7.91	0	126.319	209.670
BAB30days	-172.178	25.799	-6.67	0	-222.789	-121.567
BAB90days	-298.380	30.638	-9.74	0	-358.484	-238.276
BAB180days	360.530	25.938	13.9	0	309.645	411.415
USD	2010.456	375.638	5.35	0	1273.555	2747.356
TWI	-81.035	13.748	-5.89	0	-108.005	-54.065
EUR	2296.434	196.701	11.67	0	1910.559	2682.308
JPY	6.704	1.682	3.98	0	3.403	10.005
GBP	-327.748	127.049	-2.58	0.01	-576.984	-78.512
CHFSwissFranc	-669.741	91.677	-7.31	0	-849.588	-489.894
NZD	457.133	68.599	6.66	0	322.560	591.706
CAD	-253.155	112.146	-2.26	0.024	-473.155	-33.155
SGD	1613.132	174.926	9.22	0	1269.974	1956.29
MYR	-146.302	50.300	-2.91	0.004	-244.978	-47.627
IDR	-0.055	0.008	-6.26	0	-0.072	-0.038
CNY	126.910	36.024	3.52	0	56.239	197.581
_cons	1667.903	97.057	17.18	0	1477.503	1858.303

Table 7.4.3.b refers to the piecewise calendar independent variables table. The robustness of the overall model decreases quite substantially in relation to the F-statistic, R-squared and adjusted R-squared (the full table - Table 7.4.3.b.1 – can be viewed in the appendix). The DOW, TOTM, EOFYA and HOL variables are all insignificant. Such an outcome reinforces the observation in Table 7.4.2.a.1, that no apparent anomaly in relation to the DOW, TOTM, EOFYA and HOL exists in the NSX-AEI and therefore the market is operating efficiently in accord with the EMH.

Table 7.4.3.b; NSX-AEI Piecewise Regression Results Significant Calendar Variables

NSX-AEI Piecewise Regression Results Significant Calendar Variables						
Source	SS	df	MS	Number of obs	=	1369
				F(41, 1327)	=	0.99
Model	1140075.6	41	27806.7219	Prob > F	=	0.4871
Residual	37215685.8	1327	28044.978	R-squared	=	0.0297
_				Adj R-squared	=	-0.0003
Total	38355761.4	1368	28037.8373	Root MSE	=	167.47
Ind. Var.	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
MOTY3	51.11636	22.08889	2.31	0.021	7.783408	94.4493
MOTY12	-48.02692	23.10934	-2.08	0.038	-93.36175	-2.692085

Turning to the MOTY variables, the number of significant variables falls dramatically compared to the outcome noticed in 7.4.2.a.1, where eight of the variables displayed significant returns with, in order, MOTY4 followed by MOTY5 and MOTY3 having the sizable outcomes, while in the piecewise table above only two variables provide results which are significant (MOTY3, T-statistic – 2.31, p-value < 0.05 and MOTY12 T-statistic – -2.08), p-value < 0.05). Consequently, this outcome confirms the existence of a March (MOTY3) effect on the NSX-AEI.

In Table 7.4.2.a.1 JTOTY variables were significant for JTOTYPost3day through to JTOTYPost10day. This outcome varies quite considerably in the piecewise regression table with no JTOTY independent variable displaying any significance. Based on the observed results from the other piecewise regression tables this outcome appears somewhat irregular, requiring further examination.

When the significant independent event variables were observed in isolation from all other independent variables (the full table - Table 7.4.3.c – can be viewed in the appendix) all results proved insignificant. Therefore, based on the event variables considered in the current research it can be concluded that these are ineffectual in influencing outcomes on the NSX-AEI and therefore the NSX-AEI is operating as an efficient market according the EMH.

7.4.4. NSX-AGR Data Regression Results

Table 7.4.4.a below is a condensed version with the control variable removed and provides the regression results for all significant independent variables considered in the research based on the NSX Agriculture sub-indices (NSX-AGR) data, (the full table - Table 7.4.4.a.1, can be

found in the appendix). Again, the outcome is quite variable with respect to the significant and insignificant outcomes.

The F-statistic was analysed against a 0.05 significance level to assess the fit of the model. The lower the p-value compared to the level of significance the greater the robustness that the model fits the data. Table 7.4.4.a provides a p-value for the F-test which is equal to zero, implying that the model is significant and robust. As stated above, the R-squared statistic is an indicator of whether the data fits the regression line, being an overall measure of the strength of association. A lower score (between 0 and 100%) illustrating a lack of explanatory power in the model, while a score of 100 percent explains all the variability of the response data around its mean. Therefore, the higher the R-squared number, the greater the model fits the data. Table 7.4.4.a below demonstrates that the R-squared value equates to 0.8808, implying a reasonably strong fit between the model and the data. The implication of this outcome is that the model explains 88.08 percent of the variance in the dependent variable, i.e., NSX-AGR closing values. Adjusted R-squared is a slightly stronger measure of model fit, compared to the R-squared value, as consideration is given for a model with multiple predictors or independent variables. The adjusted R-squared value in Table 7.4.4.a equals 0.8727, marginally lower compared to the R-squared outcome (0.8808).

Table 7.4.4.a; NSX-AGR Regression Results Significant Independent Variables

NSX-AGR Regression Results Significant Independent Variables						
Source	SS	df	MS	Number of obs	=	1369
				F(87, 1281)	=	108.78
Model	28127019	87	323299.069	Prob > F	=	0
Residual	3807083.28	1281	2971.96197	R-squared	=	0.8808
				Adj R-squared	=	0.8727
Total	31934102.3	1368	23343.642	Root MSE	=	54.516
Ind. Variable	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
AGBR2yrs	-236.5507	45.97629	-5.15	0	-326.7478	-146.3536
AGBR3yrs	364.7418	67.88026	5.37	0	231.5732	497.9105
AGBR5yrs	-406.5839	56.29257	-7.22	0	-517.0197	-296.1482
AGBR10yrs	218.2892	26.28956	8.3	0	166.7139	269.8646
CRInterbankRate	-74.71472	16.45747	-4.54	0	-107.0013	-42.42817
BAB90days	-80.52222	38.07646	-2.11	0.035	-155.2213	-5.823142
BAB180days	133.7498	31.94915	4.19	0	71.07138	196.4282
USD	-4811.238	480.518	-10.01	0	-5753.927	-3868.55
TWI	253.0388	16.8873	14.98	0	219.909	286.1687
EUR	-3319.805	235.428	-14.1	0	-3781.672	-2857.938
JPY	-35.23282	2.048491	-17.2	0	-39.25158	-31.21405
GBP	-2682.472	164.464	-16.31	0	-3005.12	-2359.824
NZD	-1385.443	83.26457	-16.64	0	-1548.793	-1222.093
SGD	1019.501	247.0889	4.13	0	534.758	1504.245
MYR	-1171.827	64.4944	-18.17	0	-1298.353	-1045.301
TWD	79.48722	7.710273	10.31	0	64.36107	94.61337
KRW	-2.063816	0.1139291	-18.11	0	-2.287324	-1.840308
IDR	0.0958286	0.0118112	8.11	0	0.0726572	0.1190001
CNY	-705.1898	46.52041	-15.16	0	-796.4544	-613.9253
MOTY3	38.41992	9.411912	4.08	0	19.95547	56.88438
MOTY4	44.66045	9.860188	4.53	0	25.31656	64.00434
MOTY5	53.70881	9.48554	5.66	0	35.09991	72.31771
MOTY6	32.87829	9.816567	3.35	0.001	13.61998	52.13661
MOTY8	-30.39115	8.921925	-3.41	0.001	-47.89434	-12.88796
MOTY9	-33.27787	9.171958	-3.63	0	-51.27158	-15.28416

AFEPre1day	101.0808	39.3734	2.57	0.01	23.83737	178.3242
AFEPost1day	100.3345	39.35666	2.55	0.011	23.12394	177.5451
AFEPost2day	112.0022	39.37128	2.84	0.005	34.76289	189.2414

The interest rate variables within the macroeconomic group of independent variables, all prove significant except for the 30-day bank bill. Of the remaining values within this cohort of independent variables, all display significant T and p-values, with the three most significant variables being, in rank order: 1) 10-year Australian government bonds (AGBR10yrs; T-statistic - 8.3, p-value < 0.05); 2) 5-year Australian government bonds (AGBR5yrs; T-statistic - -7.22, p-value < 0.05) and 3) 3-year Australian government bonds (AGBR3yrs; T-statistic - 5.37, p-value < 0.05). Therefore, according to the NSX-AGR all-inclusive variable model, a reliable determinant of the closing values is the AGBR10yr rate followed by AGBR5yr and AGBR3yr rates. Additionally, in this specific circumstance, due to the number of significant predictor macroeconomic variables, a question mark over the efficacy of the EMH exists.

Similarly, to the NSX-AEI, international currencies were examined as part of the macroeconomic cohort of independent variables. As with the NSX-AEI data, fourteen currencies plus the trade weighted index (TWI) were considered (see Table 7.4.4.a.1**)**. The Hong Kong dollar (HKD) is not significant, which was also observed for the NSX-AEI data, as well as the Swiss franc, which is the opposite outcome to what was seen on the NSX-AEI and the Canadian dollar (CAD) . All the remaining currencies and the TWI show strong levels of significance. The three currencies with the most significant outcomes, in order, are: the Malaysian ringgit (MYR; T-statistic - -18.17, p-value < 0.05), the Korean won (KRW; T-statistic - -18.11, p-value < 0.05) and the New Zealand dollar (NZD, T-statistic - -16.64, p-value < 0.05). Interestingly, these currencies have a negative relationship with closing values of the NSX-AGR.

Following on from the macroeconomic independent variables in Table 7.4.4.a are the calendar independent variables. The results follow a similar outcome to the results seen in the NSX-AEI all-inclusive variables table (Table 7.4.2.a.1), with the: DOW, TOTM, EOFYA and HOL variables displaying insignificant results. Furthermore, all the JTOTY variables are not significant and cannot be viewed as predictor variables. The MOTY independent variables return a mixed set of results. Of the twelve variables considered, MOTY11 is omitted due to a collinearity issue. Of the remaining eleven months five return insignificant results (i.e. MOTY1, 2, 7, 10 and 12), while significant results are seen for MOTY3, 4, 5, 6, 8 and 9. MOTY 5 (May) returns the most significant result (T-statistic - 5.66, p-value < 0.05). Overall, based on the mixed outcome associated with all of the calendar variables the following conclusions can be made: 1) the NSX-AGR does not appear to be influenced by anomalies related to the: DOW, TOTM, EOFYA, HOL and JTOTY; 2) there does appear to be a monthly (MOTY) anomaly present, with positive May (MOTY5) returns being the strongest and most predictive and 3) the EMH appears to hold in relation to the DOW, TOTM, EOFYA, HOL and JTOTY anomalies, but is questionable in relation to the MOTY anomaly.

Events variables were also considered in relation to the NSX-AGR. The results present a slightly different outcome compared to what was observed in Table 7.4.2.a.1. Insignificant outcomes were observed for USPE, AFLGF, NRLGF and MC variables, with the conclusion being that no association exists between these independent variables and closing values on the NSX-AGR, while all of the AFE independent variables return significant results. The results across all three days are very similar in relation to the spread of the statistical results: AFEPre1day (T-statistic - 2.57, p-value < 0.05), AFEPost1day (T-statistic - 2.55, p-value < 0.05) and AFEPost2day (T-statistic - 2.84, p-value < 0.05). This outcome implies that Australian federal elections are influential in the behaviour of returns on the NSX-AGR. A recommendation for future research would be to look at this over a longer time frame and observe whether there is a correlation between federal election outcomes (i.e. which political party gains office) and stock market behaviour.

7.4.5. NSX-AGR Data Piecewise Regression Results

Table 7.4.5.a provides the significant piecewise regression results for the independent macroeconomic variables (the full table - Table 7.4.5.a.1 – can be viewed in the appendix). As with Table 7.4.4.a.1, which provides the regression results with all independent variables considered, the p-value for the F-test was analysed against a 0 .05 significance level to assess the fit of the model. As can be seen from the table the p-value for the F-test is equal to zero, the implication of which is that the model is significant and valid and that most of the macroeconomic independent variables significantly impact the behaviour of the NSX-AGR. This outcome replicates the results achieved in Table 7.4.4.a.1. Table 7.4.5.a R-squared indicates a strong association between the model and the data (R-squared = 0.859). This indicates a reasonably strong correlation between the independent macroeconomic variables and the NSX-AGR. The adjusted R squared, a stronger measure of model fit, equates to 0.857, implying that 85.7% of closing value fluctuation on the NSX-AGR could be attributed to the macroeconomic independent variables.

The overall number of significant independent variables in Table 7.4.5.a (18) is marginally lower compared to results observed in Table 7.4.3.a (19). Therefore, there is a high degree of dependability in the independent variables. The direction of each of the T-statistics in Table 7.4.5.a replicates the outcome observed in Table 7.4.3.a.

Table 7.4.5.a; NSX-AGR Piecewise Regression Results Significant Macroeconomic Variables

-AGR Piecewise Regression Results Significant Macroeconomic Variables						
Source	SS	df	MS	Number of obs	=	1370
				F(23, 1346)	=	358.52
Model	27479648.4	23	1194767.32	Prob > F	=	0
Residual	4485524.23	1346	3332.48457	R-squared	=	0.8597
-				Adj R-squared	=	0.8573
Total	31965172.6	1369	23349.286	Root MSE	=	57.728
Ind. Var.	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
AGBR2yrs	-305.4109	45.69074	-6.68	0	-395.0437	-215.7781
AGBR3yrs	390.5782	66.97853	5.83	0	259.1846	521.9719
AGBR5yrs	-408.879	55.53189	-7.36	0	-517.8175	-299.9405
AGBR10yrs	226.1239	25.87834	8.74	0	175.3577	276.8902
CRInterbankRate	-91.83598	16.14216	-5.69	0	-123.5025	-60.16945
BAB180days	148.7721	31.59683	4.71	0	86.78775	210.7565
USD	-5246.488	457.5781	-11.47	0	-6144.132	-4348.844
TWI	251.5626	16.74699	15.02	0	218.7096	284.4157
EUR	-3391.915	239.6088	-14.16	0	-3861.963	-2921.868
JPY	-31.81557	2.049608	-15.52	0	-35.83634	-27.7948
GBP	-2504.16	154.7629	-16.18	0	-2807.763	-2200.557
NZD	-1303.858	83.56305	-15.6	0	-1467.786	-1139.93
SGD	1517.157	213.0838	7.12	0	1099.145	1935.169
MYR	-1313.282	61.27234	-21.43	0	-1433.481	-1193.082
TWD	46.59307	6.712623	6.94	0	33.42473	59.76141
KRW	-1.796433	0.1123442	-15.99	0	-2.016822	-1.576045
IDR	0.0912673	0.010806	8.45	0	0.0700688	0.1124657
CNY	-562.8112	43.88321	-12.83	0	-648.8981	-476.7243

From the piecewise regression output (Table 7.4.5.a.1) it can be observed that only the BAB90days (p value = 0.155) becomes insignificant compared to the output observed in Table 7.4.4.a. The T-statistic with the most significant outcome is the AGBR10yrs independent variable (T = 8.74) (Table 7.4.5.a) which replicates the result in Table 7.4.4.a. Examining the currency results, the Malaysian ringgit (MYR) remains the most significant currency in both tables, with the British pound (GBP) becoming the second most significant, displacing the Korean won (KRW) and New Zealand dollar (NZD) results in Table 7.4.4.a.

Addressing the piecewise independent calendar variables table (Table 7.4.5.b) the robustness of the overall model decreases marginally in relation to the F-statistic, (the full table - Table 7.4.5.b.1 – can be viewed in the appendix). The conclusion that can be drawn from this is that the model remains both quite stable and reliable. A materially different outcome is detected in relation to the R-squared and adjusted R-squared results, with both decreasing significantly compared to the results seen in Table 7.4.4.a. In Table 7.4.4.a adjusted R-squared shows that 87.2% of NSX-AGR fluctuation can be attributed to the independent variables. This decreases to 1.21% in Table 7.4.5.b, implying that a considerable majority of the independent calendar variables have poor predictive ability.

Table 7.4.5.b; NSX-AGR Piecewise Regression Results Significant Calendar Variables

NSX-AGR Piecewise Regression Results Significant Calendar Variables						
Source	SS	df	MS	Number of obs	=	1369
				F(41, 1327)	=	1.41
Model	1332486.36	41	32499.6674	Prob > F	=	0.0461
Residual	30601615.9	1327	23060.7505	R-squared	=	0.0417
-				Adj R-squared	=	0.0121
Total	31934102.3	1368	23343.642	Root MSE	=	151.86
Ind. Var.	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
MOTY8	-62.99818	20.98069	-3	0.003	-104.1571	-21.83924
MOTY9	-42.35694	20.83221	-2.03	0.042	-83.22459	-1.48928

With reference to the DOW, JTOTY, TOTM, EOFYA and HOL independent variables the results in Table 7.4.5.b.1 replicate Table 7.4.4.a, with these insignificant. The remaining independent calendar variable, MOTY, also produces substantially different results. Only two variables remain significant within this group, MOTY8 (T-statistic - -3, p-value < 0.05) and MOTY9 (T-statistic - -2.03, p-value < 0.05). The inference that can be drawn from this is that the results support the existence of an August followed by September anomaly within the NSX-AGR.

Table 7.4.5.c (see appendix) refers to the independent event variables observed in isolation from all other independent variables. All the statistical regression is poorly represented and insignificant, an outcome also observed in Table 7.4.4.a. Therefore, based on the event variables considered in this research it can be concluded that these are ineffectual in influencing outcomes on the NSX-AGR and therefore the NSX-AGR is operating as an efficient market according the EMH.

7.4.6. NSX-RES Data Regression Results

Table 7.4.6.a provides the regression results for all the significant independent variables considered in the research based on the NSX resources sub-indices (NSX-RES) data (the full table - Table 7.4.6.a.1 – can be viewed in the appendix). The outcome is heavily skewed towards more insignificant outcomes. The total number of observations equals 1369. The strength of the model is indicated by the F-statistic, which in the table is equal to zero. This indicates a strong fit between the independent variables and the model. R values also prove to be significant (R-squared = 0.897 and Adjusted R squared = 0.890). Using Adjusted R squared this tells us that 89 percent of the fluctuations which occur on the NSX-RES can be explained by the independent variables in the model.

Table 7.4.6.a; NSX-RES Regression Results Significant Independent Variables

NSX-RES Regression Results Significant Independent Variables						
Source	SS	df	MS	Number of obs	=	1369
				F(87, 1281)	=	128.45
Model	27266437.6	87	313407.328	Prob > F	=	0
Residual	3125592.64	1281	2439.96303	R-squared	=	0.8972
				Adj R-squared	=	0.8902
Total	30392030.2	1368	22216.3964	Root MSE	=	49.396
Ind. Variable	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
AGBR5yrs	-224.6127	51.00598	-4.4	0	-324.6772	-124.5483
AGBR10yrs	111.2742	23.82063	4.67	0	64.54247	158.0059
CRInterbankRate	-39.43582	14.9119	-2.64	0.008	-68.69025	-10.18139
BAB90days	-251.6596	34.5006	-7.29	0	-319.3435	-183.9757
BAB180days	266.0642	28.94871	9.19	0	209.2721	322.8563
USD	-5073.931	435.3912	-11.65	0	-5928.089	-4219.773
TWI	162.6545	15.30137	10.63	0	132.636	192.673
EUR	-1780.969	213.3183	-8.35	0	-2199.461	-1362.478
JPY	-17.7292	1.856111	-9.55	0	-21.37056	-14.08785
GBP	-2146.02	149.0187	-14.4	0	-2438.367	-1853.672
NZD	-306.0265	75.44497	-4.06	0	-454.0358	-158.0173
SGD	-1214.678	223.8841	-5.43	0	-1653.898	-775.4586
MYR	-260.991	58.43755	-4.47	0	-375.6348	-146.3472
TWD	-87.79463	6.98618	-12.57	0	-101.5002	-74.08902
IDR	-0.1077015	0.010702	-10.06	0	-0.1286969	-0.0867062
CNY	487.1113	42.15155	11.56	0	404.4176	569.8049
MOTY2	-38.95036	7.486245	-5.2	0	-53.63701	-24.26371
MOTY4	29.95068	8.93419	3.35	0.001	12.42342	47.47793
MOTY10	18.97104	7.920143	2.4	0.017	3.433165	34.50892

Reviewing the interest rate variables within the macroeconomic group of independent variables, the outcome is equally divided between significant and not significant bond rate variables, with both the AGBR2yrs and AGBR3yrs shorter term rates proving insignificant (Table 7.4.6.a.1). AGBR5yrs and AGBR10yrs rates are significant, (see Table 7.4.6.a) with the AGBR10yrs variable having the higher T-statistic (4.67), this possibly being reflective of the greater importance placed by resource companies on long term financial management and planning. The cash rate (CRInterbankRate) is also significant (T-statistic = -2.64, p-value = 0.008). Again, this may be some reflection of the importance resource sector firms place on having a full understanding of the direction and management of interest rates by financial institutions. Of the three bank bill variables both the 90 (BAB90days) and 180 (BAB180days) day bank bills are significant, with the 180-day bank bill result having the stronger outcome (T-statistic = 9.19, p-value < 0.05), (Table 7.4.6.a).

Ten of the fourteen currency variables investigated prove to be significant, as well as the trade weighted index (TWI). Of the significant independent currency variables, the most robust results, in numerical order, were: the British pound (GBP: T-statistic = -14.4, p-value = 0); the Taiwanese dollar (TWD: T-statistic = -12.57, p-value = 0) and the US dollar (USD: T-statistic = -11.56, p-value = 0). A clear observation that can be seen from this outcome is the negative relationship that exists between each of these currencies and the NSX-RES. This outcome may be reflective of the impact of currency exchange on price sensitive sectors such as minerals and resources, i.e. a stronger Australian dollar, compared to trading partners, increases the cost of exports and thereby reducing competitiveness, particularly as much base resources pricing is set internationally. Looking at the currency regression output in Table 7.4.6.a it can be observed that for all the significant independent currency variables, except the Chinese yuan (CNY), the T-statistic is negative, the implication being an inverse relationship.

The next category of independent variables to be examined after the macroeconomic variables in Table 7.4.6.a and 7.4.6.a.1 are the calendar variables. Again, as with the previous results for the all-inclusive tables the: DOW, JTOTY, TOTM, EOFYA and HOL independent variables all prove inconclusive, displaying insignificant results, the exception being the MOTY independent variables. The MOTY independent variables return a mixed set of results. Of the twelve independent variables under consideration, MOTY11 is omitted due to a collinearity issue. Of the remaining eleven months, three return significant results (i.e. MOTY2, 4 and 10), while the balance are not significant. The most significant result is detected for the MOTY2 (February) returns (T-statistic = -5.2, p-value = 0), with the minus T-statistic implying negative returns for the month. This reverts to a positive significant return for the MOTY4 (April) (T-statistic = 3.35, p-value = 0).

Events variables were also considered in relation to the NSX-RES. Insignificant outcomes were observed across all the event independent variables including: the Australian federal election (AFE); US presidential variables (USPE), AFL grand final (AFLGF), NRL grand final (NRLGF) and Melbourne Cup (MC). A strong case is made for a non-existent association between these independent variables and closing values on the NSX-RES.

7.4.7. NSX-RES Data Piecewise Regression Results

Table 7.4.7.a provides the piecewise regression results for the significant independent macroeconomic variables (the full table - Table 7.4.7.a.1 – can be viewed in the appendix). As with Table 7.4.6.a.1, which provides the regression results with all independent variables considered, the p-value for the F-test was analysed against a 0.05 significance level to assess the fit of the model. As can be seen from Table 7.4.7.a, the p-value for the F-test is equal to zero, the implication of which is that the model is significant and valid and that most of the macroeconomic independent variables significantly impact the behaviour of the NSX-RES. This outcome replicates the results achieved in Table 7.4.6.a.1. The R-squared statistic in Table 7.4.7.a indicates a strong association between the model and the data (R-squared = 0.884). This demonstrates a reasonably strong correlation between the independent macroeconomic variables and the NSX-RES. The adjusted R squared, a stronger measure of model fit, equates to 0.882, implying that 88.2% of closing value fluctuation on the NSX-RES could be attributed to the macroeconomic independent variables.

Table 7.4.7.a; NSX-RES Piecewise Regression Results Significant Macroeconomic Variables

NSXRES Piecewise Regression Results Significant Macroeconomic Variables						
Source	SS	df	MS	Number of obs	=	1370
				F(23, 1346)	=	446.6
Model	26898395	23	1169495.44	Prob > F	=	0
Residual	3524753.48	1346	2618.68758	R-squared	=	0.8841
-				Adj R-squared	=	0.8822
Total	30423148.5	1369	22222.8988	Root MSE	=	51.173
Ind. Var.	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
AGBR5yrs	-140.507	49.22665	-2.85	0.004	-237.0763	-43.9378
BAB90days	-245.9506	33.08381	-7.43	0	-310.852	-181.049
BAB180days	275.7832	28.00924	9.85	0	220.8367	330.7297
USD	-5666.16	405.6234	-13.97	0	-6461.882	-4870.44
TWI	189.2087	14.84549	12.75	0	160.0859	218.3315
EUR	-2284.695	212.4029	-10.76	0	-2701.372	-1868.02
JPY	-19.9083	1.81689	-10.96	0	-23.47254	-16.3441
GBP	-2223.023	137.1907	-16.2	0	-2492.154	-1953.89
NZD	-385.5883	74.07507	-5.21	0	-530.9034	-240.273
SGD	-1459.788	188.8896	-7.73	0	-1830.338	-1089.24
MYR	-342.2676	54.31531	-6.3	0	-448.8195	-235.716
TWD	-81.07964	5.950453	-13.63	0	-92.75281	-69.4065
IDR	-0.1216385	0.009579	-12.7	0	-0.14043	-0.10285
CNY	476.7495	38.90059	12.26	0	400.4371	553.0618

Only three interest rate independent variables in Table 7.4.7.a, remain significant. This compares to Table 7.4.6.a.1 where only three of the independent variables are not significant. The changes are observed for the AGBR10yrs and the CRInterbankRate. Overall, this demonstrates that the piecewise regression output does not substantially support the results in Table 7.4.6.a.1 across most of the independent variables. This is not reflected in the results relating to BAB90days and BAB180days which reinforce the outcome in Table 7.4.6.a.1. Both variables remain significant (p-values = 0) with stronger T-statistics; BAB90days -7.43 compared to -7.29 in Table 7.4.6.a.1 and BAB180days 9.85 compared to 9.19 in Table 7.4.6.a.1. The stronger association means that changes in 90 and 180-day bank bills are robust predictors of future behaviour on the NSX-RES.

As with Table 7.4.6.a.1 ten of the fourteen currency variables investigated prove to be significant, as well as the trade weighted index (TWI). Interestingly the division between significant and not significant currencies is the same in both tables, i.e. the currencies which are not significant include: the Swiss franc (CHFSwissFranc); the Canadian dollar (CAD); the Hong Kong dollar (HKD) and the Korean won (KRW). Additionally, other than the trade weighted index (TWI) and the Chinese yuan (CNY), all T-statistics for the significant currency variables are negative, replicating the outcome observed in Table 7.4.6.a.1). Again, the three most significant currencies are those of the UK, the US and Taiwan, the order strength has altered between the US and Taiwanese dollars. In numerical order the British pound appears to be the most influential (GBP: T-statistic = -16.2, p-value = 0); followed by the US dollar (USD: T-statistic = -13.97, p-value = 0) and then the Taiwanese dollar (TWD: T-statistic = -13.63, p-value = 0).

Addressing the piecewise significant independent calendar variables table (Table 7.4.7.b below) the robustness of the overall model decreases marginally (Prob > F = 0.0208) compared to the result seen in Table 7.4.6.a.1), the implication being that the model remains both quite stable and reliable, (the full table - Table 7.4.7.b.1 – can be viewed in the appendix). From the R-squared and adjusted R-squared results in Table 7.4.7.b it can be observed that a materially different outcome is detected, with both decreasing significantly compared to the results seen in Table 7.4.6.a.1 In Table 7.4.6.a.1 adjusted R-squared shows that 89.02% of NSX-RES fluctuation can be attributed to the independent variables, substantially decreasing to 1.51% in Table 7.4.7.b, implying that a considerable majority of the independent calendar variables have poor predictive ability.

In Table 7.4.6.a.1 the independent DOW, JTOTY, TOTM, EOFYA and HOL calendar variables lacked statistical significance. This is repeated in Table 7.4.7.b.1**.** The exception is the MOTY independent variable (Table 7.4.7.b), which returns results which conflict somewhat with the results seen in Table 7.4.6.a.1. For example, in Table 7.4.6.a.1 MOTY11 is omitted due to a collinearity issue. In Table 7.4.7.b.1, MOTY11 produces an insignificant outcome and MOTY10 is omitted due to multi-collinearity. The only consistent outcome between the two tables is the significant result produced by MOTY2 (February) which from Table 7.4.7.b the T-statistic = -2.41 and a p-value = 0.016, while in Table 7.4.6.a.1 the T-statistic = -5.2, p-value = 0. This consistent outcome leads to the conclusion of a possible February anomaly.

Table 7.4.7.b; NSX-RES Piecewise Regression Results Significant Calendar Variables

NSXRES Piecewise Regression Results Significant Calendar Variables						
Source	SS	df	MS	Number of obs	=	1369
				F(41, 1327)	=	1.51
Model	1356545.88	41	33086.4848	Prob > F	=	0.0208
Residual	29035484.3	1327	21880.5458	R-squared	=	0.0446
-				Adj R-squared	=	0.0151
Total	30392030.2	1368	22216.3964	Root MSE	=	147.92
Ind. Var.	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
MOTY2	-47.48237	19.71243	-2.41	0.016	-86.1533	-8.81145
MOTY5	39.27142	19.82695	1.98	0.048	0.3758289	78.167
MOTY6	61.7663	21.51695	2.87	0.004	19.55536	103.9772
MOTY7	43.23069	20.68734	2.09	0.037	2.647228	83.81416

Table 7.4.7.c below, refers solely to the significant independent event variables observed in isolation from all other independent variables, (the full table - Table 7.4.7.c.1 – can be viewed in the appendix). As can be seen from the ANOVA result and the R-squared and Adj. R-squared results, the deconstructed model produces an inferior outcome which may be representative of the fact that most of the independent variables are insignificant.

Table 7.4.7.c; NSX-RES Piecewise Regression Results Significant Event Variables

NSXRES Piecewise Regression Results Significant Event Variables						
Source	SS	df	MS	Number of obs	=	1370
				F(23, 1346)	=	0.76
Model	390487.127	23	16977.7012	Prob > F	=	0.7828
Residual	30032661.4	1346	22312.527	R-squared	=	0.0128
				Adj R-squared	=	-0.004
Total	30423148.5	1369	22222.8988	Root MSE	=	149.37
Ind. Var.	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
AFEPost1day	228.9611	105.7042	2.17	0.03	21.59815	436.324
AFEPost2day	245.3546	105.7042	2.32	0.02	37.99165	452.7175

It was observed in Table 7.4.6.a.1 that all the independent variables were not significant. This is reflected in Tables 7.4.7.c and 7.4.7.c.1 except in relation to the Australian federal election independent variables, with two of the three variables being statistically significant. The pre-one-day election outcome (AFEPre1day) is insignificant. This is reversed for the post one and two-day results with, in order of significance, AFEPost2day providing the strongest outcome (T-statistic = 2.32 and a p-value = 0.02) followed by AFEPost1day (T-statistic = 2.17 and a p-value = 0.03). Two observations can be drawn from this outcome: 1) the all-inclusive independent variable table (Table 7.4.6.a.1) is in some way masking the behaviour and influencing the outcome and 2) the results in Table 7.4.7.c imply that Australian federal elections are able to influence stock market behaviour on the NSX-RES, indicating that a federal election anomaly exists.

7.5. Summary

This chapter summarised the results from the empirical research, including: the NSX-AGR and the NSX-RES. Overall, the main finding is that historical closing values or returns data on the NSXA are neither entirely predictable or completely follow the principles established by the EMH, but fall somewhere in between. The results illustrate that in relation to the NSX-AEI: 3-year government bonds, 180-day bank bills, the Euro currency and the calendar month of March have the most consistent and significant influence on closing values. In relation to the NSX-AGR: 10-year government bonds; 180-day bank bills, the Malaysian ringgit and while inconsistent a monthly anomaly. With respect to the NSX-RES: 5-year government bonds; 180-day bank bills, the British Pound Sterling currency, again while inconsistent a monthly anomaly and post Australian federal election results are confirmed to be significant influencers. A common significant independent variable across each of the indices is the 180-day bank bill, which provides quite robust support for the existence of a bank bill anomaly. Furthermore, the results lead to the EMH needing to be re-examined due to information inefficiency which is evident from the data. The research highlights that a stock market may display both information efficiency and inefficiency within the same period. This will be discussed further in a later section. The next chapter provides a summary of the findings and their link to the theoretical framework.

Table 7.5.a; Summary of Findings

HYPOTHESIS	STATEMENT	RESULT R / A / I	IMPLICATION
H_1	Avg returns NSXA sub-indices not influenced by AGBR	R	A long-term interest rate effect - interest rates influence avg returns
H_2	Avg returns NSXA sub-indices not influenced by CRInterbankRate	I	Partial support affecting only the NSX-AGR, further investigation required
H_3	Avg returns NSXA sub-indices not influenced by BAB rate	R	A short-term interest rate effect - interest rates influence avg returns
H_4	Avg returns NSXA sub-indices not influenced by currency movements	R	An exchange rate effect - exchange rates influence avg returns
H_5	Avg returns NSXA sub-indices on each working DOW not statistically different	A	No DOW effect - avg returns are similar across each DOW
H_6	Avg returns NSXA sub-indices not statistically high on weekends	A	No WE effect - avg returns across weekend do not vary substantially
H_7	Avg returns NSXA sub-indices in all of the year’s months are equal	R	A MOTY effect - average monthly returns are predictable
H_8	Avg returns NSXA sub-indices at TOTY not statistically significant	A	No JE/JTOTY effect - avg returns over calendar new year period do not vary substantially
H_9	Avg returns NSXA sub-indices at TOTM not statistically significant	A	No TOTM effect - avg returns between each month do not vary substantially
H_{10}	Avg returns NSXA sub-indices at EOFYA statistically not significant	A	No Aust. EOFY effect - avg returns at end of Aust financial year do not vary substantially
H_{11}	Avg returns NSXA sub-indices not influenced by national holidays	A	No Aust. HE effect - avg returns prior to & after Aust. holidays does not vary substantially
H_{12}	Avg returns NSXA sub-indices not influenced by the Australian federal elections	I	Partial support affecting only the NSX-RES, further investigation required
H_{13}	Avg returns NSXA sub-indices not influenced by U.S. Presidential elections	A	No international election spill-over effect - avg NSXA returns just prior to & after U.S. elections do not vary substantially
H_{14} / H_{15} / H_{16}	Avg returns NSXA sub-indices not influenced by H_{14} - AFL Grand Final / H_{15} - NRLGrand Final / H_{16} - Melbourne Cup	A	No sports effect - sports events do not influence avg returns
R = reject; A = accept; I = inconclusive			

8. DISCUSSION

8.1. Introduction

A large body of the research relating to stock market anomalies has attempted to explain their existence in the context of the EMH. The research is generally divided between outcomes which demonstrate robust support for the EMH and those which raise concerns over its validity or efficacy. Therefore, there is a lack of consensus surrounding stock markets and whether they have the structure of an efficient capital market. This does not mean that the EMH has minimal theoretical or practical value, as it provides an excellent reference point, or beginning, to assess how stock markets work, but rather that as a theory its general applicability across numerous financial and capital markets needs to be applied judiciously.

The purpose of this study has been to provide an empirical examination of stock market anomalies, in the context of the EMH, applied to an Australian stock exchange which has previously not been considered - the NSXA. In order to achieve this a number of steps were undertaken:

1) A review of the existing research to identify the gaps.
2) The development of a contextual model or framework and hypotheses.
3) A review of the literature.
4) Collection and analysis of the data.
5) A discussion of the results.

While there has been an abundance of research relating to anomalies and the Australian Stock Exchange (ASX) (Gray et al, 2007; Marrett et al, 2008; Liu et al, 2011 and Marrett et al 2011) there has been a literal dearth of similar research applied to the NSXA. This may be due to a lack of information regarding the NSXA and, in comparison, the abundance of information regarding the ASX or the relative size of total equity market capitalisation of each of the exchanges: ASX - $1,788t (Australian Stock Exchange n.d.) compared to the NSXA - $4.8b - (National Stock Exchange of Australia n.d.). This chapter provides a detailed discussion of the results observed in the study, the hypotheses and draws comparisons to the literature. The next section will synthesize each of the research hypotheses and results with the existing literature. Each section will be addressed by focussing on the specific hypothesis.

8.2. H_1: The average returns of the NSXA sub-indices are not influenced by the Australian government bond rate.

Stock markets are intrinsically interconnected to numerous domestic macroeconomic factors. Detailed empirical analysis of the association between macroeconomic factors and stock market outcomes has been undertaken based on the inference that changes in such factors can act as a stimulus for stock market activity due to the impact on future cash flows and the rate at which such cash flows are discounted. The foremost rational of earlier empirical research has been arbitrage pricing theory (Ross, 1976). Exchange rates and interest rates are amongst the financial/ monetary macroeconomic factors which have been considered (Abdullah et al., 1993; Acikalin et al., 2008; Bilson et al., 2001 and Forson et al., 2013). The objective of such studies is to establish causality between stock market behaviour (and returns) and macroeconomic factors.

A large body of empirical research has been undertaken investigating the relationship between macroeconomic variables and stock market behaviour and predictability. Overall the research has noted the strong relationship which exists between macroeconomic variables and stock prices across both developed and emerging stock markets. Abdullah et. al., (1993) finds that, among other factors, a negative association between both short-term and long-term interest rates and stock market returns. Studying the Istanbul Stock Exchange (ISE), Acikalin et. al., (2008) provide empirical support for a long-term stable unidirectional relationship (i.e. macroeconomic factors influence stock market outcomes) for four macroeconomic variables - gross domestic product, exchange rates, interest rates, and the current account balance and the ISE, noting this would imply that prediction of patterns of behaviour on the Istanbul Stock Exchange is possible using changes in historical data from other related sources. Bilson et. al., (2001) examines the explanatory power of macroeconomic variables on stock returns in emerging markets finding that one of the most significant indicators to be exchange rates. Bulmash e.t al., (1991) investigate the long-run relationship between US stock returns and macroeconomic and financial variables finding that short and long-term interest rates have a negative impact on stock prices, while aggregate variables such as treasury bill and bond rates and the unemployment rate have some correlation with stock prices. Fama (1981) states that economic indicators, excluding inflation, display a positive correlation with the stock market behaviour. Hooker (2004) notes that emerging stock market behaviour is less impacted by macroeconomic indicators, with the exception of foreign exchange rates. Similarly, to the conclusions reached by Menike (2006) and Humpe e.t al., (2009) in relation to the impact of interest rates, Azam (2011) finds that the stock market prices on the Karachi Stock Exchange are negatively correlated with interest rate. Examining the predictability of stock returns using macroeconomic variables in twelve industrialized countries Rapach et. al., (2005) find that interest rate variables appear as the most consistent and reliable predictors of stock market returns across the twelve industrialised countries investigated compared to financial and other macroeconomic variables.

The acceptance of macroeconomic variables as predictors of stock market activity is not universal. Ali et. al., (2010) examine the relationship between the Karachi Stock Exchange and a number of macroeconomic fundamentals, (the balance of trade, the exchange rate, index of industrial production, inflation and money supply data) and find no causal relationship, concluding that in the context of the Karachi Stock Exchange macroeconomic news announcements cannot be used to predict changes in stock prices. Another study supporting the conclusion reached by Ali et. al., (2010), in which no causal link between macroeconomic variables and stock market performance existed, was Ali (2011). This paper examined the influence of specific microeconomic and macroeconomic variables on stock returns at Dhaka Stock Exchange, concluding there was no significant causal relation between stock price and selected micro and macroeconomic variables.

The first hypothesis examined the relationship between longer term Australian government bond rates, as part of the independent macroeconomic variable group, and the main and two sub-indices on the NSXA. The aim was to determine whether a correlation existed between the two, implying that bond rates may act as a predictor of behaviour within the NSXA. Overall the results are generally significant and demonstrate that long term Australian government bond rates can explain stock returns on the NSXA. From Table 7.4.2.a it can be observed that all of the government bond variables, except the 5-year bond variable, are significant. The most robust result was returned for 3-year bonds, followed by 2 and 10-year bonds. From the piecewise regression results, as can be seen in Table 7.4.3.a all the variables become significant, with 3-year bonds again providing the most robust outcome, though in this case this is followed by 10-year, 2-year and 5-year government bonds.

An interesting observation is the direction of the correlation between the dependent and independent variables. The 3-year government bond is consistently negative in both tables, while the other significant government bond variables are all positive in direction. The relationship between bonds and stocks usually an inverse one, where increases in stock values leads to a decrease in bonds and vice versa. The overall positive correlation between the dependent and independent variable may be as a result of uncertainty within financial markets, particularly after the GFC, in relation to uncertainty about future economic activity (Rankin, 2014).

Focussing on Table 7.4.4.a, it can be observed that all of the government bond variables are significant. The NSX-AGR sub-index highlights that the most robust result can be seen for 10-year bonds, followed by 5, 3 and 2-year bond rates. From the piecewise regression results, as can be seen in Table 7.4.5.a, all the variables remain significant, with 10-year bonds providing the most robust outcome, followed by 5-year, 2-year and 3-year government bonds. The overall implication here is that the AGBR10yrs provides the strongest correlation with behaviour on the NSX-AGR and the most robust predictive capacity.

The outcome seen in the NSX-RES sub-index varies somewhat compared to the other two indices. Examining Table 7.4.6.a, not all of the independent bank bill variables are significant, with AGBR2yrs and AGBR3yrs displaying a lack of significance. Of the remaining independent variables, again the AGBR10yrs provides the strongest outcome. From the piecewise regression results, as can be seen in Table 7.4.7.a, all the AGBR variables, except AGBR5yrs, lack significance.

These results lead to the conclusion that H_1 is not supported indicating that interest rates, in the form of Australian government bond rates, influence average returns on the NSXA and can be viewed as reliable predictors of behaviour on the NSX-AEI, NSX-AGR and NSX-RES. Overall, the 10-year Australian government bond rate appears to have the strongest and most reliable predictive capacity in relation market behaviour on the NSXA. Additionally, this outcome suggests that the efficacy of the EMH may not be absolutely reliable in explaining stock market behaviour, particularly in relation to the role played by both longer-term interest rate factors.

8.3. H_2: The average returns of the NSXA sub-indices are not influenced by the cash rate.

The official cash rate is the rate of interest which the Reserve Bank of Australia (RBA) charges on overnight loans to commercial banks. The cash rate is important because it influences other interest rates, particularly rates on short term securities, such as bank bills and therefore the price of borrowing money. The RBA's cash rate has a strong influence over the interest rate policy implemented by financial institutions. Generally commercial banks will change loan interest rates in line with changes in the official cash rate. Therefore, the cash rate is able to influence the behaviour of borrowers and lenders (Campbell, 1997). The implication for stock market participants is that changes, or movement, in the cash rate can act as a signal providing an indicative guide on the direction of interest rates and policy direction of financial lenders.

The second hypothesis examined the relationship between interbank cash rate, as part of the independent macroeconomic variable group, and the main and two sub-indices on the NSXA. This was undertaken to determine if any correlation existed between the two, implying that the interbank cash rate may provide some predictive capacity in relation to behaviour within the NSXA. Overall the results are mixed, with only partial support for the relationship between the cash rate independent variable and NSXA returns. From Table 7.4.2.a, it can be observed that the CRInterbankRate is not significant. This outcome is repeated in Table 7.4.3.a. In Tables 7.4.4.a and 7.4.5.a, the opposite is observed with the CRInterbankRate becoming significant across both tables and in the same negative direction. The outcome seen in the NSX-RES sub-index varies somewhat compared to the other two indices. Examining Table 7.4.6.a, the CRInterbankRate is significant, though becomes insignificant in Table 7.4.7.a.

The overall implication here is that the there is only partial support for H_2. An explanation for the strong correlation shown between the CRInterbankRate and the NSX-AGR may be that this sector is much more sensitive to movements in short term interest rates and the direct impact this may have on profitability of listed companies. This may then flow on to investor behaviour within the NSX-AGR. Consequently, while the predictive capacity of the CRInterbankRate in relation to NSX-AEI and NSX-RES closing values is questionable, it displays a high level of predictive capacity over the NSX-AGR. The implication for the EMH is that it may not be absolute and its universal application may be dependent on factors specific to a particular market sector.

8.4. H_3: The average returns of the NSXA sub-indices are not influenced by the bank accepted bill rate.

The third hypothesis examined the relationship between bank bills, as part of the independent macroeconomic variable group, and the main and two sub-indices on the NSXA. This was undertaken to determine if any correlation existed between short-term interest rates and the dependent variables. An understanding of this may provide investors with a further tool to make better informed investment decisions relating to stock investment on the NSXA.

Overall the results are quite conclusive, with very strong support for the existence of a relationship between bank bills and NSXA returns. From Table 7.4.2.a, it can be observed that the all of the bank bill independent variables are significant. The independent variable, BAB180days, has the most significant result, followed by BAB90days and then BAB30days. This outcome is repeated in Table 7.4.3.a. The implication is that in relation to the NSX-AEI, bank bill rates are a strong predictor of returns/closing values, particularly 180-day bank bill rate. In Table 7.4.4.a, the results partially mimic those observed for the NSX-AEI. Again, a significant outcome is observed in relation to the BAB180days independent variable, with this variable having the most robust outcome. This is followed by a significant outcome for the BAB90days independent variable. In this case though the BAB30day independent variable is not significant. When the bank bill independent variable is tested in isolation, (Table 7.4.5.a) all three independent variables return significant results in an order which replicates the results seen in Table 7.4.3.a. Again, the focus of the conclusion is on the significant relationship between the BAB180days independent variable and the dependent variable. The outcome detected in the NSX-RES sub-index can be seen on a continuum where the NSX-AEI is at one end (full support for all bank bill variables) and partial support in the case of the NSX-RES. Across both tables there is a lack of significance for the BAB30day independent variable. In addition, across both tables, the most significant independent variable is the 180-day bank bill (BAB180days) followed by the BAB90 days variable.

In summary the results demonstrate a solid relationship between NSX-AEI and short-term interest rates in the form of bank bills. Whilst a significant relationship remains between short term interest rates and both the NSX-AGR and NSX-RES, it can be viewed as stable rather than solid. This is due to the lack of significance noted in the BAB30day independent variable. Overall, the results demonstrate a compelling relationship between 180 bank bills and returns on each of the indices, an indication that the weak form of the EMH may be open to question, with the behaviour of 180 bank bills acting as a proxy for returns on the NSX-AEI, NSX-AGR and NSX-RES. The interest rate independent variable outcomes observed in the current research are reflected in the results seen in the previous empirical literature, (Abdullah et. al., 1993; Acikalin et. al., 2008; Azam, 2011; Bulmash e.t al., 1991 and Rapach et. al., 2005). Therefore H_3 - the average return of NSXA sub-indices is not influenced by the bank accepted bill rate - is not supported indicating a level of cointegration between short term interest rates, in the form of bank accepted bills, and closing values on each of the NSX indices.

8.5. H_4: The average returns of the NSXA sub-indices are not influenced by currency movements.

The linkage between currency rates and stock prices has produced substantial interest within the empirical literature and financial industry practitioners. Maysami and Koh (2000) find a significant cointegration relation between exchange rates and closing values on the Singapore stock exchange. Ma and Kao (1990), and Mukherjee and Naka (1995) argue that both the levels of and changes in the exchange rate affects the performance of a country's stock market. This is due to the flow on effect for a company's cash flow and profits which is ultimately reflected in changes in stock prices. Solnick (1987) contended that when the value of a domestic currency appreciates this has a negative impact for domestic businesses, due to a reduction in export competitiveness which can potentially harm profits and ultimately the stock price, while currency depreciation has the reverse effect and potentially increases export competitiveness, all other factors remaining equal.

The fourth hypothesis is an attempt to address the above conjecture by examining the relationship between currency/exchange rates, as part of the independent macroeconomic variable group, and the main and two sub-indices on the NSXA. Support for any correlation between exchange rates and the dependent variables may enhance the ability of investors to make better informed stock investment decisions. Understanding the potential relationship between exchange rates and stock returns is important as, for example an appreciation in the value of a domestic currency decreases the volume of exports, assuming all other factors remain constant. Assuming elasticity in the demand for exports, this reduces cash flow for export oriented firms, potentially resulting in a fall in stock prices, with follow on implications for stock market investors.

Overall the results indicate very strong support for the existence of a relationship between exchange rates and NSXA returns. From Table 7.4.2.a, of the fifteen independent currency variables only three return an insignificant outcome (i.e. CAD, HKD and CNY). Of the remaining independent variables, the three most robust results, in order, are seen for: EUR, CHFSwissFranc and NZD. The outcome in Table 7.4.3.a, provides a similar result with three of the independent variables being statistically insignificant, though in this instance the particular variables change. The insignificant variables CAD and CNY from Table 7.4.2.a, move to become statistically significant and are replaced by the independent variables TWD and KRW. The HKD remains insignificant across both tables. In relation to the significant independent variables the most robust remains EUR, followed by SGD and then CHFSwissFranc. This outcome is supported by the findings of Tian and Ma (2010) who find a degree of cointegration between the Shanghai A Share Index and the euro currency post financial market liberalization. The implication is that in relation to the NSX-AEI, exchange rate variability between the Euro and Australian dollar is a strong predictor of returns/closing values.

In Table 7.4.4.a, the results partially mimic those observed for the NSX-AEI, in relation to the insignificant independent variables, with both CAD and HKD lacking significance. This is joined by the independent variable CHFSwissFranc. The most robust significant independent variables, in order, were MYR, KRW and NZD. When the independent macroeconomic variables are tested in isolation, (Table 7.4.5.a) again a lack of significance is seen in the variables CAD, HKD and CHFSwissFranc. This reinforces what was observed in Table 7.4.4.a, which implies, these particular currencies have no impact on behaviour within the NSX-AGR.

The three independent variables which return the most robust results in Table 7.4.4.a are: i) MYR, ii) KRW and iii) GBP. This somewhat supports what was seen Table 7.4.5.a, where both MYR and KRW returned the most robust results. Examining international trade data, this may reflect the importance of these countries as a destination for Australian rural exports (Department of Foreign Affair and Trade n.d.). Whilst not the most significant agricultural export destinations, Malaysia and South Korea are both significant importers of Australian commodities.

Concentrating on the NSX-RES tables an interesting outcome is observable. The results from Tables 7.4.6.a and 7.4.7.a replicate each other. Insignificant outcomes are seen for: CHFSwissFranc, CAD, HKD and KRW in both tables. In relation to the three most significant and robust results the outcome is mimicked in both tables: i) GBP, ii) USD and iii) TWD. As with the explanation above for the NSX-AGR, this may reflect the structure of Australian exports with mineral exports forming the largest by volume and most significant in dollar terms, exports (Thirwell 2017) with both the British pound and the US dollar being seen as the currencies for international trade for such commodities. The result for TWD may be as a result of this independent variable acting as a proxy for exports to China, the most significant destination for Australian mineral exports (Thirwell 2017).

On the whole, the exchange rate/currency results in the current research are replicated in the empirical literature. Ahmad et. al. (2010) uncover a positive relationship between stock returns on the KSE-100 and exchange rates; Kalyanaraman (2015) discovers both a long run equilibrium relationship and a long run causality relationship between exchange rates and returns on sectoral indices in Saudi Arabia; Olugbenga (2012) a positive short run relationship between exchange rates and stock returns and a negative long run relationship; Ouma (2014) exchange rates have a negative effect on returns on the Kenyan NSE-20 share index and Wongbangpo et. al. (2002) exchange rates are positively related to stock prices in Indonesia, Malaysia, and the Philippines, yet negatively related in Singapore and Thailand.

Therefore H_4: the average return of NSXA sub-indices are not influenced by currency movements - is not supported, indicating a level of cointegration between exchange rates and closing values of each of the NSX indices. While the direction of the relationships is variable, in summary, the results demonstrate an overall significant cointegrative relationship between the independent currency variables and returns/closing values of each of the NSX indices. Fluctuations in some currencies can act as precursors to stock market activity and behaviour on each of the NSX indices. The outcome has ramifications for the general applicability of the EMH, in the context of how stock market participants factor in the importance of exchange rate information in investment decisions. The implication for stock market investors is that maintaining a watching brief over exchange rates can assist in making more informed investment decisions and portfolio management strategies.

8.6. H_5: The average returns of the NSXA sub-indices on each working day of the week are not statistically different.

The core premise of the EMH suggests that using market timing or specific stock picking strategies to obtain superior financial returns is futile. This is due to stocks being priced efficiently by financial markets, reflecting all publicly available information. The presence of seasonality in the financial returns of stocks is a violation of the EMH. Notwithstanding, stock markets have demonstrated behaviour inconsistent with the EMH, with a number of seasonal anomalies appearing, providing at least theoretical opportunities to return superior financial results. One such anomaly is referred to as the day of the week (DOW) anomaly.

A number of theories have been advanced to explain the occurrence of the DOW anomaly.

1) The calendar-time hypothesis (French, 1980) states increases in Monday stock prices should exceed non-Monday trading days, as a result of the extended closing period between the close of trading on Friday and Monday close of trade compared to usual single day break for non-Monday trading days. Therefore, Monday returns will exceed returns for non-Mondays by three times due to the inclusion of the weekend period.

2) The trading time hypothesis adopts the opposite perspective to the calendar-time hypothesis, stating that stock market returns only occur during trading days and are reasonably consistent for each trading day. Therefore, weekends should not influence Monday returns.

3) Dividend distribution patterns in which stocks with a relatively high Monday dividend yield leads to a more pronounced weekend effect, as suggested by Phillips-Patrick and Schneeweis (1988), (Cataldo et. al., 2000).
4) The announcement effect hypothesizes that the weekday pattern in returns is simply reflects a weekday pattern in the generation of information from public announcements. The announcement hypothesis allows for both market efficiency and investor rationality (Pettengill and Buster, 1994).

5) The time zone effect refers to the correlation that occurs between two individual markets though on a delayed, or lagged, basis. Essentially where one stock market follows the behaviour of a more influential stock market a day or two later.

The fifth hypothesis examined the relationship between specific days within the stock trading week (i.e. Monday to Friday inclusive) and closing values on each of the NSXA indices. The aim was to determine if there is a discernible pattern in trading activity across each of the days. Support for any relationship between the variables would lead to a questioning of the random walk theory and the EMH which originates from this. Additionally, this may provide investors with potential arbitrage opportunities, leading to superior financial returns.

The current research examined empirically whether the NSXA stock market is efficient in relation to the DOW anomaly. The results indicate a lack of significance for a DOW effect across each of the three indices under investigation. As can be seen in each of the six tables the results for each day do not differ significantly from the other days of the week. Similar results have been observed in the previous recent empirical literature, (Apolinario, 2006; Bhattacharya et. al., 2012; Marquering, 2006; Patel, 2011 and Saeed, 2011). Therefore H_5: the average return of the NSXA sub-indices on each working day of the week is not statistically different is supported. The implication of the current outcome is that in relation to the DOW anomaly the NSXA operates efficiently, with minimal opportunity for investors to obtain abnormal returns exploiting this anomaly.

8.7. H_6: The average returns of the NSXA sub-indices are statistically not high on weekends.

The empirical research has tended to refer to the daily anomaly literature quite loosely. Terms such as the *weekend effect*, the *Monday effect* or the *day-of-the-week* effect have been used indiscriminately, for example testing for the Monday effect but referring to this as a search for a day of the week effect, Ajayi et. al., 2004; Balbina 2002; Condoyanni et. al., 1987; Gregoriou, 2004; Sarma, 2004 and Steeley 2001. The current research has made a distinction by specifically referring to a weekend effect which implies some observable phenomenon between Friday and Monday closing values and a day of the week effect which refers to an observable pattern specifically between each of the days of the week.

The current research examined empirically whether the NSXA stock market is efficient in relation to weekend returns. As indicated by the results no statistical support was observed for a weekend effect across each of the three indices under investigation. As can be seen in each of the six tables there is no distinction between values observed on Fridays or Mondays. Similar results have been observed in the empirical literature, (Hui, 2005; Marquering, 2006 and Tonchev, 2004).

As the data provides no evidence of abnormal returns, it can be concluded that H_6: the average return of the NSXA sub-indices is statistically not high on weekends. The conclusion drawn from this outcome is that, in relation to the weekend/Monday effect, the NSXA is informationally efficient and the principles regarding the EMH are valid and robust. While not approached in the current research this leaves a further question which may be worthwhile pursuing - whether the weekend/Monday effect never existed or has disappeared over time? Addressing this question may provide further insight into stock market behaviour on the NSXA. Overall, at face value the current outcome implies that stock market investors are comfortable holding their investment positions over the longer weekend time frame accepting the additional risk this may incur. Additionally, as the NSXA operates efficiently, there is no immediate opportunity for investors to obtain abnormal returns exploiting this anomaly.

8.8. H_7: The average returns of the NSXA sub-indices in all of the year's months are equal.

A stock market's capacity to adequately and expeditiously price a stock is as a result of the information processing efficiency of a capital market. The use of historical stock prices to forecast future prices is the fundamental assumption of anomalous seasonality. The empirical literature, though, has repeatedly highlighted that implicit in a stock's price is all the available relevant public information causing stock prices following a random walk, a fundamental principle of the EMH, implying that forecasting provides little, if any, real value. Anomalous seasonality though provides more cognizant stock market participants the opportunity to predict the future behaviour of stock prices and trade such stocks and secure risk-free profits. Empirical research demonstrating violations of the EMH have been undertaken demonstrating stock price anomalies present within numerous stock markets. One of these has been the monthly anomaly, also referred to as the month of the year effect (MOTY).

Essentially, the MOTY effect refers to an outcome where the distribution of stock returns displays significant variation across the months of the year, and a pattern emerging with some months being particularly noticeable. The international evidence has been categorical in establishing support for different monthly, seasonal patterns, i.e. an April abnormal returns in the UK (Reinganum and Shapiro, 1987), a May anomaly in Johannesburg stock exchange (Coutts and Sheik, 2000), predictable June returns are found in Bangladesh (Ahsan and Sarkar, 2013) and July outperforming other months on a regular basis in Kuwait (Al-Saad and Moosa, 2005).

The aim of the seventh hypothesis is to investigate the MOTY anomaly separately from the January effect in an attempt to establish greater clarity and determine if any persistent pattern is evident. The January effect will be the subject of discussion in the next section. Evidence of a persistent pattern will confirm that the EMH, at least from a weak form perspective, may lack applicability at least on this occasion. Furthermore, support for any correlation between a predictable monthly return/s and the dependent variables may enhance the ability of investors to exploit this and provide arbitrage opportunities.

Overall, while the results indicate reasonable support for the existence of a relationship between predictable monthly patterns and NSXA returns, the inconsistency between the results observed between the amalgamated model data tables and the deconstructed model data tables restricts the ability to precisely explain why the MOTY effect is evident. From Table 7.4.2.a, all months except MOTY7 (July), MOTY8 (August), MOTY11 (November) and MOTY 12 (December) return significant results. The most robust outcomes are seen in MOTY4 (April), followed by MOTY3 (March) and MOTY5 (May). When these results are compared to those seen in Table 7.4.3.b, the only consistent outcome is the observed predictability of MOTY3 returns. This outcome is supported by the results seen in Dash et. al. (2011), Gao et. al. (2005), Su et. al. (2011) and Zhang et. al. (2008) who also observe a March effect in other international markets.

Portfolio rebalancing may partly explain why there is inconsistency in the significant independent variables across both the amalgamated model data and the deconstructed model data tables. A scenario may exist where stock market investors are reacting to updated news in particular months. Stock market investors rebalance their stock portfolios at the commencement of the new month, endeavouring to exploit new information to increase profits.

With January being part of the holiday period, awareness of updated news may not be absorbed by stock market participants until February, with a delay or lag in investment decisions left until March when current news has been sufficiently scrutinized.

In an outcome which replicates the results seen in Table 7.4.2.a, a monthly effect is observed in Table 7.4.4.a, as the results reveal that stock returns are not absolutely random, with significant results seen in the months of March, April and May. Unlike the amalgamated results from NSX-AEI, the most robust result occurs in May (MOTY5), followed by April (MOTY4) and March (MOTY3). Other empirical research has also demonstrated that different sub-indices within the same index are able to return significant results across different independent variables, (Sharma et. al.2014 and Eyuboglu et. al. 2016).

While a monthly seasonal is evident in Table 7.4.5.b, (i.e. MOTY8 (August) and MOTY9 (September)) the results are not consistent with Table 7.4.4.a, (i.e. significant results for the months of March, April and May). This may suggest that undetected factors in the amalgamated model may be influencing the deconstructed model leading to a variation in the outcome. The results in Table 7.4.5.b, are supported by the previous empirical literature. Gray et. al., (2007) also establishes the existence of an August seasonality for the smallest firms on an equally weighted index of the ASX. Marrett et. al., (2011) also finds systematically higher returns in August as well as January and December for small cap stocks on the ASX. Li et. al., (2010) studying monthly seasonality in 4 stock market indices and 16 industry indices in the New Zealand stock market finds significantly negative stock returns in August for three of the market indices and half of the sixteen industry indices. Additionally, a September seasonal is noted by Jahfer (2015) in the Colombo stock market, and Wong et. al., (2007) who finds support for a negative September seasonal on the KLSE Composite Index.

Table 7.4.6.a provides further evidence of anomalous seasonal activity and a lack of randomness. From the table it can be observed, in order of significance, that a MOTY2 (February) effect exists followed by robust outcomes for MOTY4 (April) and MOTY10 (October). The amalgamated model, as evidenced by the results seen in each of the amalgamated tables, highlights a consistent MOTY4 (April) seasonal. This is supported in the empirical literature (Alagidede et. al., 2006; Liu et. al., 2011 and Marrett et. al., 2011). Furthermore, the direction of the outcome is positive, implying a consistent improvement in

returns for the month April, this also being observed by Liu et. al. (2011) and Marrett et. al. (2011).

Again, a degree of inconsistency is demonstrated by the outcomes in the two NSX-RES tables. In Table 7.4.6.a the significant independent variables were MOTY2, MOTY4 and MOTY10. This is only partially repeated in Table 7.4.7.b where MOTY4 and MOTY10 are dropped and replaced with MOTY6 and MOTY7. MOTY2 is constant between the two tables. This leads to a conclusion that while further investigation may be required to understand the discrepancies, it can be concluded that MOTY2 (February) is a significant predictor variable in assessing NSX-RES returns. This result is partially supported by Gao et. al. (2005) who find significantly higher monthly returns in the Shanghai Stock Exchange for the months of February and November. Additional support can be seen in: Giovanis (2009) examined the month of the year effect for fifty-five stock markets, finding that a February effect was in existence in nine of the stock markets under investigation; Ho (1990) support for a February effect in Malaysian stock returns, attributable to the Chinese New Year rather than the tax-loss selling hypothesis and a significant February effect was also discovered by Ke et. al. (2014) on the Taiwan Stock Exchange (TWSE).

While further research may be required to fully understand the discrepancies between the various tables, the current result may suggest support for a hybrid outcome which incorporates the theories of window dressing and portfolio rebalancing. Therefore H_7: the average returns of the NSXA sub-indices in all of the year's months are equal is not supported, suggesting that the NSXA may not be weak-form efficient in relation to the MOTY and does not follow a random walk pattern. This presents significant challenges for the random walk theory and EMH. The existence of a MOTY effect adds to the anomaly literature insofar as it reinforces concerns regarding market efficiency and investor rationality.

8.9. H_8: The average returns of the NSXA sub-indices at the turn of the year are not statistically significant.

The turn-of-the-year pattern / January effect (herein referred to as JTOTY) equity premium has been one of the most acknowledged anomalies in the empirical literature. The JTOTY anomaly was first observed by Wachtel (1942), later to be validated by multiple authors, including: Haug et. al. (2006); Keim (1983) and Rogalski et. al. (1986).

Multiple theories have been elaborated to account for the anomaly, though two theories have amassed the most accepted support: tax-loss selling and window dressing. The most well-established proponents of tax-loss selling have included: Reinganum (1983); Ritter (1988); Roll (1983) and Poterba et. al. (2001) among others. The fundamental argument behind tax-loss selling, focussing on US financial markets, states that investors dispose of underperforming stocks, taking advantage of tax benefits accrued to capital losses at the end of the financial year (December), leading to general fall in stock prices/returns. Cash generated from such sales are deposited and then reinvested (with any other monies accrued during this period) in the early part of January, leading to a short-term observable spike in stock prices/returns.

An alternative theory, proposed by Lakonishok et al. (1991), refers to the window dressing hypothesis, where institutional investors sell poorly performing stocks towards the end of December to minimize or eradicate negative impressions characterized by “loser” stocks. The goal is to leave remaining a portfolio of stocks which appears to represent a strongly performing portfolio. The institutional investor then re-enters the market in early January reconfiguring their stock portfolio.

Investors’ behavioural biases, instead of economic regards, has also been posited as an explanation for the JTOTY anomaly, Shiller (1999). Multiple studies have documented the relationship between JTOTY and firm size: Blume et. al. (1983); Haugen et. al. (1996); Haug et. al. (2006) and Keim (1983).

The aim of the eighth hypothesis was to also adopt the accepted orthodoxy and test the presence of the JTOTY anomaly in the NSXA. Due to the prevalence of small cap stocks on the NSXA, the relationship between the size effect and the JTOTY anomaly may have strong applicability to returns on the NSXA. The JTOTY anomaly was tested over a twelve-day period, two days prior to the new year followed by the first ten days of the new year. Looking at the results in Table 7.4.2.a, returns from post-3 days to post-10 days inclusive are significant, though the direction is negative, as opposed to what would be expected with the January anomaly, i.e. positive returns.

The results seen here are partially supported by the conclusion reached in Lee (1992), which examined the 'turn-of-the-year effect' and the relationships between stock market performances in five Asian stock markets: Japan, South Korea, Taiwan, Hong Kong, and Singapore. All stock markets displayed positive January returns, except South Korea where significantly positive December and negative January returns were observed. Easterday (2015) also reports an unexpected negative January effect, while Al-Rjoub, and Alwaked (2010) using data from the DJIA, the S&P 500 and the NASDAQ test whether the January effect behaves differently during crises and across company sizes and document that the average January returns are consistently negative during crises.

The current outcome has also been replicated in the literature, though referred to as "the other January effect". While there is conjecture around the validity of this anomaly essentially it refers to the direction of stock returns in January predict returns for the remainder of the year, i.e., positive (negative) January returns lead to positive (negative) returns throughout the remainder of the year, (Cooper; McConnell and Ovtchinnikov, 2006). Therefore, the result seen in Table 7.4.2.a, may be a precursor to this particular anomaly - "the other January effect".

Table 7.4.3.b provides a surprising result with all of the independent JTOTY variables becoming insignificant. This outcome is repeated across all of the other remaining tables, leading to the conclusion that the January anomaly may only be a statistical artefact with minimal significance or relevance.

Considering the insignificant results seen in each of the other JTOTY tables the significant outcome observed in Table 7.4.2.a, may not be reliable and have simply been spurious in nature due to an unquantified variable. Therefore, overall H_8: the average returns of the NSXA sub-indices at the turn of the year are not statistically significant is supported, but with some reservation and therefore requiring further empirical investigation. This would be warranted to determine the efficacy of the current results.

8.10. H_9: The average returns of the NSXA sub-indices at the turn of each month are not statistically significant.

The turn of the month (TOTM) anomaly refers to the behaviour of stock prices over the last period in one month and the early part of the new month, i.e. usually the last and first three days of each month. One of the seminal papers in the field, Lakonishok and Smidt (1988), found that the mean returns are significantly for the period covering the last four and first three days of each month compared to the remainder of the month. Additionally, the majority of stock returns occur over this specific period and therefore remaining invested in the remainder of the period provides minimal financial benefit. Ogden (1990) analysed the TOTM effects in the United States, finding support, and concluded that the standardization of payments at the turn of each calendar month was the main cause for the growth in stock returns, i.e. an increase in financial liquidity directly impacts stock market behaviour. Overall the empirical research has returned mixed results. The ninth hypothesis applies the TOTM anomaly in a new context - the NSXA. In the current research the TOTM anomaly was tested over a five-day period, one days prior to the new month followed by the first five days of the new month.

Across all of the results it is evident that in relation to the TOTM, the NSXA is informationally efficient and the EMH holds. Each of the NSX sub-indices returns insignificant results. A similar outcome is reflected in some of the empirical research, Al-Jarrah et. al. (2011), Bodla et. al. (2006), Tonchev et. al (2004) and Wong et. al (2006). The implication is that investors are unable to exploit and trade this anomaly to earn abnormal returns as the information relating to the TOTM anomaly has been fully factored into stock closing values. Subsequently, H_9: The average returns of the NSXA sub-indices at the turn of each month are not statistically significant is supported.

8.11. H_{10}: The average returns of the NSXA sub-indices at the end of the Australian financial year are statistically not significant.

The tenth hypothesis specifically focussed on the end of financial year (June-July) period in the Australian context to determine whether over this period any specific patterns of behaviour could be observed in stocks returns on the NSXA. This area has been the focus of substantial research in the international literature through studies of areas such as the January effect, the December effect and the turn of the year effect. Generally, this research has emphasized US stock return data due to the end of financial year occurring over the December - January period in the US. In the US literature, numerous studies have explored and accepted an end of the financial year effect, proxied in the form of the January effect due to the end of financial year occurring at the end of December, TLS being the main explanation. Agrawal et. al. 1994, Lakonshok et. al. 1988 and Poterba et. al. 2001.

As indicated by the results no statistical support was observed for a weekend effect across each of the three indices under investigation. As can be seen in each of the six tables there is no distinction between values observed on Fridays or Mondays. Similar results have been observed in the empirical literature, (Hui, 2005; Marquering, 2006 and Tonchev, 2004).

As indicated by the results no statistical support was observed for an end of the financial year effect across each of the three indices under investigation. As can be seen in each of the six tables all of the independent values are not significant for the entire period (i.e. from pre - 3 days to post - 2 days). Similar results have been observed in the empirical literature (Brown et al. 1983, Liu et al 2011 and Raj and Thurston, 1994). Raj et. al. (1994) note that their outcome may have been as a result of the small size and the limited liquidity of the New Zealand stock market, factors which may be similar for the NSXA and its various sub-indices.

As the data provide no evidence of abnormal returns, it can be concluded that H_{10}: the average returns of the NSXA sub-indices at the end of the Australian financial year are statistically not significant and the hypothesis is therefore supported. The conclusion drawn from this outcome is that, in relation to the existence of predictable behaviour in stock returns over the end of the financial year period on the NSXA, the stock market is informationally efficient and the principles regarding the EMH are valid and robust. The practical implication derived from this conclusion is that stock market investors are comfortable holding their investment positions through the end of financial year period and not taking advantage of tax loss or new information opportunities.

8.12. H_{11}: The average returns of the NSXA sub-indices are not influenced by national holidays.

The holiday effect (often referred to as a pre-holiday effect) is the propensity for positive returns to accrue in stocks prior to a market closure for some period of holiday. The holiday effect is one of the most persistent of all seasonal anomalies, first observed by Fields (1934). The seminal paper regarding the holiday effect was published by Lakonishok et. al. (1988). Other important papers which have observed the anomaly include: Agrawal et. al. (1994), Arsad et. al. (1997), Chan et. al. (1996), Chong et. al. (2005) and Tonchev et. al. (2004).

The current research finds no evidence to support the presence of a holiday anomaly on the NSXA. All of the independent variables considered in each of the six tables are not significant for the entire period. This outcome is supported by some of the empirical literature (Alagidede 2008, Blandon 2010, Bouges 2009 and Marquering et. al. 2006). This suggests a lack of stability in the anomaly, thereby questioning its reliability as part of a strategy to exploit stock market activity through arbitrage opportunities. With no evidence of abnormal returns, it can be concluded that H_{11}: the average returns of the NSXA sub-indices are not influenced by national holidays is supported.

8.13. H_{12}: The average returns of the NSXA sub-indices are not influenced by the Australian federal elections.

The twelfth hypothesis categorically focussed on whether Australian federal elections influence stocks returns on the NSXA. The relationship between political activities, such as elections, and stock market behaviour has been a central focus of the events literature. With most companies on the NSXA being small cap in size, it could be expected that election outcomes may have a disproportional impact on the stocks of such companies compared to large cap stocks.

Political variables may act as predictors in forecasting excess stock returns. The potential influence of elections over stock markets is seen in the reaction/s of investors to election outcomes. Much of this is driven by the expectation/s of investors, which may flow onto stock portfolio decisions. Investor expectation, with regards to elections, may revolve around concerns relating political party's policies on monetary and taxation policies, government spending promises, financial sector reform or business investment. Such issues impact investor attitudes and beliefs, leading to stock purchase or sell decisions. Ultimately, in the short-term elections create a degree of uncertainty in investors' minds which potentially influences stock market behaviour.

The empirical literature has been inconsistent in relation to this area, though a substantial amount of the research supports the ability of election activity to have a predictive capacity over stock market behaviour (Białkowski 2008, Bohl 2006, Ejara 2012 and Nezerwe 2013). In general, the results parallel the literature due to the inconsistent outcomes between each of the NSX sub-indices. No pattern of behaviour is distinguishable from all of the tables except Table

7.4.7.b, due to the lack of significance in the independent variables. Jones et. al. (2009) noted a lack of support for an election effect, investigating the relationship between US elections and monthly stock market returns concluding that neither election results nor the election cycle appears to offer much help in predicting stock market returns. A partial lack of support was also observed by Kabiru et. al. (2015), observing that the 2002 and 2013 Kenyan general elections were insignificant and had no influence over stock returns on the Nairobi Securities exchange, while the 1997 and 2007 general election events were found to be significant.

The NSX-RES tables provide a conflicting outcome in that Table 7.4.6.a, shows no support for the impact of Australian federal elections, while in Table 7.4.7.c, Australian federal elections post one and two days becomes a significant and predictable variable of returns behaviour. Chen (2005) observed that presidential elections, had significant influences on the returns of hotel stocks listed on the Taiwan Stock Exchange. Therefore, it may be possible that election outcomes may be particularly influential over one sector of the economy (and therefore a specific stock market sub-index), though Chen (2005) did not consider other sectors within the Taiwan Stock Exchange and focussed specifically on hotel stocks. It is recommended that this be a consideration for future research to ensure that the current result is simply not a statistical aberration, as such a result has not been observed in the empirical literature to the best knowledge of the researcher. With the conflicting outcome seen in the results, it can be concluded that H_{12}: the average returns of the NSXA sub-indices are not influenced by the Australian federal elections is only partially supported or inconclusive.

8.14. H_{13}: The average returns of NSXA sub-indices are not influenced by the U.S. Presidential elections.

The thirteenth hypothesis examined the link, if any, between U.S. presidential elections and returns on the main NSXA index and two sub-indices. The aim was to determine if U.S. election results would have any influence over NSXA stock market activity, and therefore investor behaviour. Would a spill-over effect be observed? The current research finds no evidence to support the ability of U.S. presidential elections to affect NSXA stock returns. Each of the independent variables considered across all six tables were not significant for the entire period. The outcome observed in the current research is in conflict with the empirical literature, which has noted a spill-over effect, or cointegration, between the results of U.S. presidential elections and local stock market returns – sometimes referred to as the international election effect: (Dobson et. al. (1993) - U.S. elections influence London, Toronto and Tokyo stock markets; Foerster (1994) – U.S. presidential election effect over Canadian stocks and Nippani (2005) - Canadian and the Mexican stock markets affected negatively by the 2000 U.S. presidential election results).

Consequently, with no evidence of abnormal returns or influence, it can be concluded that, H_{13}: the average returns of NSXA sub-indices are not influenced by the U.S. Presidential elections is supported. The practical implication of this outcome is that investors automatically factor in such news, which provides no scope to exploit U.S. presidential election activity and results to gain financial advantage in stock returns.

8.15. H_{14}: The average returns of the NSXA sub-indices are not influenced by the AFL Grand Final.

H_{15}: The average returns of the NSXA sub-indices are not influenced by the NRL Grand Final.

H_{16}: The average returns of the NSXA sub-indices are not influenced by the Melbourne Cup.

Hypotheses fourteen, fifteen and sixteen have been dealt with collectively as they all fall within the frame of sporting events. Each of these hypotheses was evaluated to determine if any link existed between them and returns on the main NSXA index and two sub-indices, i.e. could they have any predictive capacity. A significant quantity of research in the empirical literature has examined such relationships:

1) Edmans et. al. (2007) - reveals a strong association between the results of soccer games and local stock returns;

2) Ehrmann et. al. (2012) - national and global stock market returns decreased by over 20% during 2010 soccer World Cup matches;

3) Floros (2010) - examines the relationship between the Athens Olympic Games and the Athens Stock Exchange (ASE) finding no overall effect on the ASE, but significant outcomes for sponsoring companies listed on the ASE and a positive effect on the OTE (Hellenic Telecommunications Organisation) index;

4) Mishra (2010) - examines the impact of the Indian cricket team's performance in one-day international cricket matches on the returns on the Indian stock market, finding an asymmetric relationship between Indian cricket team performance and stock returns and

5) Worthington (2007) - examines the presence of a Melbourne Cup effect in Australian daily stock returns concluding a link between the Melbourne Cup and irrationally positive market behaviour.

The current research found no evidence to support the presence of a “sporting event” anomaly on the NSXA. Each of the independent event variables considered across all six tables were not significant for the entire period. This outcome is supported within the empirical literature (Klein et. al. 2009 and Martins et. al. 2011), which is an indicator of market efficiency. With no evidence of abnormal returns, it can be concluded that H_{14}, H_{15} and H_{16} are supported and sporting events do not influence closing values on the main NSXA index and the two main sub-indices.

8.16. Addressing the research questions

8.16.1. Does the theory relating to efficient markets apply to an "alternative" stock market - the NSXA?

This was the first research question posed in the introduction to the research. Evidence is provided which partially supports the existing empirical literature regarding stock market anomalies and the EMH. The reason for this is that, as stated previously, the results provide conflicting outcomes which in some cases, for example monthly data, returns are predictable and therefore do not follow the principles established by the EMH. In other cases, for example predictability of returns over days of the week (DOW), there is no foundation to support the predictability of the data and therefore the EMH holds. The absence of literature exploring any link between anomalies and the NSXA made the current research important and significant. The results show that the applicability of the EMH is open and shut or invalid, but must be seen in the context of the financial market to which it is applied and the factors which influence that market

The results suggest that there is possibly room for an alternative explanation regarding anomalies which falls somewhere between the current thinking – a segmented market efficiency hypothesis. Bechev et. al. (2007), in a short, exploratory note, made mention of such a theory. A segmented market efficiency hypothesis provides for a market to display overall characteristics which resemble an efficient model of markets, while at the same time at the sub – market level providing for inefficiencies which may be particular to a specific sector. This is observed in the current research, where several anomalies (i.e. DOW, JE, HE or events) are insignificant across all of the indices, while concurrently other anomalies appear to hold (i.e. MOTY or Australian federal elections). Or the situation where one particular anomaly is present while others are not present, indicating the lack of a standardised pattern of behaviour, (Al-Khazali et. al., 2008; Depenchuk, 2010; Saeed, 2011and Yakob et. al., 2005). The concept of a segmented market efficiency model may also be applied across different international stock markets where no systematic patterns are evident and one market displays the properties of an efficient market, while another similar market does not, (Alagidede, 2008; Cinko, 2015; Hui, 2005 and Yakob et. al., 2005).

8.16.2. If efficient market theories are demonstrated to not be entirely valid does this mean that anomalous stock market behaviour and trading strategies can be exploited to obtain superior financial returns?

This was the second research question posed in the introduction to the research. The ability to arbitrage based on the existence of anomalies is strongly dependent on round trip transaction costs and the ability to minimize or mitigate these. Stock trading transaction costs have the potential to dramatically reduce the profitability of any existing anomaly. Furthermore, due to the illiquid nature associated with smaller capitalised stocks, as is the case with many stocks listed on the NSXA, these become more significantly expensive to trade. An investor must be conscious that an illusion of profitable opportunities exists when in reality they are not available.

The outcomes observed in the current research provide investors with the ability to improve the efficiency of trading strategies through better timing of trading opportunities, rather than short – term exploitation as evidenced by day trading activity. The size of the coefficient for each of the significant independent variables from the results indicates that through more accurate timing of trades investors would be able to maximise profitable opportunities. As improvements in technologies such as software trading platforms develop, these may offer further opportunities to minimize transaction costs and allow investors more immediate, short term arbitrage opportunities based on anomalous behaviour within stock markets. Overall the existence of a number of significant outcomes in observed returns does not necessarily imply an opportunity to make immediate supernormal profits, but that such outcomes can be used to better target trading strategies to maximise profitable long term financial outcomes.

8.17. Summary

The discussion has examined in detail the relationships between stock market returns on the NSXA and a number of the accepted anomalies from the empirical literature. The ability to use either historical data or event variables to predict patterns of behaviour on the NSXA is not categorically supported. Knowledge of particular variables (for example: interest rates, specific months within the year or elections) appears to provide investors with at least a statistical opportunity to exploit these to generate abnormal financial returns. The findings that have been observed may have significant consequences for the decision-making process by investors. Knowledge of some of the factors which have been observed could allow stock market investors to better assess portfolio diversification strategies, which may improve the risk-return tradeoff which exists with investment choices or options.

The next chapter is the concluding chapter, which provides an overview of the results discussed so far. Furthermore, recommendations are provided for future research options in this specific area.

9. CONCLUSION

9.1. Introduction

The empirical anomalies literature has been strongly influenced by a few core theories - the CAPM, random walk, the EMH and APT. Each of these theories has essentially implied that while financial markets (and particularly stock markets) are not examples of perfect competition, they are informationally efficient and integrate or absorb new information almost seamlessly. Yet a large body of empirical research has questioned the validity of such concepts in highlighting how stock markets can be slow to absorb new information, thereby implying inefficiency, and at least theoretically providing opportunities for sophisticated investors to financially exploit such delays. This is not to say that such core theories are not, or no longer, relevant but that they do not offer a complete explanation of the relationship between information/news and both how financial (stock) markets operate and how investors react or respond. Building on such concepts, this research investigates the "efficiency" of an Australian stock market, which has been overlooked, the NSXA.

The remainder of this chapter is organized as follows: In Section 9.2. explains how each of the research objectives have been addressed. Section 9.3 discusses the contribution of the research. Section 9.4 discusses the limitations and recommendations for future research.

9.2. Addressing the research objectives

The first objective of the research was to determine the existence and relationship between several anomalies on a previously overlooked stock exchange – the NSXA. The data and research outcomes highlight that anomalous behaviour within stock markets is stable irrespective of whether public knowledge or acceptance of a stock market evident. Random walk theory (as espoused by the EMH) suggest that stock price movements do not follow patterns; historical data has no value and therefore ~~This leads to the question of whether~~ anomalies should be considered outliers.~~ or accepted as the new norm, even if only short lived?~~ The current research demonstrates that while anomalous behaviour may be structurally unstable, trading patterns do emerge or materialize, whether over short or longer timeframes and therefore should be ~~,~~accepted as the new norm, even if only short lived.

~~The first objective of the research was to determine the existence and relationship between several anomalies on a previously overlooked stock exchange – the NSXA. The data and research outcomes highlight that anomalous behaviour within stock markets is stable irrespective of whether public knowledge or acceptance of a stock market evident. This leads to the question of whether anomalies should be considered outliers or accepted as the new norm, even if only short lived? The current research demonstrates that while anomalous behaviour may be structurally unstable, trading patterns do emerge or materialize, whether over short or longer timeframes.~~

The second objective explored the possibility of a relationship between leading economic indicators and the predictability of the financial return of stocks on the NSXA. The earlier empirical research, Jaffe et. al. (1976), Nelson (1976) and Fama et. al. (1977), established the foundations for the studying the relationship between economic variables and stock market behaviour, acknowledging that specific macroeconomic variables influenced stock market returns. This has been followed by a substantial body of empirical research which has investigated the relationship between macroeconomic variables and stock market behaviour, noting the existence of a strong relationship between such variables and stock prices across both developed and emerging stock markets.

The current research generally confirmed the existing theory and literature. It was strongly evident that changes in several of the indicators explored had a direct impact on the closing values of the NSXA. As stated earlier in the research, the economic indicators selected were considered to be the sort that would be more relevant to professional or institutional investors. The fact that such indicators directly influenced NSXA outcomes may highlight which type of investor is following, and trading within, this specific stock market.

The third objective sought to explain why an anomaly might exist. Overall the current research has established some degree of causality between stock market behaviour (and returns) and macroeconomic factors, with the NSXA intrinsically interconnected to numerous domestic macroeconomic factors. APT may provide the most plausible explanation for the association between selected macroeconomic factors and NSXA results. With respect to the calendar variables the mixed outcome would tend to provide some support for the EMH. Only the

MOTY variables demonstrated some degree of predictability, though this was inconsistent. While further research may be required to fully understand such discrepancies, the results suggested support for a hybrid outcome incorporating both window dressing and portfolio rebalancing theories. Generally, the event variables proved insignificant (thereby providing support for the EMH), except for the relationship between Australian federal elections and the NSX-RES index. While a conclusive explanation is difficult to elucidate, due to the inconsistency of the outcome, BF theories such as anchoring or availability bias may offer the most suitable rationale.

The fourth objective sought to address the positioning of anomalies, i.e. are they structural and therefore the new norm or are they outliers, possibly statistically significant but financially unexploitable. From the research, it is evident that the ability to see anomalies as either the new norm or outliers is dependent to a large degree on the variable being investigated. Consequently, macroeconomic factors for example, provide a high degree of predictability and in this instance anomalies can be seen as structural and an opportunity to financially exploit stock markets. The inconsistency of the other significant anomalies observed in the current research though may lead to these being seen as outliers.

9.3. Contribution of the research

The research has made a significant contribution to the existing body of knowledge relating to the performance of stock markets in an Australian context by applying the concept/s of anomalous behaviour to a smaller, secondary stock market. This is important as it has highlighted the lack of effectiveness of the EMH in explaining the behaviour of a stock market which is less understood and recognized. While the NSXA displays some of the characteristics of weak form efficiency, anomalous stock market behaviour is still evident. This is important as it implies, as stated previously, a stock market may concurrently be both efficient and inefficient (as evidenced in the current research by a lack of support for some anomalies such as a DOW or January effect, though a strong indication of a monthly effect). ~~The research has made a significant contribution to the existing body of knowledge relating to the performance of stock markets in an Australian context by applying the concept/s of anomalous behaviour to a smaller, secondary stock market. This is important as it has highlighted the lack of effectiveness of the EMH in explaining the behaviour of a stock market which is less understood and recognized. While the NSXA displays some of the characteristics of weak~~

~~form efficiency, anomalous stock market behaviour is still evident. This is important as it implies, as stated previously, a stock market may concurrently be both efficient and inefficient (as evidenced in the current research by a lack of support for some anomalies such as a DOW or January effect, though a strong indication of a monthly effect).~~ Furthermore, to the researchers' current understanding this is the only study which has incorporated both an encompassing model of market behaviour and adopted a specific regression approach, i.e. piecewise, within the one study. This has provided the opportunity to raise the possibility of introducing an alternative theoretical explanation of stock market behaviour - segmented market efficiency.

Bechev et. al (2007) note that this form of "efficiency" is particularly related to "...developing markets in the early periods of their existence", (pg. 116). To some degree the NSXA can be seen as a developing stock market (certainly when compared to the ASX) in a mature financial economy, characterisitcs similar to those reported by Bechev et. al (2007). ~~Bechev et. al (2007) note that this form of "efficiency" is particularly related to "...developing markets in the early periods of their existence", (pg. 116). To some degree the NSXA can be seen as a developing stock market (certainly when compared to the ASX) in a mature financial economy, characterisitcs similar to those reported by Bechev et. al (2007).~~ Additionally, efficient markets are those in which information is easily available and widely distributed, while the NXSA displays overall informational inefficiency, due to a lack of detailed reporting through the general media and professional stock market participants, providing a possible explanation for the existence of segmentally efficient market.

This research highlights the potential importance of information flows on stock markets (and stock market participants). Consequently, from a practical market perspective, the current research draws attention to (at least statistically) the potential for practitioners (either professional or individual) to exploit inefficiencies in less well developed and/or understood stock markets. The presence of a number of anomalies associated with the NSXA provides investors with a more sophisticated level of knowledge which could be employed to improve decision making in relation to the timing of stock investments and therefore maximise financial returns in both the medium and long term.

~~This research highlights the potential importance of information flows on stock markets (and stock market participants). Consequently, from a practical market perspective, the current research draws attention to (at least statistically) the potential for practitioners (either~~

~~professional or individual) to exploit inefficiencies in less well developed and/or understood stock markets. The presence of a number of anomalies associated with the NSXA provides investors with a more sophisticated level of knowledge which could be employed to improve decision making in relation to the timing of stock investments and therefore maximise financial returns in both the medium and long term.~~

9.4. Limitations and recommendations for future research

This research is subject to the following limitations:

1) An inability to determine the types of investors who have invested in stocks on the NSXA. This would have provided an understanding of the ratio of individual to institutional investors in the market and provided further insight as to why the anomalous behavior was observed;

2) At the time of the research it was difficult to easily quantify, from the NSXA data available, the origin or domicile, of the companies listed on the exchange. This is important as knowledge of this may have been supportive in explaining trading patterns and therefore anomalous behavior;

3) For each of the calendar and event variables used in the current research a consistent time scale may have elicited alternative results. As with other empirical research, the time frames over which independent variables are assessed tend to vary greatly. It is suggested that future research may consider, where appropriate, that a standard time frame be adopted, at the very least to improve the readability of results, but more importantly to achieve greater consistency;

4) The current research did not consider the impact of market capitalization and firm size. This was due to a lack of availability of data. Future research may want to incorporate size based portfolios when undertaking analysis;

5) There may be the opportunity to further investigate each of the independent variables (particularly those that were not significant such as many of the calendar variables) by

further re-structuring the model, using a piecewise regression approach, into each specific category of variable. For example, instead of testing all the calendar variables as a group, each calendar variable (i.e. DOW) is tested independently from each other calendar variable. This may shed further insight into market behavior and have implications for the each of the numerous hypotheses;

6) While the current research analyzed changes in absolute values, future research may consider incorporating percentage changes in values as well. This may provide an additional perspective, not considered in this research;

7) Whilst the use of OLS regression is well accepted in the research, the use of other statistical techniques may provide further insight into the efficacy of the anomalies observed. The use of additional statistical procedures may also minimize the potential problem of data mining and

8) Future research may consider going beyond the five-year time frame adopted in the current research. A longer period of data may provide more stable and reliable results.

The main aim of this thesis was to provide a comprehensive understanding of the possible link between stock market returns and investor activity to determine if predictable and observable patterns of behaviour were visible. This may also provide investors with an opportunity to better appreciate systematic risk, as it relates to stock market investment, and potentially manage this more appropriately. The lack of previous research focussing on the NSXA, also raises awareness that from an Australian context, that other markets other than the ASX, may offer possible exploitable opportunities.

10. BIBLIOGRAPHY

Abraham, B. and N. Yatawara, 1988, “A score test for detection of time series outliers”, *Journal of Time Series Analysis,* Vol. 9, Iss. 2, March, pp. 109 - 119.

Abdullah, D. A. and Hayworth, S. C., 1993, "Macroeconometrics of stock price fluctuations," *Quarterly Journal of Business and Economics*, Vol. 32, No. 1, Winter, pp. 50 - 67.

Abu-Rub, N. and Sharba, T., 2011, "Calendar effects in the Palestine Securities Exchange (PSE): Analysis & investigation", *World Review of Business Research*, Vol. 1. No. 5, Nov., pp. 52 - 66.

Acikalin, S., Aktas, R. and Unal, S., 2008, "Relationships between stock markets and macroeconomic variables: an empirical analysis of the Istanbul Stock Exchange" *Investment Management and Financial Innovations*, Vol. 5, Iss. 1, pp. 8 - 16.

Ackert, L. and Athanassakos, G., 2000, "Institutional investors, analyst following and the January anomaly", *Journal of Business, Finance and Accounting*, Vol. 27, pp. 469 - 485.

Aggarwal, R., Leal, R. and Hernandez, L., 1993, “The aftermarket performance of initial public offerings in Latin America”, *Financial Management*, Vol. 22, No. 1, Spring, pp. 42 - 53.

Agrawal, A. and Tandon, K., 1994, “Anomalies or illusions? Evidence from stock markets in eighteen countries”, *Journal of International Money and Finance*, Vol. 13, Iss. 1, pp. 83 - 106.

Ahmad, T. and Ahmed, S. N., 2014, "The January effect on stock market", *European Academic Research*, Vol. I, Iss. 11, Feb., pp. 3817 - 3825.

Ahmad, M. I., Rehman, R. and Raoof, A., 2010, “Do interest rate, exchange rate effect stock returns? A Pakistani perspective”, *International Research Journal of Finance and Economics*, Iss. 50, pp. 146 - 150.

Ahsan, A. M. and Sarkar, A. H., 2013, "Does January effect exist in Bangladesh?", *International Journal of Business and Management*, Vol. 8, No. 7, pp. 82 - 89.

Ajayi, R., Mehdian, A. S. and Perry, M. J., 2004, "The day-of-the-week effect in stock returns: Further evidence from Eastern European emerging markets", *Markets Finance and Trade*, Vol. 40, No. 4, Jul. - Aug., pp. 53 - 62.

Ajinkya, B. B. and Gift, M. J., 1985, “Dispersion of financial analysts' earnings forecasts and the (option model) implied standard deviations of stock returns”, *The Journal of Finance*, Vol. 40, Iss. 5, Dec., pp. 1353 - 1365.

Akbulut, M., Chan, S. H. and Letdin, M., 2015, "Calendar anomalies: Do REITs behave like stocks?", *International Real Estate Review*, Vol. 18, No. 1, pp. 177 - 215.

Aksoy, M. and Ulusoy, V., 2015, "Analysis of relative return behaviour of Borsa Istanbul Reit And Borsa Istanbul 100 index", *Journal for Economic Forecasting*, Iss. 1, pp. 107 - 128.

Akhter, A., Sandhu, A. and Butt, S., 2015, "Islamic calendar effect on market risk and return evidence from Islamic countries", *Journal of Business & Financial Affairs*, Vol. 4, Iss. 2, pp. 1 - 5.

Akyol, A.C., 2011, "Stock returns around nontrading periods: evidence from an emerging market", *Applied Financial Economics*, Vol. 21, Iss. 20, pp. 1549 - 1560.

Alagidede, P., 2008, "Month-of-the-year and pre-holiday seasonality in African stock markets", *Stirling Economics Discussion Papers*, No. 2008-23, University of Stirling, Division of Economics, pp. 1 - 19.

Alagidede, P. and Panagiotidis, T., 2006, "Calendar anomalies in an emerging African market: Evidence from the Ghana Stock Exchange”, http://creativecommons.org/licenses/by-nc-nd/2.5/, *Working Paper (Economics)*, pp. 1 - 30, accessed Aug. 2010.

Ali, I., Rehman, K .U., Yilmaz, A. K., Khan, M. A. and Afzal, H., 2010, "Causal relationship between macro-economic indicators and stock exchange prices in Pakistan", *African Journal of Business Management*, Vol. 4, No. 3, Mar., pp. 312 - 319.

Ali, M. B., (2011), "Impact of micro and macroeconomic variables on emerging stock market return: A case on Dhaka Stock Exchange (DSE)", *Interdisciplinary Journal of Research in Business*, Vol. 1, Iss. 5, May, pp. 8 - 16.

Ali, S. and Akbar, M., 2009, "Calendar effects in Pakistani stock market", *International Review of Business Research Papers*, Vol. 5 No. 1, Jan., pp. 389 - 404.

Al-Ississ, M., 2015, "The holy day effect", *Journal of Behavioural and Experimental Finance*, 5, pp. 60 - 80.

Al-Jafari, M. K., 2011, "The monthly effect of stock market returns and the global financial crisis: Evidence and implications from Bahrain Bourse". *International Research Journal of Finance and Economics*, Iss. 78, pp. 83 - 95.

Al-Jafari, M. K., Salameh, R. M. and Habbash, M. R., 2011, "Investigating the relationship between stock market returns and macroeconomic variables: Evidence from developed and emerging markets", *International Research Journal of Finance and Economics*, Issue 79, pp. 6 - 30.

Al-Jarrah, I. M., Khamees, B. A. and Qteishat, I. H., 2011, "The turn of the month anomaly in Amman stock exchange: Evidence and implications", *Journal of Money, Investment, and Banking*, 21, pp. 5 - 11.

Al-Khazali, O. M., Koumanakos, E. P. and Pyun, C. S., 2008, “Calendar anomaly in the Greek stock market: Stochastic dominance analysis”, *International Review of Financial Analysis*, Vol. 17, Iss. 3, pp. 461 - 474.

Al-Rjoub, S. A. M. and Alwaked, A., 2010, "January effect during financial crises: Evidence from the U.S", *European Journal of Economics, Finance and Administrative Sciences*, Iss. 24, pp. 29 - 35.

Allen, L. and Saunders, A., 1992, "Bank window dressing: Theory and evidence", *Journal of Banking & Finance*, Vol. 16, Iss. 3, June, pp. 585 - 623

Alrabadi, D. W. H. and Al-Qudah, K. A., 2012, “Calendar anomalies: The case of Amman Stock Exchange”, *International Journal of Business and Management*, Vol. 7, No. 24, pp. 120 - 127.

Al-Saad, K. and Moosa, I. A., 2005, "Seasonality in stock returns: evidence from an emerging market", *Applied Financial Economics*, Vol. 15, No. 1, pp. 63 - 71.

Aly, H. Y., Mehdian, S. M. and Perry, M. J., 2004, "An analysis of day-of-the-week effects in the Egyptian stock market", *International Journal of Business*, 9 (3), pp. 301 - 308.

Amihud, Y, and Mendelson, H., 1986, “Asset pricing and the bid-ask spread”, *Journal of Financial Economics*, Vol. 17, Iss.2, December, pp. 223 - 249.

Amihud, Y, and Mendelson, H., 1991, “Liquidity, asset prices and financial policy”, *Financial Analyst Journal*, Vol. 47, No. 6, Nov. - Dec., pp. 56 - 66.

Amihud, Y., 2002, “Illiquidity and stock returns: cross-section and time-series effects”, *Journal of Financial Markets*, Vol. 5, Iss. 1, Jan., pp. 31 - 56.

An, J, and Park, C., 2012, "Election cycles and stock market reaction: International evidence", *KIEP Research Paper No. Working Paper-12-04*, pp. 1 - 32.

Angelovska, J., 2014, “Month related seasonality on the Macedonian stock market”, *Business and Economics Research Journal*, Vol. 5, No. 1, pp. 143 - 150.

Andersen, T. G., Bollerslev, T., Diebold, F. X. and Vega, C., 2005, "Real-time price discovery in stock, bond, and foreign exchange markets", *NBER Working Paper No. 11312*, pp. 1 - 56.

Anderson, D., Clarkson, P.M. and Moran, S.P., 1997, “The association between information, liquidity and two stock market anomalies, the size effect and seasonalities in equity returns”, *Accounting Research Journal*, Vol. 10, No. 1, pp. 6 -19.

Anderson, K., Woodhouse, K., Ramsay, A. and Faff, R., 2009, "Testing for asymmetric effects in the accrual anomaly using piecewise linear regressions: Australian evidence", *Pacific Accounting Review*, Vol. 21 Iss. 1, pp.5 - 25.

Andrikopoulos, P., Daynes, A., Latimer, D. and Pagas, P., 2008, “Size effect, methodological issues and “risk-to-default”: Evidence from the UK stock market”, *The European Journal of Finance*, Vol. 14, No. 4, Jun., pp. 299 - 314.

Apolinario, R.M.C., Santana, O.M., Sales, L.J. and Caro, A.R., 2006, "Day of the week effect on European stock markets" *International Research Journal of Finance and Economics*, 2(1), pp. 53 - 70.

Arbel, A., 1985, “Generic stocks. An old product in a new package”, *The Journal of Portfolio Management*, Vol. 11, No. 4, Summer, pp. 4 - 13.

Arbel, A, and Strebel, P., 1983, “Pay attention to neglected firms! Even when they are large”, *The Journal of Portfolio Management*, Vol. 9, No. 2, Winter, pp. 37 - 42.

Ariel, R. A., 1987, “A monthly effect in stock returns”, *Journal of Financial Economics*, Vol. 18, Iss. 1, Mar., pp.161 - 174.

Ariel, R. A., 1990, "High stock returns before holidays: Existence and evidence on possible causes", *The Journal of Finance*, Vol. 45, No. 5, Dec., pp.1611 - 1626.

Arsad, Z, and Coutts, J. A., 1997, "Security price anomalies in the London International Stock Exchange: a 60-year perspective", *Applied Financial Economics*, Vol. 7, No. 5, Oct., pp. 455 - 464.

Asness, C. S., 2000, “Stocks versus Bonds: Explaining the equity risk premium”, *Financial Analysts Journal*, Vol. 56, No. 2, Mar. - Apr., pp. 96 - 113.

Asprem, M., 1989, "Stock prices, asset portfolios and macroeconomic variables in ten European countries", *Journal of Banking & Finance*, Vol. 13, Iss. 4 - 5, pp. 589 - 612.

Asteriou, D. and Kavetsos, G., 2006, "Testing for the existence of the ‘January effect’ in transition economies", *Applied Financial Economics Letters,* Vol. 2, Iss. 6, pp. 375 - 381.

Athanassakos, G., 1992, “Portfolio rebalancing and the January effect in Canada”, *Financial Analysts Journal*, Vol. 48, No. 6, Nov. - Dec., pp. 67 - 78.

Athanassakos, G. and Robinson, M.J., 1994, “The day-of-the-week anomaly: The Toronto Stock Exchange experience”, *Journal of Business, Finance and Accounting,* Vol. 21, Iss. 6, Sept. pp. 833 - 856.

Australian Stock Exchange n.d., *End of Month Values*, viewed 22 October2017, < http://www.asx.com.au/about/historical-market-statistics.htm>.

Australian Stock Exchange, 2015, *The Australian Share Ownership Study,* Jun., n.d.

Australian Stock Exchange, 2017, *ASX Australian Investor Study*, n.d.

Avramov, D. and Chordia, T., 2006, “Asset pricing models and financial market anomalies”, *The Review of Financial Studies*, Vo. 19, No. 3, pp. 1001 - 1040.

Aydoğan, K. and Booth, G., 2003, "Calendar anomalies in the Turkish foreign exchange markets", *Applied Financial Economics*, Vol. 13, Iss. 5, pp. 353 - 360.

Azam, M., 2011, "Stock price variation regarding macroeconomic and firm specific accounting variables: Evidence from Karachi Stock Exchange", *International Research Journal of Finance and Economics,* Iss. 81, pp. 77 - 88.

Badrinath, S. G. and Lewellen, W. G., 1991, "Evidence on tax-motivated securities trading behavior", *The Journal of Finance,* Vol. 46, No. 1, pp. 369 - 382.

Baker, M., Pan, X. Wurgler, J., 2012, "The effect of reference point prices on mergers and acquisitions", *Journal of Financial Economics,* Vol. 106, Iss. 1, pp. 49 - 71.

Ball, R, and Brown, P., 1968, "An empirical evaluation of accounting income numbers", *Journal of Accounting Research,* Vol. 6, No. 2, Autumn, pp. 159 - 178.

Ball, R. and Shivakumar, L., 2006, "The role of accruals in asymmetrically timely gain and loss recognition", *Journal of Accounting Research*, Vol. 44, No. 2, pp. 207 - 242.

Banz, R. W., 1981, "The relationship between return and market value of common stocks", *The Journal of Financial Economics,* Vol. 9, Iss. 1, March, pp. 3 - 18.

Barone, E., 1990, "The Italian Stock Market: Efficiency and calendar anomalies", *Journal of Banking & Finance,* Vol. 14, Iss. 2 - 3, August, pp. 483 - 510.

Bartolini, L., Goldberg, L., & Sacarny, A., 2008, "How economic news moves markets", *Current Issues in Economics and Finance,* Vol. 14, No.6, pp. 1 - 7.

Basu, S., 1977, "Investment performance of common stocks in relation to their price-earnings ratios: A Test of the Efficient Markets Hypothesis", *The Journal of Finance,* Vol. 32,No. 3, pp. 663 - 682.

Basu, S., 1983, "The relationship between earnings' yield, market value and return for NYSE common stocks: Further evidence", *Journal of Financial Economics*, Vol. 12, Iss. 1, pp. 129 - 156

Battalio, R. H. and Mendenhall, R., 2005, “Earnings expectation, Investor trade size, and anomalous returns around earnings announcements”, *Journal of Financial Economics,* Vol. 77, Iss. 2, Aug., pp. 289 - 319.

Beaver, W. H., 1968, "The information content of annual earnings announcements", *Journal of Accounting Research*, Vol. 6, pp. 67 - 92.

Bechev, I. and Gechev, P., 2007, “Segmented market efficiency hypothesis”, *Journal of the University of Chemical Technology and Metallurgy*, Vol.42, Iss. 1, pp. 115 - 116.

Becker, K. G., Finnerty, J. E. and Friedman, J., 1995, "Economic news and equity market linkages between the US and UK", *Journal of Banking & Finance*, Vol. 19, Iss. 7, Oct., pp. 1191 - 1210.

Behavioural finance (n.d.), *Prospect Theory,* http://prospect-theory.behaviouralfinance.net, accessed Oct. 2015.

Bepari, K. and Mollik, A.T., 2009, “Seasonalities in the monthly stock returns: Evidence from Bangladesh Dhaka Stock Exchange (DSE)”, *International Research Journal of Finance and Economics*, Iss. 24, pp. 167 - 176.

Bernard, V, and Thomas, J., 1990, “Evidence that stock prices do not fully reflect the implications of current earnings for future earnings,” *Journal of Accounting and Economics*, Vol. 13, Iss. 4, Dec., pp. 305 - 40.

Berument, H. and Kiymaz, H., 2001, “The day of the week effect on stock market volatility”, *Journal of Economics and Finance*, Vol. 25, No. 2, Summer, pp. 181 -193.

Bessembinder, H. and Hertzel, M. G., 1993, “Return autocorrelations around nontrading Days”, *The Review of Financial Studies*, Vol. 6, No. 1 pp. 155 - 189.

Bhabra, H. S., Dhillon, U. S. and Ramírez, G. G., 1999, “A November effect? Revisiting the tax-loss selling hypothesis”, *Financial Management,* Vol. 28, No. 4, Winter, pp. 5 - 15.

Bhardwaj, R. K. and Brooks, L. D., 1992, “The January anomaly: Effects of low share price, transaction costs and bid-ask bias”, *The Journal of Finance,* Vol. 47, No. 2, pp. 553 - 575.

Bhattacharya, S., Sengupta, P.P. and Sarkar, P.S., 2012, “Day of the week effect: An empirical analysis of national stock exchange”, *ZENITH International Journal of Multidisciplinary Research*, Vol.2 Issue 5, May, pp. 91 - 98.

Białkowski, J., Gottschalk, K. and Wisniewski, T. P., 2008, "Stock market volatility around national elections", *Journal of Banking & Finance*, Vol.32, Iss. 9, Sept., pp. 1941 - 1953.

Bildik, R., 2004, "Are calendar anomalies still alive?: Evidence from Istanbul Stock Exchange", *http://ssrn.com/abstract=598904*, pp. 1 - 30, accessed May 2014.

Bilson, C. M., Brailsford, T. J. and Hooper, V. J., 2001, "Selecting macroeconomic variables as explanatory factors of emerging stock market returns", *Pacific-Basin Finance Journal*, Vol. 9, Iss. 4, Aug., pp. 401 - 426.

Bittlingmayer, G., 1998, “Output, Stock Volatility, and Political Uncertainty in a Natural Experiment: Germany, 1880-1940”, *Journal of Finance,* Vol. 53, Iss. 6, pp. 2243 - 2257.

Blandon, J. G., 2010, "Return's seasonalities in the LATIBEX market", *Revista de Análisis Económico / Economic Analysis Review*, Vol. 25 Iss. 1, Jun., pp. 3 - 14.

Bley, J. and Saad, M., 2010, "Cross-cultural differences in seasonality", *International Review of Financial Analysis*, Vol. 19, Iss. 4, pp. 306 - 312.

Blume, M. and Stambaugh, R., 1983, “Biases in computed returns: An application to the size effect”, *The Journal of Financial Economics,* Vol. 12, Iss. 3, Nov., pp. 387 - 404.

Board, J. L. G. and Sutcliffe, C. M. S., 1988, “The weekend effect in UK stock market returns”,*Journal of Business, Finance and Accounting*, Vol. 15, Iss. 2, Summer, pp. 199 - 213.

Bodla, B.S. and Jindal, K., 2006, "Seasonal anomalies in stock returns: Evidence from India and the US", *Decision*, Vol. 33, No.1, Jan. - Jun., pp. 163 - 178.

Bohl, M. T., Döpke, J. and Pierdzioch, C., 2006, "Real-time forecasting and political stock market anomalies: evidence for the US", *Deutsche Bundesbank, Research Centre,* Discussion Paper Series 1, Economic Studies, No. 22/2006, pp. 1 - 24.

Bolster, P. J., Lindsey, L. B. and Mitrusi, A., 1989, "Tax-induced trading: The effect of the 1986 Tax Reform Act on stock market activity", *The Journal of Finance*, Vol. 44, No. 2, Jun., pp. 327 - 344.

Bonin, J. M. and Moses, E. A., 1974, “Seasonal variations in prices of individual Dow Jones industrial stocks”, Journal of Financial and Quantitative Analysis, Vol. 9, No. 6, Dec., pp. 963 - 991.

Booth, G. G., Kallunki, J-P. and Martikainen, T., 2001, "Liquidity and the turn-of-the-month effect: evidence from Finland", *Journal of International Financial Markets, Institutions and Money*, Vol. 11, Iss. 2, Jun., pp. 137 - 146.

Boudreaux, D., Rao, S. and Fuller, P., 2010, “An investigation of the weekend effect during different market orientations”, *Journal of Economics and Finance,* Vol. 34, No. 3, pp. 257 - 268.

Bouges, J. C., Jain, R. and Puri, Y. R., 2009, "American depository receipts and calendar anomalies", *Applied Financial Economics*, Vol. 19, Iss. 1, pp. 17 - 25.

Boyd, J. H., Hu, J. and Jagannathan, R., 2005, "The stock market’s reaction to unemployment news: Why bad news is usually good for stocks", *The Journal of Finance*, Vol. 60, No. 2, Apr., pp. 649 - 672.

Brahmasrene, T. and Jiranyakul, K., 2007, "Cointegration and causality between stock index and macroeconomic variables in an emerging market", *Academy of Accounting and Financial Studies Journal*, Vol. 11, No. 3, pp. 17 - 30.

Brauer, G. A. and Chang, E. C., 1990, "Return seasonality in stocks and their underlying assets: Tax-loss selling versus information explanations", *Review of Financial Studies*, Vol. 3 Iss.2, pp. 255 - 280.

Brockman, P. and Michayluk, D., 1997, “The holiday anomaly: An investigation of firm size versus share price effects”, *Quarterly Journal of Business and Economics,* Vol. 36, Iss. 3, pp. 23 - 33.

Brown, P., Chappel, N., Da Silva Rosa, R. and Walter, T., 2006, "The reach of the disposition effect: Large sample evidence across investor classes", *International Review of Finance*, Vol. 6, Iss. 1–2, Mar./Jun., pp. 43 - 78.

Brown, P., Keim, D., Kleidon, A. and Marsh, T., 1983, “Stock return seasonality and the tax-loss selling hypothesis: Analysis of arguments and Australian evidence”, *The Journal of Financial Economics,* Vol. 12, Iss. 1, June, pp. 105 - 128.

Brown, L. D. and Luo, L., 2004, "The predictive value of the signs of January returns: Evidence of a new January effect", *http://ssrn.com/abstract=525162 or http://0-dx.doi.org.library.vu.edu.au/10.2139/ssrn.525162*, pp. 1 - 18, accessed Sept. 2014.

Brown, P., Ferguson, A. and Sherry, S., 2010, "Investor behaviour in response to Australia’s capital gains tax", *Accounting & Finance,* Vol. 50, Iss. 4, pp. 783 - 808.

Brusa, J., Liu, P. and Schulman C., 2000, “The weekend effect, `reverse' weekend effect, and firm size”, *Journal of Business Finance & Accounting*, Vol. 27, Iss. 5 & 6, Jun., pp. 555 - 574

Brusa, J., Lee, W. Y. and Liu, P., 2011, “Monday returns and asset pricing”, *Journal of Economics and Finance,* Vol. 35, Iss. 3, pp. 332 – 347.

Bulmash, S. B. and Trivoli, G. W., 1991, "Time–lagged interactions between stocks prices and selected economic variables", *The Journal of Portfolio Management Summer*, Vol. 17, No. 4, pp. 61 - 67.

Bundoo, S. K., 2008, "An analysis of the day of the week effect and the January effect on the stock exchange of Mauritius", *African Journal of Accounting, Economics, Finance and Banking Research*, Vol.2, No. 2, pp. 20 - 37.

Butt, B. Z., Rehman, K. U., Khan, M. A. and Safwan, N., 2010, "Do economic factors influence stock returns? A firm and industry level analysis", *African Journal of Business Management*, Vol. 4, No. 5, May, pp. 583 - 593.

Cagnetti, A., 2002, "Capital Asset Pricing Model and Arbitrage Pricing Theory in the Italian Stock Market: An empirical study", *Edinburgh: Management School and Economics, the University of Edinburgh*, http://www.eva.lib.edu.ac.uk /1042/1821/1/CFMR_021.pdf, pp. 1 - 29, accessed Nov. 2016

Cahan, J., Malone, C. B., Powell, J. G. and Choti, U. W., 2005, "Stock market political cycles in a small, two-party democracy", *Applied Economics Letters*, Vol. 12, Iss. 12, pp. 735 - 740.

Cai, J., Li, Y. and Qi, Y., 2006, "The day-of-the-week effect: New evidence from the Chinese stock market", *Chinese Economy*, Vol. 39, No. 2, Mar. - Apr., pp. 71 - 88.

Camilleri, S. J., 2008, "Month-related seasonality of stock price volatility: Evidence from the Malta stock exchange". *Bank Valletta Review,* 37, Spring, pp. 49 - 65.

Campbell, F., 1997, "*The Implementation of Monetary Policy: Domestic Market Operations*", viewed 6 November 2017, <https://www.rba.gov.au/mkt-operations/resources/implementation-mp.html>.

Cao, X.L., Premachandra, I.M., Bhabra, G.S. and Tang, Y.P., 2009, "Firm size and the pre-holiday effect in New Zealand", *International Research Journal of Finance and Economics*, 32, pp. 171 - 187.

Cao, Z., Harris, R. and Wang, A., 2007, "Seasonality in the returns, volatility and turnover of the Chinese stock markets", *Finance Letters*, Vol. 5, No. 6, pp. 1 - 11.

Carchano, Ó. and Pardo, Á., 2015, "The pan-European holiday effect", *Spanish Journal of Finance and Accounting/Revista Espanola de Financiacion y Contabilidad,* Vol. 44, No. 2, pp. 134 - 145.

Cataldo, A. J. and Savage, A. A., 2000, *The January effect and other seasonal anomalies: A common theoretical framework,* JAI Press, Connecticut.

Chan, H., Faff, R. and Ramsay, A., 2005, “Firm size and the information content of annual earnings announcements: Australian evidence”, *Journal of Business Finance & Accounting*, Vol. 32, pp. 211 - 54.

Chan, L., Hamao, J. and Lakonishok, K., 1991, “Fundamentals and stock returns in Japan”, *Journal of Finance,* Vol. 46, No. 5, Dec., pp. 1739 - 1764.

Chan, M. W. L., Khanthavit, A. and Thomas, H., 1996, "Seasonality and cultural influences on four Asian stock markets", *Asia Pacific Journal of Management*, October, Vol. 13, Iss. 2, pp. 1 - 24.

Chan, H.L. and Woo, K.Y., 2012, “Day-of-the-week effect on the return and conditional variance of the H-shares index in Hong Kong”, *Applied Economics Letters,* Vol. 19, Iss. 3, pp. 243 - 249.

Chang, L. C., Pinegar, M. and Ravinchandran, R., 1993, “International evidence on the robustness of the day-of-the-week effect”, *The Journal of Financial and Quantitative Analysis,* Vol. 28, No. 4, pp. 497 - 513.

Chang, P-C, Fan, C-Y. and Liu, C-H., 2009, “Integrating a Piecewise Linear Representation Method and a Neural Network Model for Stock Trading Points Prediction”, *IEEE Transactions on Systems, Man, and Cybernetics, Part C: Applications and Reviews*, Vol.39, Iss. 1, Jan., pp. 80 - 92.

Chaudhuri, K. & Smiles, S., 2004, "Stock market and aggregate economic activity: evidence from Australia", *Applied Financial Economics*, Vol. 14, Iss. 2, pp. 121 - 129.

Chen, Q., 2012, "Risk and seasonal effects: International evidence", *Economics and Finance Working Paper Series*, Working Paper No. 12-15, Brunel University, London, Department of Economics and Finance, Sept., pp. 1 - 25.

Chen, Q., 2013, "Risk and seasonal effects: International evidence", *Journal of Chinese Economic and Business Studies,* Vol. 11, No. 4, pp. 299 - 311.

Chen, S. S., 2009, "Predicting the bear stock market: Macroeconomic variables as leading indicators", *Journal of Banking & Finance*, Vol. 33, Iss. 2, Feb., pp. 211 - 223.

Chen, C. and Liu, L-M., 1993, "Joint estimation of model parameters and outlier effects in time series", *Journal of the American Statistical Association,* Vol. 88, No. 421, Mar. pp. 284 - 297.

Chen, M. H., Kim, W. G. and Kim, H. J., 2005, "The impact of macroeconomic and non-macroeconomic forces on hotel stock returns", *International Journal of Hospitality Management*, Vol. 24 No. 2, pp. 243 - 258.

Chen, N-F., Roll, R. and Ross, S. A., 1986, "Economic forces and the stock market", *The Journal of Business*, Vol. 59, Iss. 3, pp. 383 - 403.

Chen, H. and Singal, V., 2004, "All things considered, taxes drive the January effect", *Journal of Financial Research*, Vol. 27, No. 3, Fall, pp. 351 - 372.

Chi, J., Tripe, D. and Young, M., 2010, "Do exchange rates affect the stock performance of Australian banks?", *The International Journal of Banking and Finance*, Vol. 7, No. 1, pp. 35 – 50.

Chia, R. C-J. and Liew, V. K-S., 2012, “Month-of-the- year and symmetrical effects in the Nikkei 225”, *IOSR Journal of Business and Management*, Jul. - Aug., Vol. 3, Issue 2, pp. 68 - 72.

Chiang, L. C. and Kee, H. T., 2009, "Macro-economic and non-macroeconomic variables link to Singapore hotel stock returns", *2009 Oxford Business & Economics Conference Program, Oxford University*, Jun., pp. 1 - 12.

Cho, Y-H., Linton, O. and Whang, Y-J., 2007, “Are there Monday effects in stock returns: A stochastic dominance approach” *Journal of Empirical Finance*, Vol. 14, Iss. 5, Dec., pp. 736 - 755.

Chong, R., Hudson, R., Keasey, K. and Littler, K., 2005, "Pre-holiday effects: International evidence on the decline and reversal of a stock market anomaly", *Journal of International Money and Finance*, Vol. 24, Iss. 8, pp. 1226 - 1236.

Chopra, N., Lakonishok, J. and Ritter, J.R., 1992, “Measuring abnormal performance: Do stocks overreact”? *Journal of Financial Economics*, Vol. 31, Iss.2, pp. 235 - 268.

Choudhry, T., 2001, "Month of the year effect and January effect in pre-WWI stock returns: Evidence from a non-linear GARCH model", *International Journal of Finance & Economics*, Vol. 6, Iss. 1, pp. 1 - 11.

Choy, A. Y. F. and O’Hanlon, J., 1989, “Day of the week effects in the UK equity market: A cross Sectional analysis”, *The Journal of Business, Finance & Accounting,* Vol. 16, No. 1, pp. 89 - 104.

Chukwuogor-Ndu, C 2006, ‘Stock Market Returns Analysis, Day-of-the-Week Effect, Volatility of Returns: Evidence from European Financial Markets 1997-2004’, *International Research Journal of Finance and Economics*, vol. 1, pp. 112 - 124.

Cochran, A., 2001, “*Prospect Theory and Overview*”, available at: http://alexcochran.com.au/wp-content/uploads/2008/04/propect-theory-customer-choice.pdf, accessed Aug. 2015.

Coffie, W. and Chukwulobelu, O., 2015, "The application of Capital Asset Pricing Model (CAPM) to individual securities on Ghana Stock Exchange" *Finance and Development in Africa*, Mar., pp. 121 - 147.

Compton, W. A., Johnson, D. T. and Kunkel, R. A., 2006, "The turn-of-the-month effect in real estate investment trusts (REITs)", *Managerial Finance*, Vol. 32, Iss. 12, pp. 969 - 980.

Compton, W., A. Kunkel, R. A. and Kuhlemeyer, G., 2013, "Calendar anomalies in Russian stocks and bonds", *Managerial Finance*, Vol. 39 No. 12, pp.1138 - 1154.

Condoyanni, L., O'Hanlon, J. and Ward, C. W. R., 1987, "Day of the week effects on stock returns: International evidence", *The Journal of Business, Finance, & Accounting*, Vol. 14, Iss. 2, Summer, pp. 159 - 174.

Connolly, R. A., 1989, "An examination of the robustness of the weekend effect", *The Journal of Financial and Quantitative Analysis*, Vol. 24, No. 2, pp. 133 - 169.

Conrad, J. and Kaul. G., 1988, "Time-variation in expected returns", *Journal of Business*, Vol. 61, No. 4, pp. 409 - 425.

Cooper, M. J., McConnell, J. J. and Ovtchinnikov, A. V., 2006, "The other January effect", *Journal of Financial Economics*, Vol. 82, No. 2, November, pp. 315 - 341.

Copeland, M. and Copeland, T., 1998, "Leads, lags, and trading in global markets", *Financial Analysts Journal*, Vol. 54, Iss. 4, Jul. / Aug., pp. 70 - 80.

Corhay, A., Hawawini, G., and Michel, P., 1987, "Seasonality in the risk return relationship: Some international evidence", *The Journal of Finance*, Vol. 42, No. 1, pp. 49 - 68.

Coutts, J. A. and Hayes, P. A., 1999, "The weekend effect, the stock exchange account and the Financial Times Industrial Ordinary Shares Index: 1987-1994", *Applied Financial Economics*, Vol. 9, Iss. 1, pp. 67 - 71.

Coutts, A., Kaplanidis, C. and Roberts, J., 2000, "Security price anomalies in an emerging market: the case of the Athens Stock Exchange", *Applied Financial Economics*, Vol. 10, Iss. 5, pp. 561 - 571.

Coutts, J. A. and Sheikh, M. A., 2000, “The January effect and monthly seasonality in the All Gold Index on the Johannesburg Stock Exchange 1987-1997”, *Applied Economics Letters,* Vol. 9, No. 8, p. 489 - 492.

Cross, F., 1973, “The behaviour of stock prices on Fridays and Mondays”, *Financial Analysts Journal,* Vol. 29. No. 6, Nov - Dec., pp. 67 - 69.

Curtis, G., 2004, “Modern portfolio theory and behavioural finance”, *The Journal of Wealth Management*, Fall, pp. 16 - 22.

Damodaran, A., 1989, “The weekend effect in information releases: A study of earnings and dividend announcements”, *Review of Financial Studies*, Vol. 2, No. 4, pp. 607 - 623.

Damodaran, A. 2003, *Investment Philosophies: Successful Strategies and the Investors Who Made Them Work*, Wiley, Hoboken, NJ.

Darrat, A.F., Li, B., Liu, B. and Su, J.J., 2011, "A fresh look at seasonal anomalies: an international perspective", *International Journal of Business and Economics*, Vol. 10 Issue 2, Aug., pp. 93 - 116.

Darrat, A. F., Li, B. and Chung, R., 2013, “Seasonal anomalies: A closer look at the Johannesburg stock exchange”, *Contemporary Management Research,* Vol. 9, No. 2, Jun., pp. 155 - 168.

Dash, M., Sabharwal, M. and Dutta, A., 2011, "Seasonality and market crashes in Indian stock markets", *Asian Journal of Finance & Accounting*, Vol. 3, No. 1, pp. 174 - 184.

Debasish, S. S., 2012, “An empirical study on month of the year effect in gas, oil and refineries sectors in Indian stock market”, *International Journal of Management and Strategy*, Vol. 3, Iss. 5, pp. 1 - 18.

De Bondt, W. F. M. and Thaler, R., 1985, “Does the stock market overreact”? *The Journal of Finance*, Vol. 40, No. 3, Dec., pp. 793 - 805.

Deloitte Access Economics, 2017, “ASX Australian Investor Study”, pp. 1 - 79.

Demir, E., Lau, C. K. M. and Fung, K. W. T., 2014, " The effect of international soccer games on exchange rates using evidence from Turkey", *Journal of Advanced Studies in Finance*, Vol. 5 Iss. 2, Winter, pp. 145 - 156.

Department of Foreign Affair and Trade n.d., *Trade and investment topics*, viewed 8 November 2017, <http://dfat.gov.au/trade/topics/pages/agriculture.aspx>.

Depenchuk, I. O., Compton, W. S. and Kunkel, R. A., 2010, "Ukrainian financial markets: An examination of calendar anomalies", *Managerial Finance*, Vol. 36, No. 6, pp. 502 - 510.

Desai, H. and Jain, P. C., 1997, “Long-run common stock returns following stock splits and reverse splits”, *The Journal of Business*, Vol. 70 No. 3, Jul., pp. 409 - 433.

Dhrymes, P. J., Friend, I. and Gultekin, N. B., 1984, “A Critical Reexamination of the Empirical Evidence on the Arbitrage Pricing Theory”, *The Journal of Finance*, Vol. 39, No. 2, Jun., pp. 323 - 346.

Dimson, E. and Musavian, M., 2000, “Market efficiency”, *The Current State of Business Disciplines*, Vol. 3, pp. 959 - 970.

D’ Mello, R., Ferris, S. P. and Hwang, C. Y., 2003, "The tax-loss selling hypothesis, market liquidity and price pressure around the turn-of-the-year", *Journal of Financial Markets*, Vol. 6, Iss. 1, Jan., pp. 73 - 98.

Dobbins, R., Witt, S. F., and Fielding, J., 1994, *Portfolio Theory and Management* 2nd Ed, London: Blackwell Publishers.

Dobson, J. and Dufrene, U. B. (1993), “The impacts of U.S. presidential elections on international security-markets”, *Global Finance Journal*, Vol. 4, Iss. 1, Spring, pp. 39 - 47.

Dodd, O. and Gakhovich, A., 2011, "The holiday effect in Central and Eastern European financial markets", *Investment Management and Financial Innovations,* Vol. 8, Iss. 4, pp. 29 - 35.

Dolley, J. C., 1933, " Characteristics and procedure of common stock split-ups", *Harvard Business Review*, Vol. 11 Iss. 3, Apr., pp. 316 - 326.

Draper, P. and Paudyal, K., 1997, “Microstructure and seasonality in the U.K. equity market”, *Journal of Business, Finance & Accounting,* Vol. 24, Issue. 7 - 8, pp. 1177 -1204.

Draper, P. and Paudyal, K., 2002, "Explaining Monday returns", *Journal of Financial Research*, Vol. 25, No. 4, Winter, pp. 507 - 520.

Drew, M. and Noland, J., 2000, “EMH is alive and well”, *JASSA*, No. 4, Summer, pp. 15 - 18.

Drew, M. and Stanford, J., 2003, “Returns from investing in Australian equity superannuation funds, 1991–1999”, *The Service Industries Journal*, Vol 23, Iss. 4, Sept., pp. 12 - 24.

Dumitriu, R., Stefanescu, R. and Nistor, C., 2012, "Holiday effects during quiet and turbulent times", *Scientific Research & Education in the Air Force - AFASES*, Vol. 1, pp. 57 - 62.

Durand, R. B., Limkriangkrai, M. and Smith, G., 2006, "Momentum in Australia—A note", *Australian Journal of Management*, Vol. 31, No. 2, Dec., pp. 355 - 364.

Dyl, E. A., 1977, “Capital gains taxation and year-end stock market behavior”, *The Journal of Finance,* Vol. 32, No. 1, Mar., pp. 165 - 175.

Dyl, E. A and Maberlyl, E. D., 1988, “A possible explanation of the weekend effect”, *Financial Analyst Journal,* Vol. 44, No. 3, pp. 83 - 84.

Eakins, S. and Sewell, S., 1993, “Tax-loss selling, institutional investors and the January effect: A note”, *Journal of Financial Research*, winter, Vol. 16, Iss. 4, pp. 377 - 384.

Easterday, K. E. 2015, "The January effect anomaly: effect on the returns-earnings association" *American Journal of Business*, Vol. 30, Iss. 2, pp. 114 - 146.

Edmans, A., Garcia, D. and Norli, Ø., 2007, "Sports sentiment and stock returns", *The Journal of Finance*, Vol. 62, No. 4, Aug., pp.1967 - 1998.

Ehrmann, M. and Jansen, D. J., 2012, "The pitch rather than the pit: investor inattention during FIFA World Cup matches", *Working Paper Series from European Central Bank*, *No 1424*, Feb., pp. 1 - 35.

Ejara, D. D., Nag, R. and Upadhyaya, K. P., 2012, "Opinion polls and the stock market: evidence from the 2008 US presidential election”, *Applied Financial Economics*, Vol. 22, Iss. 6, pp. 437 - 443.

Elango, R. and Pandey, D., 2008, “An empirical study on January anomaly and return predictability in an emerging market: Evidence from India”, http://papers.ssrn.com/sol3/papers.cfm?abstract id=1150080, *Working Paper Series*, pp. 1 - 19, accessed Sept., 2010.

Elbannan, M. A., 2015, “The capital asset pricing model: An overview of the theory”, *International Journal of Economics and Finance*, Vol. 7, No. 1, pp. 219 - 228.

Elfakhani, S. and Zaher, T., 1998, “Differential information hypothesis, firm neglect and the small firm effect”, *Journal of Financial and Strategic Decisions*, Vol. 11, No. 2, Fall, pp. 29 - 40.

Eyuboglu, K., Eyuboglu, S. and Yamak, R.,2016, “Predicting intra-day and day of the week anomalies in Turkish stock market”, *The Romanian Economic Journal*, No. 59, Mar., pp. 73 - 93.

Faff, R. W., 1988, “An empirical test of the Arbitrage Pricing Theory on Australian stock returns 1974-85”, *Accounting and Finance*, Vol. 28, Iss. 2, Nov., pp. 23 - 43.

Fama, E. F., 1965. "The behaviour of stock-market prices", *The Journal of Business*, Vol. 38, No. 1, Jan., pp. 34 - 105.

Fama, E. F., 1965, “Random walks in stock market prices”, *Financial Analyst Journal*, Vol. 21, No. 5, Sept. - Oct., pp. 55 - 59.

Fama, E. F., 1970, “Efficient capital markets: A review of theory and empirical work”, *The Journal of Finance*, Vol. 29, No. 2, pp. 383 - 417.

Fama, E. F., 1981, "Stock returns, real activity, inflation, and money", *The American Economic Review*, Vol. 71, No. 4, Sept, pp. 545 - 565.

Fama, E. F., 1998, “Market efficiency, long-term returns and behavioural finance”, *Journal of Financial Economics*, Vol. 49, Iss. 3, Sept., pp. 283 - 306.

Fama, E. F., Fisher, L., Jensen, M. C. and Roll, R., 1969, "The adjustment of stock prices to new information", *International Economic Review*, Vol. 10, No. 1, Feb., pp. 1 - 21.

Fama, E. F. and French, K. R., 1988, “Dividend yields and expected stock returns”, *Journal of Financial Economics*, Vol. 22, Iss. 1, pp. 3 - 25.

Fama, E. F. and French, K. R., 1992, “The cross-section of expected stock returns”, *The Journal of Finance*, Vol. 47, Iss.2, Jun., pp. 427 - 465.

Fama, E. F. and French, K. R., 2004, The Capital Asset Pricing Model: theory and evidence”, *Journal of Economic Perspectives*, Vol. 18, No. 3, Summer, pp. 25 - 46.

Fama, E. F. and MacBeth, J. D., 1973, “Risk, return, and equilibrium: Empirical tests”, *The Journal of Political Economy*, Vol. 81, No. 3, May - Jun., pp. 607 – 636.

Fama E. F. and Schwert, W. G., 1977, “Asset returns and inflation”, *Journal of Financial Economics*, Vol. 5, Iss. 2, Nov., pp. 115 - 146.

Ferson, W. and Korajczyk, R., 1995, “Do arbitrage pricing models explain the predictability of stock returns?”, The Journal of Business, Vol. 68, Iss. 3, pp. 309 - 349.

Fields, M. J., 1931, “Stock prices: A problem in verification”, *The Journal of Business of the University of Chicago*, Vol. 4, No. 4, pp. 415 - 418.

Finnerty, J. E., 1976, “Insiders and market efficiency”, *The Journal of Finance*, Vol. 31, Iss. 4, Sept., pp. 1141 - 1148.

Fishe, R. P. H., Gosnell, T. F., and Lasser, D. J., 1993, “Good news, bad news, volume and the Monday effect”, *Journal of Business, Finance & Accounting*, Vol. 20, Iss. 6, Nov., pp. 881 - 892.

Flannery, M. J. and Protopapadakis, A. A., 2002, "Macroeconomic factors do influence aggregate stock returns", *Review of Financial Studies*, Vol. 15, Iss. 3, Summer, pp. 751 - 782.

Floros, C., 2008, "The monthly and trading month effects in Greek stock market returns: 1996-2002", *Managerial Finance*, Vol. 34, No. 7, pp. 453 - 464.

Floros, C., 2010,"The impact of the Athens Olympic Games on the Athens Stock Exchange", *Journal of Economic Studies*, Vol. 37 Iss. 6 pp. 647 - 657.

Foerster, S. R., (1993), "Stock market performance and elections: Made-in-Canada effects?" *Papers in Political Economy*, 37, Political Economy Research Group, University of Western Ontario, pp. 2 - 14.

Forson, J. and Janrattanagu, J., 2013, "Selected macroeconomic variables and stock market movements: Empirical evidence from Thailand", *Contemporary Economics*, Vol. 8, Iss. 2, Jun., pp. 154 - 174.

Foster, F, D. and Viswanathan, S., 1990, “A theory of the interday variations in volume, variance and trading costs in securities”, *The Review of Financial Studies*, Vol. 3, No. 4, pp. 593 - 624.

Fountas, S. and Segredakis, K.N., 2002, "Emerging stock markets return seasonalities: the January effect and the tax-loss selling hypothesis", *Applied Financial Economics*, Vol. 12, No. 4, Apr., pp. 291 - 299.

Franses, P. H., 1998, *Time series models for business and economic forecasting*, Cambridge, UK: Cambridge University Press.

French, K., 1980, “Stock Returns and the Weekend Effect,” *Journal of Financial Economics*, Vol. 8, Iss. 1, Mar. pp. 55 - 69.

Frost, J., 2013, *How to Interpret Regression Analysis Results: P-values and Coefficients*, http://blog.minitab.com/blog/adventures-in-statistics-2/how-to-interpret-regression-analysis-results-p-values-and-coefficients, accessed Oct. 2017.

Frost, J., 2013, *Multiple regression analysis: Use adjusted R-squared and Predicted R-squared to include the correct number of variables*, http://blog.minitab.com/blog/adventures-in-statistics-2/multiple-regession-analysis-use-adjusted-r-squared-and-predicted-r-squared-to-include-the-correct-number-of-variables, accessed Oct. 2017.

Frost, J., 2013, *Regression analysis: How do I Interpret R-squared and assess the Goodness-of-Fit?* http://blog.minitab.com/blog/adventures-in-statistics-2/regression-analysis-how- do-i-interpret-r-squared-and-assess-the-goodness-of-fit, accessed Oct. 2017, Frost, J., 2015, *What is the F-test of overall significance in regression analysis?*, http://blog.minitab.com/blog/adventures-in-statistics-2/what-is- the-f-test-of-overall-significance-in-regression-analysis, accessed Oct. 2017.

Frost, J., 2016, *Understanding t-Tests: t-values and t-distributions*, http://blog.minitab.com/blog/adventures-in-statistics-2/understanding-t-tests-t-values-and-t-distributions, accessed Oct. 2017,

Gama, P. M. and Vieira, E. F., 2013, "Another look at the holiday effect", *Applied Financial Economics*, Vol. 23, Iss. 20, pp. 1623 - 1633.

Gamble Jr., R. C., 1993, "The January effect and intergenerational transfers", *The Quarterly Review of Economics and Finance*, Vol. 33, Iss. 3, Autumn, pp. 295 - 304.

Gan, C., Lee, M., Yong, H. H. A. and Zhang, J., 2006, "Macroeconomic variables and stock market interactions: New Zealand evidence", *Investment Management and Financial Innovations*, Vol. 3, Iss 4, pp. 89 - 101.

Gao, L. and Kling, G., 2005, "Calendar effects in Chinese stock market", *Annals of Economics and Finance*, Vol. 6, No. 1, pp. 75 - 88.

Gaunt, C., Gray, P. and McIvor, J., 2000, "The impact of share price on seasonality and size anomalies in Australian equity returns. *Accounting & Finance*, Vol. 40, Iss. 1, Mar., pp. 33 - 50.

Gay Jr, R. D., 2008, "Effect of macroeconomic variables on stock market returns for four emerging economies: Brazil, Russia, India, and China", *International Business & Economics Research Journal*, Vol. 7, No. 3, Mar., pp. 1 - 8.

Georgantopoulos, A. G., Kenourgios, D. F. and Tsamis, A. D., 2011, "Calendar anomalies in emerging Balkan equity markets", *International Economics & Finance Journal*, Vol. 6, No. 1, Jan. - Jun., pp. 67 - 82.

Gerlach, J. R., 2007, "Macroeconomic news and stock market calendar and weather anomalies", *The Journal of Financial Research*, Vol. 30, No. 2, Summer, pp. 283 - 300.

Gharghori, P., Lee, R. and Veeraraghavan, M., 2009, "Anomalies and stock returns: Australian evidence", *Accounting and Finance*, Vol. 49, Iss. 3, Sept., pp. 555 - 576.

Gibbons, M. and Hess, P., 1981, "Day-of-the-week effects and asset returns", *Journal of Business,* Vol. 54, No. 4, Oct., pp. 579 - 596.

Gibson, S., Safieddine, A. and Titman, S., 2000, "Tax-motivated trading and price pressure: An analysis of mutual fund holdings", *Journal of Financial and Quantitative Analysis*, Vol. 35, Iss. 03, pp. 369 - 386.

Giovanis, E., 2009, "The month-of-the-year effect: Evidence from GARCH models in fifty-five stock markets", University of London, Royal Holloway College - Department of Economics, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1595706, accessed Feb., 2013.

Givoly, D. and Ovadia, A., 1983, "Year-end tax-induced sales and stock market seasonality", *The Journal of Finance American Economic Review*, Vol. 38, Iss. 1, March, pp. 171 - 185.

Gjerde, O. and Saettem, F., 1999, "Causal relations among stock returns and macroeconomic variables in a small, open economy", *Journal of International Financial Markets, Institutions and Money,* Vol. 9, Iss. 1, pp. 61 - 74.

Górska, A. and Krawiec, M., 2015, "Calendar effects in the market of crude oil", *Scientific Journal Warsaw University of Life Sciences – SGGW Problems of World Agriculture*, Vol. 15 (30), No. 4, pp. 62 - 70.

Gray, P. and Tutticci, I., 2007, "Australian stock market anomalies: A review and re-examination of the January and small firm effects", *Journal of Investment Strategy*, Vol. 2, Iss. 2, pp. 27 - 36.

Gregoriou, A., Kontonikas, A. and Tsitsianis, N., 2004, "Does the day of the week effect exist once transaction costs have been accounted for? Evidence from the UK", *Applied Financial Economics*, Vol. 14, Iss. 3, pp. 215 - 220.

Grinblatt, M. and Keloharju, M., 2004, "Tax-loss trading and wash sales", *Journal of Financial Economics*, Vol. 71, Iss. 1, Jan., pp. 51 - 76.

Groenewold, N., 1997, “Share market efficiency: tests using daily data for Australia and New Zealand”, *Applied Financial Economics,* Vol. 7, Iss. 6, pp. 645 - 657.

Grossman, S. J. and Stiglitz, J. E., 1980, "On the impossibility of informationally efficient markets", *The American Economic Review,* Vol. 70, No. 3, Jun., pp. 393 - 408.

Gu, A. Y., 2004, “The reversing weekend effect: Evidence from the U.S. equity markets”, *Review of Quantitative Finance and Accounting,* Vol. 22, Iss. 1, pp. 5 - 14.

Gu, A.Y., 2006, “The declining January effect: Experience of Five G7 Countries”, *Academy of Accounting and Financial Studies Journal*, Vol. 10, No. 1, pp. 41 - 48.

Guerard Jr, J. B., 2010, *Handbook of Portfolio Construction: contemporary applications of Markowitz techniques,* Springer Science+Business Media, New York; London.

Gulseven, O., 2014, “Multidimensional analysis of monthly stock market returns”, *Annals of the Alexandru Ioan Cuza University-Economics*, 61(2), pp.181 - 196.

Gultekin, M.N. and Gultekin, N.B., 1983, "Stock market seasonality: International evidence", *Journal of Financial Economics,* Vol. 12, Iss. 4, Dec., pp. 469 - 481.

Gultekin, M. N. and Gultekin, N. B., 1987, "Stock return anomalies and tests of the APT", *The Journal of Finance*, Vol. 42, No. 5, Dec., pp. 1213 - 1224.

Gurrola, P. and Herrerias, R., 2007, "Anomalies in the Mexican interest rate futures market", available at SSRN: http://ssrn.com/abstract=954602 or http://0-dx.doi.org.library.vu.edu.au/10.2139/ssrn.954602, Mar., pp. 1 - 24, accessed Oct. 2015.

Hafeez, B., Hassan, T.R., Habib, A. and Sabir, N., 2014, "Stock market anomalies across various stock market indices of Pakistan", *International SAMANM Journal of Finance and Accounting*, Vol. 2, No. 2, Apr., pp. 192 - 208.

Hamon, J. and Jacquillat, B., 1999, "Is there value - added information in liquidity and risk premiums?" *European Financial Management*, Vol. 5, No. 3, pp. 369 - 393.

Hamrita, M., and Trifi, A., 2011, "The relationship between interest rate, exchange rate and stock price: A wavelet analysis", *International Journal of Economics and Financial Issues*, Vol. 1, Iss. 4, Oct., pp. 220 - 228.

Haroon, M. A. and Jabeen, H., 2013, "Impact of Macroeconomic Variables on Share Price Behaviour of Karachi Stock Exchange", *Pakistan Journal of Commerce and Social Sciences*, Vol. 7, No. 3, pp. 493 - 504.

Harris, L., 1986, "A transaction study of weekly and intradaily patterns in stock returns", *The Journal of Financial Economics*, Vol. 16, No. 1, pp. 99 - 117.

Harris, L. and Gurel, E., 1986, "Price and volume effects associated with changes in the S&P 500 List: New evidence for the existence of price pressures", *The Journal of Finance*, Vol. 41, Iss. 4, Sept., pp. 815 - 829.

Hasan, T. and Raj, M., 2001, "An examination of the tax loss selling behavior in a de-regulated pacific financial market", *American Business Review*, June, Vol. 19, Iss. 2, pp. 100 - 105.

Hashmi, M. A., 2014, "January effect in Pakistan: A time series analysis", *Market Forces: College of Management Sciences*, Vol. 9, No. 1, Jun., pp. 37 - 44.

Haug, M. and Hirschey, M., 2006, "The January effect", *Financial Analysts Journal,* Vol. 62, No. 5, Sept. - Oct., pp. 78 - 88.

Haugen, R. A. and Jorion, P., 1996, “The January effect: Still there after all these years”, *Financial Analysts Journal*, Vol. 52, No. 1, Jan. - Feb., pp. 27 - 31.

Haugen, R. A. and Lakonishok, J., 1988, *The Incredible January Effect: The Stock Market’s Unsolved Mystery*, New York: Dow Jones-Irwin.

He, L. T. and He, S. C., 2011, "Has the November effect replaced the January effect in stock markets?, *Managerial and Decision Economics*, Vol. 32, Iss. 7, Oct., pp. 481 - 486.

Heaton, C., Milunovich, G. and Passe-De Silva, A., 2011, “International commodity prices and the Australian stock market”, *Economic Record*, Vol. 87, No. 276, Mar., pp. 37 - 44.

Henderson, Y. K., 1990, "Capital gains tax rates and stock market volume", *National Tax Journal*, Vol. 43, No. 4, Dec., pp. 411 - 425.

Henker, J. and Paul, D.J., 2012, "Retail investors exonerated: The case of the January effect", *Accounting & Finance*, Vol. 52, Iss. 4, Dec., pp.1083 - 1099.

Hensel, C. R, and Ziemba, W. T., 1996, “Investment results from exploiting turn-of-the-month effects”, *The Journal of Portfolio Management*, Vol. 22, Iss. 3, Spring, pp. 17 - 23.

Hepsen, A., 2012, "Calendar anomalies and Turkish real estate investment trusts (REITs)", *International Journal of Economics and Finance*, Vol. 4, No. 3, Mar., pp. 230 - 236.

Hersh, S. and Statman M., 1985, "The disposition to sell winners too early and ride losers too long: theory and evidence", *The Journal of Finance*, Vol. 40, Iss. 3, Jul., pp 777 - 790.

Hillier, D. and Marshall, A., 2002, "Insider trading, tax-loss selling, and the turn-of-the-year effect", *International Review of Financial Analysis*, Vol. 11, Iss. 1, pp. 73 - 84.

Ho, Y. K., 1990, "Stock return seasonality in Asia Pacific markets", Journal of International Financial Management and Accounting, Vol. 2, Iss. 1, Mar., pp. 47 - 77.

Hoffmann, A. O. I. and Post, T., 2014, "Self-Attribution bias in consumer financial decision-making: How investment returns affect individuals' belief in skill", *Journal of Behavioural and Experimental Economics*, 52, May, pp. 23 - 28. Available at SSRN: http://ssrn.com/abstract=2367230.

Hooker, M. A., http://0-www.sciencedirect.com.library.vu.edu.au/science/article/pii/S1566014104000494 - cor12004, "Macroeconomic factors and emerging market equity returns: a Bayesian model selection approach", *Emerging Markets Review*, Vol. 5, Iss. 4, Dec. pp. 379 - 387.

http://www.anz.com/documents/FXOnline/capmktspublished.pdf, retrieved March 2016.

https://australiancentre.com.au/wp-content/uploads/2016/04/ACFS-Financial-Integration-website-version.pdf, *"Financial Integration in the Asia-Pacific: Fact and fiction"*, sourced August 2015.

http://australiangovernmentbonds.gov.au/etbs/treasury-bonds/, retrieved 27 June 2017.

https://www.banksa.com.au/corporate-business/institutional-financial-markets/treasury-investments/bbfaq., retrieved March 2016.

https://dfat.gov.au/about-us/publications/Documents/fifty-years-of-Australias-trade.pdf, *"Fifty years of Australia's trade"*, retrieved August 2015.

http://dfat.gov.au/about-us/publications/Documents/australias-trade-since-federation.pdf, *"Australia’s trade since Federation"*, retrieved August 2015.

http://dfat.gov.au/trade/resources/trade-at-a-glance/pages/default.aspx, *"Australia's Top 10 Two-way Trading Partners"*, retrieved August 2015.

http://www.rba.gov.au/mkt-operations/resources/cash-rate-methodology/, retrieved June 2017.

Hui, T. K., 2005, "Day-of-the-week effects in US and Asia–Pacific stock markets during the Asian financial crisis: a non-parametric approach", *Omega*, Vol. 33, Iss. 3, pp. 277 - 282.

Humpe, A. and Macmillan, P., 2009, "Can macroeconomic variables explain long-term stock market movements? A comparison of the US and Japan", *Applied Financial Economics*, Vol. 19, Iss. 2, pp. 111 - 119.

Hutcheson, G. D. 2011, 'Ordinary Least-Squares Regression', in L. Moutinho and G.D. Hutcheson (ed.), *The SAGE Dictionary of Quantitative Management Research,* SAGE Publications Inc., pp. 224 - 228.

Hussain, F., Hamid, K., Akash, R.S.I. and Khan, M.I., 2011, “Day of the week effect and stock returns: (Evidence from Karachi stock exchange-Pakistan)”, *Far East Journal of Psychology and Business*, Vol. 3, No. 1, Apr., pp. 25 - 31.

Ibbotson, R. G., 1975, “Price performance of common stock new issues”, *Journal of Financial Economics*, Vol. 2, Iss. 3, Sept., pp. 235 - 272.

Ibbotson, R. G., Sindelar, J.L. and Ritter, J. R., 1988, “Initial public offerings”, *Journal of Applied Corporate Finance*, Vol. 1, Iss. 2, Summer, pp. 37 - 45.

Ihsan, H., Ahmad, E., Haq, M. I. U. and Sadia, H., 2007, "Relationship of economic and financial variables with behaviour of stock returns", *Journal of Economic Cooperation*, Vol. 28, Iss. 2, pp. 1 - 24.

Ikenberry, D. L, Rankine, G, and Stice, E. K., 1996, "What do stock splits really signal"? *The Journal of Financial and Quantitative Analysis*, Vol. 31, No. 3, Sept., pp.357-375.

Ilkucan, A. and Onder, Z., 2004, "How does an emerging stock market respond immediately to political and economic news?" http://0-papers.ssrn.com.library.vu.edu.au/sol3/papers.cfm?abstract_id=676851, pp. 1 - 27, accessed Nov. 2015.

Imhof, M. J. and Brusa, J., 2008, "The other January effect: International evidence", *International Journal of Business Research*, Vol. 8, No. 5, pp. 48 - 52.

Islam, Sardar M. N. and Oh, K. B., 2007, *Applied financial econometrics in e-commerce*, Elsevier Amsterdam ; Boston.

Jacobsen, B. and Zhang, C. Y., 2013, "Are Monthly Seasonals Real? A Three Century Perspective", *Review of Finance*, Vol. 17, Iss. 5, Sept., pp. 1743 - 1785.https://academic.oup.com/rof/issue/17/5

Jaffe, J. and Mandelkar, G., 1976, "The Fisher effect for risky assets: An empirical investigation", *The Journal of Finance*, Vol. 31, No. 2, May., pp. 447 - 456.

Jaffe, J. and Westerfield, R., 1985, "The week end effect in common stock returns: The international evidence", *The Journal of Finance*, Vol. 40, No. 2, Jun., pp. 433 - 454.

Jaffe, J., Westerfield, R., and Ma, C., 1989, "A Twist on the Monday Effect: Evidence from the U.S. and Foreign Markets", *Journal of Banking & Finance*, Vol. 13, Iss. 4 - 5, Sept., pp. 641 - 650.

Jahfer, A., 2015, “Calendar effects of the Colombo stock market”, *Journal of Management*, Vol. 12, No. 2, Oct., pp. 121 - 132.

Jalonen, E., Vähämaa, S. and Äijö, J., 2010, "Turn-of-the-month and intramonth effects in government bond markets: Is there a role for macroeconomic news?", *Research in International Business and Finance,* Vol. 24, Iss. 1, pp. 75 - 81.

Jamaludin, N., Ismail, S. and Ab Manaf, S., 2017, “Macroeconomic variables and stock market returns: Panel analysis from selected ASEAN countries”, *International Journal of Economics and Financial Issues,* Vol. 7, No. 1, pp. 37 - 45.

Jegadeesh, N., 1991, “Seasonality in stock price mean reversion: Evidence from the U.S. and the U.K”, *The Journal of Finance,* Vol. 46, No. 4, pp. 1427 - 1444.

Jegadeesh, N. and Titman, S. 1993, “Returns to buying winners and selling losers: Implications for stock market efficiency”, *The Journal of Finance*, Vol. 48, Iss. 1, Mar., pp. 65 - 91.

Jimenez, K., 2010, “A fair share of the spoils: alternative stock exchanges”, [ONLINE] Available at: http://www.theaustralian.com.au/business/wealth/a-fair-share-of-the-spoils-alternative-stock-exchanges/story-e6frgac6-1225887271911. accessed Nov. 2014.

Johnston, K. and Cox, D. R., 1996, “The influence of tax-loss selling by individual investors in explaining the January effect”, *Quarterly Journal of Business and Economics,* Vol. 35, No. 2, Spring, pp. 14 - 20.

Johnston, K. and Paul, C., 2005, "Further evidence of the November effect", *Journal of Economics and Finance,* Vol. 29, No. 2, Summer, pp. 280 - 288.

Jones, E., 2008, “International weekend-effect: 1998–2007”, Journal of International Business & Economics, Vol. 8, No. 3, pp. 55 - 69.

Jones, S. L., Lee, W. and Apenbrink, R., 1991, "New evidence on the January effect before personal income taxes", *The Journal of Finance*, vol. 46, no. 5, Dec., pp. 1909 - 1924.

Jones, S. T. and Banning, K., 2009, "US elections and monthly stock market returns", *Journal of Economics and Finance*, Vol. 33, Iss. 3, pp. 273 - 287.

Jones, C. P., Pearce, D. K. and Wilson, J. W., 1987, "Can tax-loss selling explain the January effect? A note", *The Journal of Finance*, Vol. 42, No. 2, Jun., pp. 453 - 461.

Junkus, J. C., 1986, "Weekend and day of the week effects in returns on stock index futures", *The Journal of the Futures Markets*, Vol. 6, Iss. 3, Fall, pp. 397 - 407.

Kabiru, J. N., Ochieng, D. E. and Kinyua, H, W., 2015, "The effect of general elections on stock returns at the Nairobi securities exchange", *European Scientific Journal*, Vol. 11, No. 28, Oct., pp. 435 - 460.

Kahneman, D. and Frederick, S., 2002, "Representativeness revisited: Attribute substitution in intuitive judgment" in T. Gilovich, D. Griffin, & D. Kahneman (eds.), *Heuristics of intuitive judgment: Extensions and applications*, pp. 49 - 81, New York: Cambridge University Press.

Kahneman, D. and Tversky, A., 1972, "Subjective probability: A judgment of representativeness", *Cognitive Psychology*, Vol. 3, Iss. 2, Jul., pp. 430 - 454.

Kahneman, D. and Tversky, A., 1979, "Prospect theory: An analysis of decision under risk",. *Econometrica: Journal of the Econometric Society*, Vol. 47, No. 2, Mar., pp. 263 - 292.

Kamara, A., 1997, "New evidence on the Monday seasonal in stock returns", *The Journal of Business*, Vol. 70, No. 1, pp. 63 - 84.

Kandir, S. Y., 2008, "Macroeconomic variables, firm characteristics and stock returns: Evidence from Turkey", *International Research Journal of Finance and Economics*, Iss. 16, No. 1, Jun., pp. 35 - 45.

Kaplanski, G. and Levy, H., 2010, "Exploitable predictable irrationality: The FIFA World Cup effect on the U.S. stock market", *Journal of Financial and Quantitative Analysis*, Vol. 45, No. 2, Apr. pp. 535 - 553.

Kasa, K., 1992, "Common stochastic trends in international stock markets", *Journal of Monetary Economics*, Vol. 29, Iss. 1, Feb., pp. 95 - 124.

Karadzic, V. and Vulic, T.B., 2011 "The Montenegrin capital market: calendar anomalies", *Economic Annals*, Vol. 56, No. 191, Oct. - Dec., pp. 107 - 121.

Kato, K. and Schallheim, J., 1985, "Seasonal and size anomalies in the Japanese stock market", *Journal of Financial and Quantitative Analysis*, Vol. 20, Iss. 2, pp. 243 -260.

Ke, M-C, Chou, J-H, Hsieh, C-S, Chi, T-L, Chen, C-T. and Tung, L. L., 2014, "Testing the monthly anomaly with stochastic dominance", Managerial *Finance*, Vol. 40, Iss. 2, pp. 137 - 156.

Keim, D. B., 1983, "Size related anomalies and stock market seasonality: Further empirical evidence", *The Journal of Financial Economics*, Vol. 12, Iss. 1, Jun., pp. 13 - 32.

Keim, D.B., 1989, "Trading patterns, bid-ask spreads, and estimated security returns: The case of common stocks at calendar turning points", *Journal of Financial Economics*, Vol. 25, Iss. 1, Nov., pp. 75 - 97.

Keim, D. B. and Stambaugh, R. F., 1984, "A further investigation of the weekend effect in stock returns", *The Journal of Finance*, Vol. 39, Iss. 3, pp. 819 - 840.

Kenourgios, D. and Samitas, A., 2008, "The day of the week effect patterns on stock market return and volatility: Evidence for the Athens Stock Exchange", *International Research Journal of Finance and Economics*, Iss. 15, pp. 78 - 89.

Keong, L.B., Yat, D.N.C. and Ling, C.H., 2010, "Month-of-the-year effects in Asian countries: A 20-year study (1990-2009)", *African Journal of Business Management*, Vol. 4, No. 7, Jul., pp. 1351 - 1362.

Kettell, B., 2001, *Financial economics: making sense of information in financial markets*, Financial Times/Prentice Hall London.

Khalid, M., Altaf, M., Bagram, M. M. M. and Hussain, H., 2012, "Long-run relationship between macroeconomic variables and stock return: Evidence from Karachi Stock Exchange (KSE)", *The Journal of Commerce*, Vol. 4, No. 3, Jul., pp. 45 - 59.

Khaled, M. S. and Keef, S. P., 2012, "A note on the turn of the month and year effects in international stock returns", *The European Journal of Finance*, Vol. 18, Iss. 6, Jul., pp. 597 - 602.

Khan, M., (2008), “Are accruals mispriced? Evidence from tests of an Intertemporal Capital Asset Pricing Model”, Journal of Accounting and Economics, Vol. 45, Iss. 1, Mar. pp. 55 – 77.

Kim, H. Y. and Mei, J., 1994, “Political risk and the stock market: the case of Hong Kong”, *Working Paper Series FD – 94 - 39*, New York University, Stern School of Business, Finance Department, pp. 1 - 62.

Kim, S-J. and Kow, L., 2004, “The role of public information in Japan: Effects of scheduled macroeconomic announcements on the foreign exchange, debt, and stock markets”., pp. 1 - 36, http://ssrn.com/abstract=708987, accessed Dec. 2015.

Kim, S-J. and Kow, L., 2005, “The Role of Public Information in Japan: Effects of Scheduled Macroeconomic Announcements on the Foreign Exchange, Debt, and Stock Markets”, *SSRN: https://ssrn.com/abstract=708987* or *http://dx.doi.org/10.2139/ssrn.708987*, accessed Oct. 2016.

King, M. A. and Wadhwani, S., 1990, "Transmission of volatility between stock markets", *The Review of Financial Studies*, Vol. 3, No. 1, pp. 5 - 33.

Klein, C., Zwergel, B. and Heiden, S., 2009, "On the existence of sports sentiment: The relation between football match results and stock index returns in Europe", *Review of Managerial Science*, Vol. 3, Iss. 3, Nov., pp. 191 - 208.

Ko, K., 1998, “Strategic international diversification and monthly seasonality”, *Journal of Business, Finance & Accounting*, Vol. 25, Nos. 1 & 2, pp. 203 - 223.

Koogler, P. R. and Maberly, E. D., 1994, “Additional evidence of year-end tax- motivated trading by individual investors, 1962-1986”, *Journal of the American Taxation Association*, Spring, Vol. 16, Iss. 1, pp. 122 - 137.

Kortian, T. and O' Regan, J., 1996, "Australian financial market volatility: an exploration of cross-country and cross-market linkages", *Reserve Bank of Australia Research Discussion Paper 9609*, Sydney, pp. 1 - 59.

Koutianoudis, T. and Wang, S., 2002, “Is the January effect economically exploitable? - Evidence from Athens Stock Exchange”, http://papers.ssrn.com/sol3/papers.cfm?abstract id=329380, *Working Paper Series*, pp. 1 - 30, accessed Aug. 2010.

http://www.jstor.org/action/showPublication?journalCode=jaccorese

Krawiec, M. and Górska, A., 2014, “Analysis of calendar effects in markets of precious metals”, *Metody Ilościowe w Badaniach Ekonomicznych*, Vol. 15, No. 2, pp. 392 - 402.

Kross, W. and Schroeder, D. A., 1984, "An empirical investigation of the effect of quarterly earnings announcement timing on stock returns", *Journal of Accounting Research*, Vol. 22, No. 1, Spring, pp. 153 - 176.

Kumar, H and Jawa, R, 2017, “Efficient market hypothesis and calendar effects: Empirical evidences from the Indian stock markets”, *Business Analyst*, Vol. 37, Iss. 2, pp. 145 - 160.

Kuria, A. M., 2013, “Stock market anomalies: A study of seasonal effects on average returns of Nairobi Securities Exchange”, *Research Journal of Finance and Accounting*, Vol. 4, No. 7, pp. 207 - 215.

Kunkel, R.A., Compton, W.S. and Beyer, S., 2003, "The turn-of-the-month effect still lives: The international evidence", *International Review of Financial Analysis*, Vol. 12, Iss. 2, pp. 207 - 221.

Kwon, C. S. and Shin, T. S., 1999, "Cointegration and causality between macroeconomic variables and stock market returns", *Global Finance Journal*, Vol. 10, Iss. 1, Spring - Summer pp. 71 - 81.

Lai, D., Bai, A., Chang, K.C., Wei, H. and Luo, L., 2012, “Nonparametric analysis of the Shenzhen Stock Market: The day of the week effect”, *Mathematical and Computer Modelling*, Vol. 55, No. 3, pp. 1186 - 1192.

Lakonishok, J. and Lee, I., 2001, “Are insider trades informative”? *Review of Financial Studies*, Vol. 14, No.1, Mar., pp. 79 - 111.

Lakonishok, J. and Maberly, E., 1990, “The Weekend Effect: Trading Patterns of Individual and Institutional Investors”, *Journal of Finance*, Vol. 45, No. 1, pp. 231 - 243.

Lakonishok, J. and Smidt, S., 1986, "Volume for Winners and Losers: Taxation and Other Motives for Stock Trading", *The Journal of Finance*, Vol. 41, No. 4, Sept., pp. 951 - 974.

Lakonshok, J. and Smidt, S., 1988, “Are seasonal anomalies real? A ninety-year perspective”, *Review of Financial Studies*, Vol. 1, Iss. 4, Winter, pp. 403 - 425.

Lakonishok, J., Shleifer, A., Thaler, R. and Vishny, R., 1991, "Window dressing by pension fund managers", *The American Economic Review*, Vol. 81, Iss. 2, pp. 227 - 231.

Larson, S. J. & Madura, J., 2003, "What Drives Stock Price Behaviour Following Extreme One-Day Returns", *Journal of Financial Research*, Vol. 26, Iss. 1, pp. 113 - 127.

Lee, I., 1992, "Stock market seasonality: Some evidence from the Pacific-Basin countries", *Journal of Business Finance & Accounting*, Vol. 19, Iss. 2, Jan., pp. 199 - 210.

Lee, P. J., Taylor, S. L. and Walter, T. S., 1996, "Australian IPO pricing in the short and long run", Journal of Banking & Finance, Vol. 20, Iss. 7, Aug., pp. 1189 - 1210.

Levent, A., Aslihan, A. and Kursat, A., 2000, "A cross - section of expected returns on the Istanbul stock exchange", *Russian and East European Finance and Trade*, Vol. 36, Iss. 5, pp. 6 - 26.

Levis, M., 1989, "Stock market anomalies: A re-assessment based on UK evidence", *Journal of Banking and Finance*, Vol. 13, Iss. 4-5, Sept., pp. 675 - 696.

Lewellen, J. and Nagel, S., 2006, "The conditional CAPM does not explain asset-pricing anomalies", *Journal of Financial Economics*, Vol. 82, Iss. 2, Nov., pp. 289 - 314.

Li, B. and Li, J., 2012, "Empirical portfolio analysis: M-V vs CAPM", *International Proceedings of Economics Development and Research*, Vol. 42, pp. 259 - 266.

Li, J. and Born, J. A., 2006, "Presidential election uncertainty and common stock returns in the United States", *Journal of Financial Research*, Vol. 29, Iss. 4, Winter, pp. 609 - 622.

Ligon, J. A., 1997, "A simultaneous test of competing theories regarding the January effect", *Journal of Financial Research*, Spring, Vol. 20, Iss. 1, pp. 13 - 32.

Lin, J. C. and Howe, J. S., 1990, "Insider trading in the OTC market", *The Journal of Finance*, Vol. 45, No. 4, Sept., pp. 1273 - 1284.

Lin, J. C. and Rozeff, M. S., 1995, "The speed of adjustment of prices to private information: empirical tests", *The Journal of Financial Research*, Vol. 18, Iss. 2, pp. 143 -156.

Linn, S. C. and Lockwood, L. J., 1988, “Short-term stock price patterns: NYSE, AMEX, OTC”, *The Journal of Portfolio Management*, Vol. 14, No. 2, Winter, pp. 30 - 34.

Lintner, J., 1965, "Security prices, risk and maximal gains from diversification", *The Journal of Finance*, Vol. 20, Iss. 4, Dec., pp. 587 - 615.

Litzenberger**,** R. H. and Ramaswamy**,** K., 1982, **“**The effects of dividends on common stock prices tax effects or information effects?” *Journal of Finance*, Vol. 37, Iss. 2, May, pp. 429 - 443.

Liu, B. and Li, B., 2011, "Monthly seasonality in the top 50 Australian stocks" *Journal of Modern Accounting and Auditing*, Vol. 7, No. 4, Apr., pp. 380 - 390.

Lo, A. W., 2004, “The Adaptive Markets Hypothesis”, *The Journal of Portfolio Management*, 30th Anniversary Issue, Vol. 30, Iss. 5, pp. 15 - 29.

Lo, A. W., 2005, “Reconciling efficient markets with behavioural finance: The adaptive markets hypothesis”, *Journal of Investment Consulting*, pp. 21 - 44.

Lo, A. W. and MacKinlay, A. C., 1988, “Stock market prices do not follow random walks: Evidence from a simple specification test”, *Review of Financial Studies*, Vol. 1, No. 1, pp. 41 - 66.

Lo, A.W. and MacKinlay, A. C., 1990, "Data-snooping biases in tests of financial asset pricing models", *Review of Financial Studies*, Vol. 3, Iss.3, pp. 431 - 467.

Lo, A. W., Mamaysky, H. and Wang, J., 2000, “Foundations of technical analysis: Computational algorithms, statistical inference, and empirical implementation”, *The Journal of Finance*, Vol. 55, Iss. 4, Aug., pp. 1705 - 1765.

Longin, F. and Solnik, B., 1995, "Is the correlation in international equity returns constant: 1960–1990?", *Journal of International Money and Finance*, Vol. 14, Iss1, Feb., pp. 3 - 26.

Loomes, G. and Sugden, R., 1982, “Regret theory: An alternative theory of rational choice under uncertainty”, *The Economic Journal*, Vol. 92, No. 368, Dec., pp. 805 - 824.

Lynch, A., Puckett, A. and Yan, X., 2014. "Institutions and the turn-of-the-year effect: Evidence from actual institutional trades," *Journal of Banking & Finance*, Vol. 49, Iss. C, pp. 56 - 68.

Ma, C. K. and Kao, G. W., 1990, "On exchange rate changes and stock price reactions", *Journal of Business Finance and Accounting*, Vol. 17, Iss. 3, Jun., pp. 441 - 449.

Maher, D. and Parikh, A., 2013, "The turn of the month effect in India: A case of large institutional trading pattern as a source of higher liquidity", *International Review of Financial Analysis*, Vol. 28, Iss. C, pp. 57 - 69.

Madureira, L., and Leal, R., 2001, "Elusive anomalies in the Brazilian stock market", *International Review of Financial Analysis*, 10, pp. 123 - 134.

Maher, D. and Parikh, A., 2013, “The turn of the month effect in India: A case of large institutional trading pattern as a source of higher liquidity”, *International Review of Financial Analysis*, Vol. 28, Iss. C, pp. 57 - 69.

Mainul Ahsan, A. F. M. and Sarkar, A. H., 2013, "Does January effect exist in Bangladesh?", *International Journal of Business and Management*, Vol. 8, No. 7, pp. 82 - 89.

Mandaci, P. E., 2003, “Abnormal return fluctuations in the ISE (Istanbul Stock Exchange) before and after the general elections in Turkey”, *The ISE Review Volume*, Vol. 7, No: 27, Jul. / Aug. /Sept., pp. 1 - 14.

Mangram, M. E., 2013, "A simplified perspective of the Markowitz portfolio theory", *Global Journal of Business Research*, Vol. 7, No. 1, pp. 59 - 70.

Mandaci, P. E., 2003, “Abnormal return fluctuations in the ISE (Istanbul Stock Exchange) before and after the general elections in Turkey”, *The ISE Review*, Vol. 7, No: 27, Jul. / Aug. / Sept., pp. 1 - 14.

Markowitz, H. M., 1952, "Portfolio selection", *The Journal of Finance*, Vol. 7, No. 1, Mar., pp. 77 - 91.

Markowitz, H. M., 1991, "Foundations of portfolio theory", *The Journal of Finance*, Vol. 46, Iss 2, Jun., pp. 469 - 477.

Marquering, W., Nisser, J. and Valla, T., 2006, "Disappearing anomalies: a dynamic analysis of the persistence of anomalies", *Applied Financial Economics*, Vol. 16, Iss. 4, pp. 291 - 302.

Marrett, G. J. and Worthington, A. C., 2008, "The day-of-the-week Effect in the Australian Stock Market: An Empirical Note on the Market, Industry and Small Cap Effects", International Journal of Business and Management, Vol 3, No 1, Jan., pp. 3 - 8.

Marrett, G. J. and Worthington, A. C., 2009, “An empirical note on the holiday effect in the Australian stock market, 1996-2006”, *Applied Economics Letters*, Vol. 16, Iss., 17, pp. 1769 - 1772.

Marrett, G. J. and Worthington, A. C., 2011, “The month-of-the-year effect in the Australian stock market: A short technical note on the market, industry and firm size impacts”, *Australasian Accounting Business and Finance Journal*, Vol. 5, Iss. 1, pp. 117 - 123.

Martikainen, T and Puttonen, V., 1996, “Finnish day-of-the-week effects”, *Journal of Business, Finance & Accounting*, Vol. 23, Iss. 7, pp. 1019 - 1032.

Martins, A. M. and Serra, A. P., 2011, "Market impact of international sporting and cultural events", *Journal of Economics and Finance*, Vol. 35, Iss. 4, Oct., pp. 382 - 416.

Mastronardi, R., Patané, M. and Tucci, M. P., 2013, "Macroeconomic news and Italian equity market", *Investment Management and Financial Innovations*, Vol. 10, Iss. 2, pp. 132 - 141.

Maxwell, W. F., 1998, "The January effect in the corporate bond market: A systematic examination", *Financial Management*, Vol. 27, No. 2, Summer, pp. 18 - 30.

Maysami, R. C. and Koh, T. S., 2000, "A vector error correction model of the Singapore stock market", *International Review of Economics & Finance*, Vol. 9, Iss. 1, pp. 79 - 96.

Mayo, H. B., 2013, *Investments: An introduction*, 11th edn., Cengage Learning US, ISBN 9781133935995.

Mazzola, P. and Gerace, D., 2015, "A comparison between a dynamic and static approach to asset management using CAPM models on the Australian securities market", *Australasian Accounting, Business and Finance Journal*, Vol. 9, Iss. 2, pp. 43 - 58.,

McConnell, J.J. and Xu, W., 2008, "Equity returns at the turn of the month", *Financial Analysts Journal*, Vol. 64, No. 2, Mar. - Apr., pp. 49 - 64.

McGee, V. E. and Carleton, W. T., 1970, "Piece Wise Regression", *Journal of the American Statistical Association*, Vol. 65, No. 331, Sep., pp. 1109 - 1124.

McGuinness, P. B., 2006, "Turn of the month return effects for small cap Hong Kong stocks", *Applied Economics Letters*, Vol. 13, Iss. 14, pp. 891 - 898.

Mehdian, S. and Perry, M. J., 2001, "The reversal of the Monday effect: New evidence from US equity markets", *Journal of Business Finance & Accounting*, Vol. 28, No.7 & 8, pp. 1043 - 1065.

Mehdian, S. and Perry, M.J., 2002, "Anomalies in US equity markets: A re-examination of the January effect", *Applied Financial Economics*, Vol. 12, Iss. 2, pp. 141 - 145.

Menike, L. M. C. S., 2006, "The effect of macroeconomic variables on stock prices in emerging Sri Lankan stock market", *Sabaragamuwa University Journal*, Vol 6, No. 1, pp. 50 - 67.

Merton, R. C., 1987, "A simple model of capital market equilibrium with incomplete information", *The Journal of Finance,* Vol. 42, Iss. 3, Jul., pp. 483 - 510.

Merrill, A., 1966 *"The behavior of prices on wall street"*, Chappaqua, The Analysis Press –

Miller, E. M., 1990, "Explaining the January small firm effect by the interaction of procedurally rational investors and seasonal traders", *Quarterly Journal of Business and Economics,* Vol. 29, No. 36, Summer, pp. 36.

Mills, T. C. and Coutts, J. A., 1995, "Calendar effects in the London stock exchange FT-SE indices", *The Journal of Finance,* Vol. 1, No. 1, pp. 79 - 93.

Mishra, V. and Smyth, R., 2010, "An examination of the impact of India's performance in one-day cricket internationals on the Indian stock market", *Pacific-Basin Finance Journal*, Vol. 18, Iss. 3, Jun., pp. 319 - 334.

Mitchell, J. D. and Ong, L. L., 2006, "Seasonalities in China's Stock Markets: Cultural or Structural?", *IMF Working Paper WP/06/4,* Jan., pp. 1 - 44.

Mittal, S. K. and Jain, S., 2009, "Stock market behaviour: evidences from Indian market", *Vision: The Journal of Business Perspective*, Vol. 13, No. 3, Jul. – Sept., pp. 19 - 29.

Moller, N. and Zilca, S., 2008, "The evolution of the January effect", *The Journal of Banking and Finance,* Vol. 32, Iss. 3, Mar., pp. 447 - 457.

Moser, C. and Rose, A.K., 2014, "Who benefits from regional trade agreements? The view from the stock market", *European Economic Review*, 68, pp. 31 - 47.

Mossin, J., 1966, "Equilibrium in a capital asset market", *Econometrica*, Vol. 34, No. 4, Oct., pp. 768 - 783.

Mouselli, S. and Al Samman, H., 2016, "An examination of the month-of-the-year effect at Damascus Securities Exchange", *International Journal of Economics and Financial Issues*, Vol. 6, No. 2, pp. 573 - 577.

Mukherjee, T. K. and Naka, A., 1995, "Dynamic relations between macroeconomic variables and the Japanese stock market: An application of a vector error correction model", *Journal of Financial Research*, Vol. 18, Iss. 2, Summer, pp. 223 - 237.

Mullins, D. W., 1982, “Does the capital asset pricing model work?”, *Harvard Business Review*, Vol. 60, No. 1, Jan. – Feb., pp. 105 - 113.

Nageswari, P. and Selvam, M., 2011, “An empirical study on seasonal analysis in the Indian stock market”, *IJMBS*, Vol. 1, Iss. 4, Oct. - Dec. 2011, pp. 90 - 95.

Nageswari, P., Selvam, M. and Gayathri, J., 2011, “Analysis of Monday effect in Indian stock market”, *Research Journal of Business Management*, *5*(4), pp. 170 - 177.

Narayan, S. and Narayan, P. K., 2012, "Do US macroeconomic conditions affect Asian stock markets?", *Journal of Asian Economics*, Vol. 23, Iss. 6, Dec., pp. 669 - 679.

National Stock Exchange of Australia n.d., *Competition: The New Playbook*, viewed October 2017, https://www.nsx.com.au/.

National Stock Exchange of Australia n.d., viewed May 2016, https://www.nsxa.com.au/companies_pre_listed/cpl_why_nsx.

National Stock Exchange of Australia n.d., viewed May 2016, https://www.nsxa.com.au/companies_pre_listed/brochures

National Stock Exchange of Australia n.d., viewed May 2016, https://www.nsxa.com.au/companies_pre_listed/asx_vs_nsx

Nazário, R. T. F., Silva, J. L., Sobreiro, V. A. and Kimura, H., 2017, "A literature review of technical analysis on stock markets", *The Quarterly Review of Economics and Finance*, Vol. 66, Nov., pp. 115 - 126.

Nelson, C. R., 1976, "Inflation and rates of return on common stocks", *The Journal of Finance*, Vol. 31, No. 2, May, pp. 471 - 483.

Nezerwe, Y., 2013, "Presidential elections and stock returns in Egypt", *Review of Business & Finance Studies*, Vol. 4, Iss. 2, pp. 63 - 68.

Niederhoffer, V., 1971, "The analysis of world events and stock prices", *The Journal of Business*, Vol. 44, No. 2, pp. 193 - 219.

Nikkinen, J., Sahlström, P. and Äijö, J., 2007, "Turn of the month and intramonth effects: Explanation from the important macroeconomic news announcements", *Journal of Futures Markets*, Vol. 27, Iss. 2, pp. 105 - 126.

Nikkinen, J., Sahlström, P., Takko, K. and Äijö, J., 2009, "Turn-of-the-month and intramonth anomalies and U.S. macroeconomic news announcements on the thinly traded Finnish stock market", *International Journal of Economics and Finance*, Vol. 1, No. 2, Aug., pp. 3 - 11.

Nippani, S. and Arize, A.C., 2005, "US presidential election impact on Canadian and Mexican stock markets", *Journal of Economics and Finance*, Vol. 29, No. 2, Summer, pp. 271 - 279.

Nisar, S. and Hanif, M., 2012, "Testing market efficiency: Empirical evidence from developed markets of Asia Pacific", Jan., https://ssrn.com/abstract=1983960.

O'Brien, M. A., Brailsford, T. and Gaunt, C., 2010, "Interaction of size, book-to-market and momentum effects in Australia", *Accounting and Finance*, Vol. 50, Iss. 1, Mar. pp. 197 - 219.

O'Connell, D. and O'Grady, B., 2014, "The buy-write strategy, index investment and the efficient market hypothesis: More Australian evidence", *Journal of Derivatives,* Vol. 22, Iss. 1, Fall, pp. 71 - 89.

Odean, T., 1999, "Do investors trade too much?", *The American Economic Review*, Vol. 89, No. 5, Dec., pp. 1279 - 1298.

Ogden, J. P., 1990, "Turn-of-month evaluations of liquid profits and stock returns: A common explanation for the monthly and January effects", *The Journal of Finance*, Vol. 45, No. 4, Sept., pp. 1259 - 1272.

Oguzsoy, C. B. and Güven, S., 2006, "Turn of the month and turn of the month surrounding days effects in Istanbul Stock Exchange", *Journal of Emerging Market Finance*, Vol. 5, Iss. 1, pp. 1 - 13.

Olanrewaju, O. K. and Ayoola, F. J., 2012, "Does macro-economic variables have effect on stock market movement in Nigeria"?, *Journal of Economics and Sustainable Development*, Vol. 3, No. 10, pp. 192 - 202.

Olugbenga, A. A., 2012, "Exchange rate volatility and stock market behavior: The Nigerian Experience, *European Journal of Business and Management*, Vol. 4, No. 5, pp. 31 - 39.

Ortiz, C, Sarto, J. L. and Vicente, L., 2012, "Portfolios in disguise? Window dressing in bond fund holdings", *Journal of Banking & Finance*, Vol. 36, Iss. 2, Feb., pp. 418 - 427.

Omisore, I., Munirat, Y. and Nwufo, C., 2012, "The modern portfolio theory as an investment decision tool", *Journal of Accounting and Taxation*, Vol. 4, No. 2, Mar., pp. 19 - 28.

Ouma, W. D. and Muriu, P., 2014, "The impact of macroeconomic variables on stock market returns in Kenya", *International Journal of Business and Commerce*, Vol. 3, No.11, Jul., pp. 1 - 31.

Panait, I., 2013, “The month-of-the-year effect on Bucharest Stock Exchange”, *Hyperion Economic Journal*, Year 1, No. 1(1), Mar., pp. 19 - 26.

Pandekar, G. and Putrini, N., 2015, " Turn-of-the-month effect on stocks in LQ45 index and various sectors in the Indonesia Stock Exchange using GARCH (p, q)", *Indonesian Capital Market Review*, Vol. 4, No.1, pp. 41 - 50.

Patel, J. B., 2008, “Calendar effects in the Indian stock market”, *International Business & Economics Research Journal*, Vol. 7, No. 3, Mar., pp. 61 - 70.

Patel, R.J. and Patel, M.K., 2011, "An econometric analysis of Bombay Stock Exchange: Annual returns analysis, day-of-the-week effect and volatility of returns", *Research Journal of Finance and Accounting*, Vol. 2, No. 11, pp. 1 - 9.

Perold, A. F., 2004, "The Capital Asset Pricing Model", *Journal of Economic Perspectives*, Vol. 18, No. 3, Summer, pp. 3 - 24.

Pettengill, G. N., 1989, “Holiday closings and security returns”, *Journal of Financial Research*, Vol. 12, Iss. 1, Spring, pp. 57 - 67.

Pettengill, G. N. and Buster, D. E., 1994, "Variation in Return Signs: Announcements and the Weekday Anomaly", *Quarterly Journal of Business and Economics*, Vol. 33, Iss. 3, pp. 81 - 93.

Porter, D., Powell, G. and Weaver, D., 1996, “Portfolio rebalancing, institutional ownership, and the small-firm January effect”, *Review of Financial Economics*, Vol. 5 No. 1, pp. 19 - 29.

Poterba, J. and Summers, L, H., 1988, “Mean reversion in stock prices: Evidence and implications”, *Journal of Financial Economics*, Vol. 22, Iss.1, pp. 27 - 59.

Poterba, J. and Weisbenner, S., 2001, "Capital gains tax rules, tax-loss trading, and turn-of-the-year returns", *The Journal of Finance*, Vol. 56, Iss. 1, Feb., pp. 353 - 368.

Puffer, M. K., 1991, "Private information and weekend volatility in the Tokyo and New York stock markets", *The Journal of Banking & Finance*, Vol. 15, Iss. 2, pp. 407 - 423.

Pyeman, J, and Ahmad, I., 2009, ", *Malaysian Accounting Review*, Vol. 8, No. 1, pp. 81 - 100.

Qi, M. and Wang, W., 2013, “The monthly effects in Chinese gold market”, *International Journal of Economics and Finance*, Vol. 5, No. 10, p.141 - 146.

Quadir, M. M., 2012, "The effect of macroeconomic variables on stock returns on Dhaka Stock Exchange", *International Journal of Economics and Financial Issues*, Vol. 2, No. 4, pp. 480 - 487.

Rahman, M. L. and Amin, A. S., 2011, “Monthly seasonality in emerging market: Evidence from Bangladesh”, *The Global Journal of Finance and Economics*, Vol. 8, No. 1, pp. 61 - 76.

Rankin, E. and Idil, M. S., 2014, "Century of Stock-Bond Correlations", *RBA Bulletin*, Sept., pp. 67 - 74.

Rapach, D. E., Wohar, M. E. and Rangvid, J., 2005, "Macro variables and international stock return predictability" , *International Journal of Forecasting*, Vol. 21, Iss 1, Jan. - Mar., pp. 137 - 166.

Raj, M. and Thurston, D., 1994, "January or April? Tests of the turn–of–the–year effect in the New Zealand stock market", *Applied Economics Letters*, Vol. 1, Iss. 5, pp. 81 - 83.

Raj, M. and Kumari, D., 2006, "Day-of-the-week and other market anomalies in the Indian stock market", *International Journal of Emerging Markets*, Vol. 1 Iss. 3, pp. 235 - 246.

Ramiah, V. and Davidson, S., 2007, “Information-adjusted noise model: Evidence of inefficiency on the Australian stock market”, *The Journal of Behavioral Finance*, Vol. 8, No. 4, pp. 209 - 224.

Rastogi, N., Bang, N.P. and Chaturvedula, V.C., 2011, "Day-of-the-week effects in the Indian spot and futures markets", *Journal of Applied Finance & Banking*, Vol.1, No.2, pp. 69 - 93.

Ray, S., 2012, "Testing Granger causal relationship between macroeconomic variables and stock price behaviour: Evidence from India", *Advances in Applied Economics and Finance*, Vol. 3, No. 1, pp. 470 - 481.

Reinganum, M. R., 1981, “Abnormal returns in small firm portfolios”, *Financial Analysts Journal*, Vol. 37, No. 2, Mar. - Apr., pp. 52 - 57.

Reinganum, M. R., 1982, “A direct test of Roll’s conjecture on the firm size effect”, *The Journal of Finance*, Vol. 37, Iss. 1, March, pp. 27 - 35.

Reinganum, M. R., 1983, “The anomalous stock market behaviour of small firms in January: Empirical tests for tax-loss selling effects”, *Journal of Financial Economics*, Vol. 12, Iss. 1, pp. 89 - 104.

Reinganum, M. R. and Shapiro, A. C., 1987, “Taxes and stock return seasonality: Evidence from the London Stock Exchange”, *Journal of Business*, Apr., Vol. 60, No. 2, pp. 281 - 295.

Rendleman Jr . R, Jones, C. P. and Latané, H. A., 1982, “Empirical anomalies based on unexpected earnings and the importance of risk adjustments”, *Journal of Financial Economics*, Vol. 10, Iss. 3, Nov., 1982, pp. 269 - 287.

Rendon, J. and Ziemba, W.T., 2007, “Is the January effect still alive in the futures markets?”, *Financial Markets and Portfolio Management*, Vol. 21, Iss. 3, Sept., pp. 381 - 396.

Ricciardi, V. and Simon, H. K., 2000, “What is Behavioral Finance?”, *Business, Education & Technology Journal*, Vol. 2, No. 2, Fall, pp. 1 - 9.

Ritter, J. R., 1988, `The buying and selling behaviour of individual investors at the turn of the year', *The Journal of Finance*, Vol. 43, No. 3, Jul., pp. 701 - 717.

Ritter, J. R., 1991, “The long-run performance of initial public offerings”, *The Journal of Finance*, Vol. 46, Iss. 1, Mar., pp. 3 - 27.

Ritter, J. R., 2003, “Behavioural finance”, *Pacific-Basin Finance Journal*, Vol. 11, No. 4, Sept., pp. 429 - 437.

Ritter, J. R. and Chopra, N., 1989, "Portfolio rebalancing and the turn-of-the-year effect", *The Journal of Finance*, Vol. 44, No. 1, Mar., pp. 149 - 166.

Rogalski, R. J., 1984, “New findings regarding day of the week returns over trading and non-trading periods: A note”, *The Journal of Finance,* Vol. 39, No. 5, pp. 1603 -1614.

Roll, R., 1983, “Vas ist das? The turn-of-the-year effect and the return premia of small firms”, *The Journal of Portfolio Management*, Winter, Vol. 9, No. 2, pp. 18 - 28.

Roll, R. and Ross, S. A., 1980, “An empirical investigation of the arbitrage pricing theory”, *The Journal of Finance,* Vol. 35, No. 5, Dec., pp. 1073 - 1103.

Rosenburg, B., Reid, K. and Lanstein, R., 1985, “Persuasive evidence of market inefficiency”, *Journal of Portfolio Management,* Vol. 11, No. 3, Spring, pp. 9 - 16.

Ross, S. A., 1976, “The arbitrage theory of capital asset pricing”, *Journal of Economic Theory,* Vol. 13, Iss. 3, Dec., pp. 341 - 360.

Ross, S.A., 1976a, Arbitrage, Risk Return in Finance Ed. I. *Friend and J. Bicksler, Cambridge, Mass.: Ballinger*.

Rozeff, M. S. and Kinney, W. R., 1976, “Capital market seasonality: The case of stock returns”, *The Journal of Financial Economics,* Vol. 3, Iss. 4, Oct., pp. 379 - 402.

Rubinstein, M., 2001, "Rational markets: Yes or no? The affirmative case", *Financial Analysts Journal*, Vol. 57, Iss. 3, May / Jun., pp. 15 - 29.

Saeed, S. K., Sargana, S. M. and Ayub, U., 2011, "Are equity markets efficient? Evidence from emerging economy", *Interdisciplinary Journal of Contemporary Research in Business,* Vol. 3, No. 1, May, pp. 417 - 428.

Sanaullah, A., Shah, S. M. A., Ather, M., Ali, E. and Asla, M. R., 2012, "How behavioral aspects affect market efficiency - Evidence from KSE 100 Index", *Global Journal of Management And Business Research,* Vol. 12, Iss. 10, Jun., pp. 25 - 32.

Sander, P. and Veiderpass, R., 2013, "Testing the turn-of-the-year effect on Baltic stock exchanges", *The Review of Finance and Banking*, Vol. 5, Iss. 2, pp. 145 - 154.

Santa-Clara, P. and Valkanov, R., 2003, “The presidential puzzle: Political cycles and the stock market”, *The Journal of Finance*, Vol. 58, Iss. 5, Oct., pp. 1841 - 1872.

Schmidheiny, K., 2016, "Short Guides to Microeconometrics", Fall, University at Basel, pp. 1 - 17, http://kurt.schmidheiny.name/teaching/ols2up.pdf, accessed Nov. 2016.

Schultz, P., 1985, “Personal income taxes and the January effect: Small firm stock returns before the War Revenue Act of 1917: A note”, *The Journal of Finance,* Vol. 40, No. 1, Mar., pp. 333 - 343.

Schwert, G. W., 2002, "Anomalies and market efficiency", *NBER Working Paper No. 9277,* Oct., pp. 1 - 54.

Selvakumar, D. S., 2011, “Existence of certain anomalies in the Indian stock market, *IPEDR*, Vol. 4, 2011 International Conference on Economics and Finance Research, pp. 498 - 504.

Selvarani, M. and Jenefa, L., 2009, "Calendar anomalies in National Stock Exchange indices", *The Icfai Journal of Applied Finance,* Vol. 15, No. 1, pp. 56 - 67.

Sevil, T. and Polat, A., 2015, "Sport sentiment and stock market returns: An evidence of national match days in Turkey", *International Journal of Economics, Commerce and Management,* Vol. III, Iss. 12, Dec, United Kingdom, pp.1 - 9.

Sewell, M., 2012, "*Prospect theory*", available at: http://prospect-theory.behaviouralfinance.net, accessed: Nov. 2015.

Seyhun, H. N., 1992, "Why does aggregate insider trading predict future stock returns", *The Quarterly Journal of Economics*, Vol. 107, No. 4, Nov., pp. 1303 - 1331.

Shanken, J., 1982, "The Arbitrage Pricing Theory: Is it testable? *The Journal of Finance*, Vol. 37, No. 5, Dec., pp. 1129 – 1140.

Sharma, G. D., Mittal, S. and Khurana, P., 2014. "Month of the year anomalies in stock markets: Evidence from India". *The International Journal of Applied Economics and Finance,* Vol.8, No.3, pp. 82 - 97.

Sharma, S. S. and Narayan, P. K., 2014, "New evidence on turn-of-the-month effects", *Journal of International Financial Markets, Institutions and Money*, Vol. 29, Iss. C, pp. 92 - 108.

Sharpe, W, F., 1964, "Capital asset prices: A theory of market equilibrium under conditions of risk", *The Journal of Finance,* Vol. 19, No. 3, Sept., pp. 425 - 442.

Sharpe, W. F., 1985, *Investments*, Prentice-Hall, Inc., Englewood Cliffs, New Jersey.

Sharpe, W. F., Capaul, C. and Rowley, I., 1993, "International value and growth stock returns", *Financial Analysts Journal*, Vol. 49, No. 1 Jan. / Feb., pp. 27 - 36.

Shefrin, H., 2011, "Behavioural corporate finance", *Journal of Applied Corporate Finance,* Vol. 14, Iss. 3, Fall, pp. 113 - 126.

Shefrin, H. and Statman, M., 1985, "The disposition to sell winners too early and ride losers too long: Theory and evidence", *The Journal of Finance*, Vol. 40, Iss. 3, Jul., pp. 777 - 790.

Shiller, R. J., 1984, "Stock prices and social dynamics", *Brookings Papers on Economic Activity*, Vol. 15, Iss. 2, pp. 457 - 510.

Sias, R. W. and Starks, L. T., 1997, "Institutions and individuals at the turn-of-the-year", *The Journal of Finance*, Vol. 52, Iss. 4, pp. 1543 - 62.

Siddiqui, T. A. and Narula, I., 2013, "Market efficiency and anomalies: Evidences from S&P CNX NIFTY", *Vision: The Journal of Business Perspective*, Vol. 17, Iss. 3, pp. 233 - 245.

Sikes, S. A., 2014, "The turn-of-the-year effect and tax-loss-selling by institutional investors", *Journal of Accounting and Economics*, Vol. 57, Iss. 1, Feb., pp. 22 - 42.

Simmons, P., 2011, “How efficient was the Australian share market between 2000 and 2008?”, *Business, Economics and Public Policy Working Papers*, No. 2011 – 1, School of Business, Economics and Public Policy Faculty of the Professions, University of New England, pp. 2 - 15.

Sinha, T., 1994, “Prospect theory and the risk return association: Another look”, *Journal of Economic Behavior & Organization*, Vol. 24, Iss. 2, Jul., pp. 225 - 231.

Slemrod, J., 1982, "The effect of capital gains taxation on year-end stock market behaviour", *National Tax Journal*, Mar., Vol. 35, Iss. 1, pp. 69 - 77.

Sloan, R. G., 1996, “Do stock prices fully reflect information in accruals and cash flows about future earnings?”, *The Accounting Review*, Vol. 71, No. 3, Jul., pp. 289 - 315.

Slovic, P., 1972, "Psychological study of human judgment: Implications for investment decision making", *The Journal of Finance*, Vol. 27, Iss. 4, Sept., pp. 779 - 799.

Slovic, P., Finucane, M. L., Peters, E., & MacGregor, D. G., 2002, “The affect heuristic” in Gilovich, D. Griffin, & D. Kahneman (eds.), *Heuristics and biases: The psychology of intuitive judgment*, pp. 397 - 420, New York: Cambridge University Press.

Slovic, P., Monahan, J., & MacGregor, D. M., 2000, “Violence risk assessment and risk communication: The effects of using actual cases, providing instructions, and employing probability vs. frequency formats”, *Law and Human Behavior*, Vol. 24, Iss. 3, Jun., pp 271 - 296.

Solnik, B., 1987, "Using financial prices to test exchange rate models: a note", *Journal of Finance*, Vol. 42, Iss. 1, Mar. pp 141 - 149.

Solnik, B. and Bousquet, L., 1990, “Day–of–the-returns effect on the Paris Bourse”, *Journal of Banking and Finance,* Vol. 14, Iss. 2-3, pp. 461 - 468.

Starks, L.T., Yong, L. and Zheng, L., 2006, “Tax - loss selling and the January effect: Evidence from municipal bond closed - end funds”, *The Journal of Finance*, Vol. 61, Iss. 6, Dec., pp. 3049 - 3067.

Steeley, J. M., 2001, “A note on information seasonality and the disappearance of the weekend effect in the UK stock market”, *The Journal of Banking and Finance*, Vol. 25, Iss. 10, Oct., pp. 1941 - 1956.

Stoica, O, and Diaconasu, D. E., 2011, “An examination of the calendar anomalies on emerging central and eastern European stock markets”, *Alexandru Ioan Cuza University of Iasi Working Paper*, 11, pp. 116 - 121.

Su, R., Dutta, A. S. and Xu, M., 2011, “Financial anomalies: Evidence from Chinese A-share markets”, *International Journal of Economics and Finance,* Vol.3, No.2, pp. 76 - 88.

Subrahmanyam, A., 2008, “Behavioural finance: A review and synthesis”, *European Financial Management*, Vol. 14, Iss. 1, pp. 12 - 29.

Sullivan, R., Timmermann, A. and White, H., 2001. "Dangers of data mining: The case of calendar effects in stock returns", *Journal of Econometrics*, Vol. 105, Iss. 1, Nov., pp. 249 - 286.

Sun, Q. and Tong, W. H., 2002, "Another new look at the Monday effect", *Journal of Business Finance & Accounting*, Vol. 29, Iss. 7 & 8, pp. 1123 - 1147.

Szylar, C. (ed) (2013) The Capital Asset Pricing Model and the Arbitrage Pricing Theory, in *Handbook of Market Risk*, John Wiley & Sons, Inc., Hoboken, NJ, USA. doi: 10.1002/9781118572979, Ch 5.

Taimur, M. and Khan, S., 2015, "Impact of political and catastrophic events on stock returns", *VFAST Transactions on Education and Social Sciences,* Vol. 6, No. 1, Jan. - Feb., pp. 21 - 32.

Tangjitprom, N., 2011, “The calendar anomalies of stock return in Thailand", *Journal of Modern Accounting and Auditing*, Vol. 7, No. 6, Jun., pp. 565 - 577.

Tangjitprom, N., 2012, "Macroeconomic factors of emerging stock market: The evidence from Thailand", *International Journal of Financial Research*, Vol. 3, No. 2; Apr., pp. 105 - 114.

Thaler, R. H. 1987, “Anomalies the January effect”, *Economic Perspectives*, Vol. 1, No. 1, Summer, pp. 197 - 201.

Thirlwel, M., 2017 *Australia’s export performance in 2016*, viewed 8 November 2017 https://www.austrade.gov.au/news/economic-analysis/australias-export-performance-in-2016.

Tian, G. G. and Ma, S., 2010, "The relationship between stock returns and the foreign exchange rate: the ARDL approach", *Journal of the Asia Pacific economy*, Vol. 15, No. 4, pp. 490 - 508.

Tonchev, D. and Kim, T. H., 2004, "Calendar effects in Eastern European financial markets: Evidence from the Czech Republic, Slovakia and Slovenia", *Applied Financial Economics*, Vol. 14, Iss. 14, pp. 1035 - 1043.

Tong, W., 2000, “International evidence on weekend anomalies”, *The Journal of Financial Research*, Vol. 23, No. 4, pp. 496 - 522.

Tsay, R. S., 1988, “Outliers, level shifts and variance changes in time series”, *Journal of Forecasting*, Vol. 7, Iss. 1, pp. 1 - 20.

Tsuji, C., 2009, " The anomalous stock market behaviour of big and low book-to-market equity firms in April: New evidence from Japan", *The Open Business Journal*, 2, pp. 54 - 63.

Urquhart, A. and McGroarty, F., 2014, "Calendar effects, market conditions and the adaptive market hypothesis: Evidence from long-run US data", *International Review of Financial Analysis*, Vol. 35, Iss. C, pp. 154 - 166.

Veraros, N., Kasimati, E. and Dawson, P., 2004, “The 2004 Olympic Games announcement and its effect on the Athens and Milan stock exchanges”, Applied Economics Letters, Vol. 11, Iss. 12, pp. 749 - 753.

Wachtel, S.B., 1942, "Certain observations on seasonal movements in stock prices", *The Journal of Business of the University of Chicago*, Vol. 15, No. 2, Apr., pp. 184 - 193.

Wang, G., 2008, “Test of macroeconomic variables through Arbitrage Pricing Theory in different industry indices in the Australian stock market”, Jul., https://ssrn.com/abstract=1262035.

Wang, K., Li, Y. and Erickson, J., 1997, “A new look at the Monday effect”, *The Journal of Finance*, Vol.52, Iss. 5, pp. 2171 - 2186.

Wasserfallen, W., 1989, "Macroeconomics news and the stock market: Evidence from Europe", *Journal of Banking & Finance,* Vol. 13, Iss. 4 - 5, Sept., pp. 613 - 626.

What are some of the problems with stepwise regression? n.d, <https://www.stata.com/support/faqs/statistics/stepwise-regression-problems/>, accessed Oct. 2017.

Who does the NSX suit? n.d, <http://www.nsxa.com.au/companies_pre_listed/cpl_why_nsx>, accessed May 2015.

Wiley, J. A. and Zumpano, L. V., 2009, "Institutional investment and the turn-of-the-month effect: evidence from REITs", *The Journal of Real Estate Finance and Economics*, Vol. 39, Iss. 2, pp.180 - 201.

Wong, M. K., Ho, C. M. and Dollery, B., 2007, "An empirical analysis of the monthly effect: The case of the Malaysian stock market", *Working Paper Series in Economics*, No. 4, University of New England, pp. 1 - 18.

Wong, W. K., Agarwal, A. and Wong, N. T., 2006, "The disappearing calendar anomalies in the Singapore stock market", *Lahore Journal of Economics*, Vol. 11, Iss. 2, Winter, pp. 123 - 139.

Wongbangpo, P. and Sharma, S. C., 2002, "Stock market and macroeconomic fundamental dynamic interactions: ASEAN-5 countries", *Journal of Asian Economics*, Vol. 13, Iss. 1, Jan. - Feb., pp. 27 - 51.

Worthington, A. C., 2006, “Political cycles and risk and return in the Australian stock market, Menzies to Howard”, School of Accounting & Finance, University of Wollongong, Working Paper 6, pp. 1 - 14. http://ro.uow.edu.au/accfinwp/22, accessed Apr. 2013.

Worthington, A.C., 2007, "National exuberance: A note on the Melbourne Cup effect in Australian stock returns", *Economic Papers: A Journal of Applied Economics and Policy*, Vol. 26, Iss. 2, pp.170 - 179.

Worthington, A. C., 2008, “The impact of natural events and disasters on the Australian stock market: a GARCH-M analysis of storms, floods, cyclones, earthquakes and bushfires”, *Global Business and Economics Review*, Vol. 10, No.1, pp. 1 - 10.

Worthington, A. C., 2009, " Political cycles in the Australian stock market since Federation", *The Australian Economic Review*, Vol. 42, No. 4, Dec., pp. 397 - 409.

Worthington, A.C., 2010, “The decline of calendar seasonality in the Australian Stock Exchange, 1958–2005”, *Annals of Finance*, Vol. 6, Iss. 3, pp. 421 - 433.

Wu, C., 2013, "The Chinese New Year holiday effect: Evidence from Chinese ADRs", *Investment Management and Financial Innovations*, Vol. 10, Iss. 2, pp. 8 - 14.

Wyeme, B. M. D. F. and Olfa, C., 2011, “Month of the year effect: Existence and behavioural explanation”, *International Research Journal of Finance and Economics,* Iss. 67, pp. 72 - 81.

Yakob, N. A., Beal, D. and Delpachitra, S., 2005, "Seasonality in the Asia Pacific stock markets", *Journal of Asset Management*, Vol. 6, No. 4, Dec., pp. 298 - 318.

Zach, T., 2003, “Political events and the stock market: Evidence from Israel”, *International Journal of Business*, Vol. 8, No. 3, Summer, pp. 243 - 266.

Zafar, N., Urooj, S.F. and Farooq, S.U., 2010, "Karachi stock exchange: Testing month of the year effect", *European Journal of Economics, Finance and Administrative Sciences*, Iss. 24, pp. 20 - 28.

Zhang, B. and Li, X., 2006, “Do calendar effects still exist in the Chinese stock markets?”, *Journal of Chinese Economic and Business Studies*, Vol. 4, No. 2, Jul., pp.151 - 163.

Zhang, Z, Sun, W. and Wang, H., 2008, "A new perspective on financial anomalies in emerging markets: the case of China", *Applied Financial Economics*, Vol. 18, Iss. 21, pp. 1681 - 1695.

Zhong, A., Limkriangkrai, M. and Gray, P., 2014, "Anomalies, risk adjustment and seasonality: Australian evidence", *International Review of Financial Analysis*, Vol. 35, Iss. C, pp. 207 - 218.

Ziemba, W.T., 1991, "Japanese security market regularities: Monthly, turn-of-the-month and year, holiday and golden week effects", *Japan and the world Economy*, Vol. 3, Iss. 2, pp.119 - 146.

APPENDIX

Table 2.6.3.a, Brief overview of some of the significant BF concepts

CONCEPT	EXPLANATION
Affect	Specific stimuli cause an individual to experience positive or negative feelings. Inadequate resources or time constraints cause affect-based judgments to become more pronounced.
Anchoring	The propensity to link specific thoughts to a reference point even though it may have no logical relevance to the current situation. Anchoring leads to persistent beliefs even if new contradictory information is presented.
Availability Bias	Individuals focus on easily accessible information (mental shortcuts) to form decisions rather than a detailed examination of all potential options or alternatives.
Cognitive Dissonance	Established beliefs are challenged by newly acquired and conflicting information causing mental conflict leading to self-denial and an affirmation of original beliefs.
Confirmation Bias	An individual focus is on information which confirms existing beliefs. From an investment perspective this explains why an investor justifies their investment choice/s using selective information processing, thereby disregarding information contradicting their choice/s in preference for information validating choices.
Conservatism	Occurs when an individual maintains their original beliefs at the expense of acknowledging new information. The tendency is for the investor to persevere and maintain a status quo rather than acknowledge the most current information, even if contradictory.
Disposition Effect	Refers to the behaviour of investors to sell winners too soon and hold onto losers too long, implying a willingness to realise profits but not losses.
Familiarity Bias	The inclination for investors to prefer familiar investments despite the potential gains from a diversification strategy. This leads to a lack of diversification and increases the overall risk allocation leading to potentially suboptimal portfolio decisions.
Frame Dependence	A cognitive heuristic where conclusions are derived from the framework within which a scenario is presented. Therefore, the way in which investment alternatives are presented to the investor has the potential to influence choice.
Innumeracy	Refers to the difficulty experienced by people (investors) in evaluating ratios, probabilities or nominal values and focussing on absolute values, leading to confusion between nominal and real change.
Loss Aversion	A core concept within prospect theory, in which there is greater sensitivity apportioned to losses than gains, and therefore investors have much greater difficulty realising losses, irrespective of tax advantages.
Mental Accounting	Refers to the propensity for an individual to allocate their finances into individual accounts based on numerous subjective criteria. Individuals attribute different functions to each asset category, often irrationally and detrimental effect on their consumption decisions and other behaviours.

Overconfidence	Occurs when an investor has a greater belief in their own ability (subjective confidence) over their objective (actual) performance. Overconfident judgments lead to an overestimation in financial forecasts. Success is often seen as due to individuals own skills while failures are externalized. Leads to excessive trading without proper consideration of transaction costs.
Prospect Theory	People react differently to situations/events based on the level of certainty; underweighting outcomes that are merely probable compared to outcomes that are obtained with certainty. Individuals place greater value on actual gains and losses as opposed to final assets with decision weights replacing probabilities when making choices.
Regret Aversion	A fear that, in hindsight, wrong choices are made. Regret aversion is associated with risk aversion. In a financial context, portfolio allocation can be strongly influenced by overwhelming tendencies to avoid regret and is a prime reason why investors defer selling losing stocks.
Representativeness	Refers to the tendency to use stereotypes, or a limited set of observations, to make decisions. Examples within investment decisions includes: investors attempting to detect patterns in data from random numbers or basing investment choice on the most recent financial performance rather than over a much longer period.
Self-attribution Bias	The tendency for investors to attribute successful outcomes to their own personal skills and failures to external factors beyond their control. Self-attribution bias is considered to underlie and reinforce investor overconfidence leading to excessive trading volumes over time.

Table 7.3.a.1; NSX - AEI, AGR and RES, descriptive statistics output for DOW data

DAY of the WEEK					
NSX-AEI					
	Mon	Tues	Wed	Thurs	Fri
Mean	1222.883	1226.062	1226.398	1229.452	1226.332
Standard Error	10.6104	10.196	10.000	9.824	10.044
Median	1301.914	1303.7345	1302.419	1304.332	1302.218
Mode	988.351	890.56	999.905	988.351	988.351
Standard Deviation	170.099	168.780	167.637	164.985	166.871
Sample Variance	28933.733	28486.907	28102.315	27220.137	27845.974
Kurtosis	0.15861388	0.236	0.268	0.354	0.295
Skewness	-1.362	-1.394	-1.404	-1.430	-1.407
Range	576.045	559.672	570.071	584.98	583.972
Minimum	804.52	819.69	804.52	804.52	804.52
Maximum	1380.565	1379.362	1374.591	1389.5	1388.492
Sum	314281.144	335941.101	344617.884	346705.684	338467.802
Count	257	274	281	282	276
Confidence Level (95.0%)	20.894	20.073	19.685	19.339	19.773
NSX-AGR					
Mean	913.647	909.634	911.694	910.094	910.637
Standard Error	9.527	9.279	9.106	9.107	9.219
Median	958.008	956.565	958.008	955.122	958.008
Mode	644.417	644.417	644.417	644.417	644.417
Standard Deviation	152.743	153.605	152.650	152.943	153.157
Sample Variance	23330.696	23594.744	23302.107	23391.785	23457.334
Kurtosis	-0.593	-0.676	-0.621	-0.652	-0.655
Skewness	-0.852	-0.806	-0.838	-0.829	-0.820
Range	502.726	502.726	502.726	502.726	502.726
Minimum	627.679	627.679	627.679	627.679	627.679
Maximum	1130.405	1130.405	1130.405	1130.405	1130.405
Sum	234807.421	249239.745	256186.18	256646.568	251336.08
Count	257	274	281	282	276

DAY of the WEEK					
NSX-AEI					
	Mon	Tues	Wed	Thurs	Fri
Confidence Level (95.0%)	18.763	18.268	17.925	17.927	18.148
NSX-RES					
Mean	712.344	714.137	712.324	715.115	711.004
Standard Error	9.388	8.955	8.852	8.858	9.066
Median	738.059	745.331	745.331	745.331	745.331
Mode	784.219	784.219	784.219	784.219	784.219
Standard Deviation	150.505	148.235	148.389	148.761	150.617
Sample Variance	22651.804	21973.753	22019.538	22129.949	22685.492
Kurtosis	-0.253	-0.098	-0.265	-0.223	-0.308
Skewness	-0.470	-0.554	-0.599	-0.602	-0.536
Range	769.792	802.579	688.642	688.642	688.642
Minimum	312.175	312.175	312.175	312.175	312.175
Maximum	1081.967	1114.754	1000.817	1000.817	1000.817
Sum	183072.458	195673.737	200163.096	201662.655	196237.27
Count	257	274	281	282	276
Confidence Level (95.0%)	18.488	17.630	17.425	17.437	17.847

.

Table 7.3.b.1; NSX - AEI, AGR and RES, descriptive statistics output for MOTY data

MONTH of the YEAR												
NSX-AEI												
	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
Mean	1196.603	1240.951	1263.553	1253.804	1246.001	1240.537	1228.786	1234.454	1227.604	1213.330	1202.898	1165.648
Standard Error	16.291	12.164	11.595	13.247	14.365	16.599	16.467	16.726	17.001	17.216	17.287	17.458
Median	1295.032	1290.293	1322.268	1301.322	1323.632	1322.851	1307.031	1313.408	1321.93	1306.652	1302.419	1281.887
Mode	988.351	1295.131	972.273	973.073	1344.239	910.356	890.56	1326.689	884.398	1321.287	838.491	831.374
Standard Deviation	178.460	134.356	131.190	142.677	156.711	168.462	173.498	171.392	176.676	176.415	183.773	191.247
Sample Variance	31848.280	18051.751	17210.912	20356.815	24558.434	28379.630	30101.729	29375.380	31214.462	31122.452	33772.847	36575.734
Kurtosis	-0.3243	1.085	1.314	0.347	0.160	0.433	0.123	0.535	0.100	0.0307	0.014	-0.984
Skewness	-1.1423	-1.682	-1.663	-1.397	-1.337	-1.524	-1.443	-1.577	-1.403	-1.381	-1.343	-0.873
Range	539.383	462.229	459.869	426.554	475.901	506.686	460.585	462.162	474.498	489.143	511.164	519.229
Minimum	804.52	897.831	928.623	949.641	913.599	854.488	883.098	879.493	881.102	851.445	820.43	820.43
Maximum	1343.903	1360.06	1388.492	1376.195	1389.5	1361.174	1343.683	1341.655	1355.6	1340.588	1331.594	1339.659
Sum	143592.439	151396.059	161734.897	145441.355	148274.121	127775.366	136395.314	129617.687	132581.238	127399.747	135927.562	139877.83
Count	120	122	128	116	119	103	111	105	108	105	113	120
Confidence Level (95.0%)	32.258	24.082	22.945	26.240	28.448	32.924	32.635	33.168	33.701	34.140	34.253	34.569
NSX-AGR												
Mean	933.095	929.079	931.231	944.217	920.783	886.299	873.982	847.091	867.787	909.765	936.577	935.5957
Standard Error	13.676	12.586	12.575	13.107	14.255	14.723	14.473	14.938	15.058	15.238	14.275	14.371
Median	955.122	965.992	990.94	974.776	925.984	923.412	913.844	962.441	962.441	981.303	1023.663	962.6905
Mode	910.792	958.008	644.417	644.417	644.417	644.417	767.252	627.893	962.441	990.94	924.804	627.679
Standard Deviation	149.814	139.024	142.271	141.172	155.511	149.429	152.486	153.076	156.491	156.152	151.745	157.433
Sample Variance	22444.414	19327.866	20241.166	19929.679	24183.743	22329.279	23252.188	23432.385	24489.478	24383.594	23026.773	24785.339
Kurtosis	0.1743	0.669	0.274	0.557	-0.487	-0.792	-1.189	-1.689	-1.617	-0.791	-0.062	-0.0979
Skewness	-1.047	-1.416	-1.283	-1.249	-0.574	-0.335	-0.385	-0.472	-0.387	-0.962	-1.250	-1.061
Range	474.648	441.589	446.337	461.206	485.988	466.163	451.76	363.047	440.312	440.526	459.631	476.631
Minimum	627.679	627.679	644.417	644.417	644.417	644.417	627.893	627.893	627.893	627.679	627.679	627.679
Maximum	1102.327	1069.268	1090.754	1105.623	1130.405	1110.58	1079.653	990.94	1068.205	1068.205	1087.31	1104.31
Sum	111971.48	113347.759	119197.611	109529.236	109573.229	91288.855	97012.072	88944.574	93721.054	95525.39	105833.25	112271.484
Count	120	122	128	116	119	103	111	105	108	105	113	120

Confidence Level (95.0%)	27.080	24.918	24.883	25.963	28.230	29.204	28.682	29.624	29.851	30.219	28.284	28.457
NSX-RES												
Mean	685.913	653.533	709.128	731.499	740.254	763.671	745.113	735.473	724.801	701.661	674.068	702.85535
Standard Error	14.050	11.486	13.778	17.933	16.413	9.447	8.495	9.550	12.599	15.480	14.778	14.906
Median	735.556	701.704	744.009	784.219	784.219	784.219	745.331	755.106	755.1055	745.786	718.83	745.331
Mode	809.415	721.229	784.43	784.219	872.404	784.219	745.331	867.896	867.896	872.404	718.83	809.415
Standard Deviation	153.913	126.872	155.881	193.148	179.048	95.880	89.505	97.865	130.939	158.623	157.097	163.297
Sample Variance	23689.307	16096.513	24298.973	37306.376	32058.236	9193.050	8011.2817	9577.752	17145.198	25161.555	24679.758	26666.212
Kurtosis	-1.224	-1.039	0.319	-0.277	0.993	-1.118	-1.364	-1.617	-1.398	-1.519	-0.554	-1.122
Skewness	-0.309	-0.365	-1.056	-0.693	-1.146	-0.217	-0.283	-0.101	-0.348	-0.221	0.266	-0.216
Range	470.822	546.208	557.622	652.268	673.005	327.954	283.375	278.1	411.336	457.287	664.045	530.569
Minimum	439.496	402.04	380.644	348.549	312.175	579.037	583.221	589.796	489.686	463.991	450.709	436.644
Maximum	910.318	948.248	938.266	1000.817	985.18	906.991	866.596	867.896	901.022	921.278	1114.754	967.213
Sum	82309.567	79731.137	90768.483	84853.931	88090.259	78658.16	82707.599	77224.673	78278.598	73674.466	76169.701	84342.642
Count	120	122	128	116	119	103	111	105	108	105	113	120
Confidence Level (95.0%)	27.820	22.740	27.264	35.522	32.502	18.738	16.836	18.939	24.977	30.697	29.281	29.517

.

Table 7.3.c; NSX - AEI, AGR and RES, descriptive statistics output for JTOTY data

	JANUARY TURN of the YEAR											
	JTOTYPre 2 days	JTOTYPre 1 day	JTOTYPst 1 day	JTOTYPst2 day	JTOTYPst3 day	JTOTYPst4 day	JTOTYPst5 day	JTOTYPst6 day	JTOTYPst7 day	JTOTYPst8 day	JTOTYPst9 day	JTOTYPst10 day
	NSX-AEI											
Mean	1169.204	1172.335	1169.627	1169.337	1168.518	1167.97	1168.394	1168.533	1167.683	1167.051	1166.514	1164.818
Standard Error	85.208	86.341	85.337	85.828	86.521	87.008	87.165	87.202	87.166	86.953	90.009	89.657
Median	1272.961	1273.533	1273.075	1273.075	1273.112	1273.112	1273.112	1272.672	1270.241	1270.052	1272.786	1273.888
Mode	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Standard Deviation	208.716	211.491	209.033	210.235	211.933	213.125	213.510	213.601	213.514	212.992	220.477	219.615
Sample Variance	43562.425	44728.709	43695.134	44198.943	44915.751	45422.548	45586.607	45625.405	45588.274	45365.969	48610.298	48230.924
Kurtosis	-0.507	-0.548	-0.510	-0.474	-0.412	-0.367	-0.374	-0.3727	-0.398	-0.390	-0.288	-0.309
Skewness	-1.134	-1.112	-1.133	-1.139	-1.150	-1.158	-1.155	-1.155	-1.146	-1.149	-1.166	-1.171
Range	496.188	508.285	495.556	498.645	503.77	507.281	510.618	512.333	512.333	511.973	528.969	526.721
Minimum	831.374	831.374	831.374	828.285	823.23	819.69	819.69	819.69	819.69	819.69	804.52	804.52
Maximum	1327.562	1339.659	1326.93	1326.93	1327	1326.971	1330.308	1332.023	1332.023	1331.663	1333.489	1331.241
Sum	7015.226	7034.012	7017.764	7016.022	7011.111	7007.82	7010.364	7011.199	7006.098	7002.311	6999.084	6988.908
Count	6	6	6	6	6	6	6	6	6	6	6	6
Confidence Level(95.0%)	219.034	221.946	219.367	220.628	222.410	223.661	224.065	224.160	224.069	223.522	231.376	230.472
	NSX-AGR											
Mean	941.930	941.930	941.930	941.930	941.930	940.018	936.194	936.194	936.194	934.282	932.63	926.205
Standard Error	70.818	70.818	70.818	70.818	70.818	70.524	70.089	70.089	70.089	69.949	69.170	66.546
Median	961.738	961.738	961.738	961.738	961.738	956.001	944.528	944.528	944.528	938.792	938.792	938.792
Mode	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Standard Deviation	173.467	173.467	173.467	173.467	173.467	172.748	171.683	171.683	171.683	171.340	169.433	163.003
Sample Variance	30091.146	30091.146	30091.146	30091.146	30091.146	29841.939	29475.154	29475.154	29475.154	29357.577	28707.687	26570.303
Kurtosis	2.156	2.156	2.156	2.156	2.156	2.151	2.084	2.084	2.0844	2.020	2.135	2.605
Skewness	-1.360	-1.360	-1.360	-1.360	-1.360	-1.333	-1.263	-1.263	-1.263	-1.222	-1.269	-1.395
Range	474.648	474.648	474.648	474.648	474.648	474.648	474.648	474.648	474.648	474.648	464.736	464.736
Minimum	627.679	627.679	627.679	627.679	627.679	627.679	627.679	627.679	627.679	627.679	627.679	627.679
Maximum	1102.327	1102.327	1102.327	1102.327	1102.327	1102.327	1102.327	1102.327	1102.327	1102.327	1092.415	1092.415
Sum	5651.584	5651.584	5651.584	5651.584	5651.584	5640.111	5617.165	5617.165	5617.165	5605.692	5595.78	5557.232

	JANUARY TURN of the YEAR											
	JTOTYPre 2 days	JTOTYPre 1 day	JTOTYPst 1 day	JTOTYPst2 day	JTOTYPst3 day	JTOTYPst4 day	JTOTYPst5 day	JTOTYPst6 day	JTOTYPst7 day	JTOTYPst8 day	JTOTYPst9 day	JTOTYPst10 day
Count	6	6	6	6	6	6	6	6	6	6	6	6
Confidence Level(95.0%)	182.043	182.043	182.043	182.043	182.043	181.288	180.170	180.170	180.170	179.810	177.809	171.062
	NSX-RES											
Mean	698.793	705.687	699.791	698.162	698.710	698.811	700.951	701.242	700.907	700.713	692.912	692.304
Standard Error	72.398	69.394	71.497	71.308	71.392	71.348	70.444	70.093	70.340	70.684	70.477	71.228
Median	749.862	749.8625	748.22	743.332	744.978	744.978	744.978	744.91	744.91	745.727	721.319	723.772
Mode	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Standard Deviation	177.339	169.981	175.133	174.670	174.874	174.766	172.552	171.693	172.297	173.139	172.632	174.473
Sample Variance	31449.303	28893.783	30671.783	30509.648	30581.175	30543.448	29774.310	29478.642	29686.527	29977.410	29802.119	30440.939
Kurtosis	-0.885	-0.222	-0.807	-0.802	-0.809	-0.800	-0.582	-0.664	-0.642	-0.637	-0.876	-1.028
Skewness	-0.601	-0.685	-0.592	-0.557	-0.568	-0.569	-0.597	-0.574	-0.583	-0.595	-0.370	-0.368
Range	473.674	470.822	470.822	470.822	470.822	470.822	470.822	466.802	468.812	470.822	468.812	468.812
Minimum	436.644	439.496	439.496	439.496	439.496	439.496	439.496	443.516	441.506	439.496	441.506	441.506
Maximum	910.318	910.318	910.318	910.318	910.318	910.318	910.318	910.318	910.318	910.318	910.318	910.318
Sum	4192.762	4234.127	4198.747	4188.972	4192.264	4192.871	4205.709	4207.452	4205.442	4204.282	4157.476	4153.824
Count	6	6	6	6	6	6	6	6	6	6	6	6
Confidence Level(95.0%)	186.106	178.384	183.791	183.305	183.519	183.406	181.082	180.181	180.8154383	181.699	181.167	183.098

SMALL NO. IV'S IN SAMPLE

.

7.3.d.1; NSX - AEI, AGR and RES, descriptive statistics output for TOTM data

TURN of the MONTH					
	TOTMPre1 day	TOTMPst1 day	TOTMPst2 day	TOTMPst3 day	TOTMPst4 day
NSX-AEI					
Mean	1226.676	1225.968	1225.671	1225.804	1226.411
Standard Error	20.862	20.860	20.767	20.652	20.7198
Median	1305.972	1306.334	1306.871	1307.331	1303.914
Mode	#N/A	#N/A	#N/A	#N/A	#N/A
Standard Deviation	169.491	169.467	168.716	167.782	168.328
Sample Variance	28727.323	28719.214	28465.103	28150.939	28334.494
Kurtosis	0.302	0.330	0.357	0.332	0.341
Skewness	-1.410	-1.424	-1.427	-1.420	-1.423
Range	553.473	549.905	554.712	550.31	551.22
Minimum	820.43	820.43	820.43	823.23	819.69
Maximum	1373.903	1370.335	1375.142	1373.54	1370.91
Sum	80960.653	80913.924	80894.342	80903.12	80943.167
Count	66	66	66	66	66
Confidence Level (95.0%)	41.666	41.660	41.475	41.246	41.380
NSX-AGR					
Mean	912.263	910.845	909.845	908.858	910.162
Standard Error	18.721	18.788	18.945	19.023	18.980
Median	960.2245	960.2245	960.018	960.018	962.441
Mode	644.417	644.417	644.417	644.417	644.417
Standard Deviation	152.095	152.638	153.915	154.551	154.195
Sample Variance	23132.963	23298.557	23689.8705	23886.139	23776.211
Kurtosis	-0.530	-0.591	-0.631	-0.679	-0.678
Skewness	-0.867	-0.855	-0.835	-0.817	-0.823
Range	502.726	482.901	482.901	502.726	502.726
Minimum	627.679	627.679	627.679	627.679	627.679
Maximum	1130.405	1110.58	1110.58	1130.405	1130.405
Sum	60209.362	60115.772	60049.781	59984.664	60070.705
Count	66	66	66	66	66

Confidence Level (95.0%)	37.389	37.523	37.837	37.993	37.905
NSX-RES					
Mean	715.987	714.297	713.322	714.482	715.683
Standard Error	18.490	18.471	18.399	18.460	18.584
Median	744.052	745.331	743.402	745.331	745.331
Mode	872.404	784.219	872.404	745.331	784.219
Standard Deviation	150.221	150.059	149.476	149.975	150.983
Sample Variance	22566.437	22517.987	22343.335	22492.624	22795.945
Kurtosis	-0.237	-0.323	-0.120	-0.055	-0.095
Skewness	-0.621	-0.624	-0.709	-0.683	-0.640
Range	618.664	607.966	655.038	673.005	673.005
Minimum	348.549	359.247	312.175	312.175	312.175
Maximum	967.213	967.213	967.213	985.18	985.18
Sum	47255.165	47143.622	47079.262	47155.823	47235.119
Count	66	66	66	66	66
Confidence Level (95.0%)	36.929	36.889	36.746	36.868	37.116

Table 7.3.e; NSX - AEI, AGR and RES, descriptive statistics output for EOFYA data

END of FINANCIAL YEAR AUSTRALIA					
	EOFYAPre3 day	EOFYAPre2 day	EOFYAPre1 day	EOFYAPst1 day	EOFYAPst2 day
NSX-AEI					
Mean	1228.0084	1225.810	1238.645	1238.327	1237.673
Standard Error	88.927	93.073	86.341	84.611	84.451
Median	1311.137	1312.188	1324.177	1318.932	1313.916
Mode	#N/A	#N/A	#N/A	#N/A	#N/A
Standard Deviation	198.847	208.117	193.065	189.198	188.839
Sample Variance	39540.227	43313.0477	37274.3607	35795.902	35660.371
Kurtosis	4.906	4.896	4.928	4.931	4.930
Skewness	-2.209	-2.207	-2.216	-2.216	-2.216
Range	462.289	484.576	445.171	436.811	436.811
Minimum	873.14	854.488	893.893	900.461	900.461
Maximum	1335.429	1339.064	1339.064	1337.272	1337.272
Sum	6140.042	6129.053	6193.228	6191.636	6188.365
Count	5	5	5	5	5
Confidence Level(95.0%)	246.901	258.412	239.722	234.920	234.475
NSX-AGR					
Mean	887.2402	891.724	904.894	904.8944	904.894
Standard Error	72.533	73.719	76.339	76.339	76.339
Median	925.089	925.089	978.084	978.084	978.084
Mode	#N/A	#N/A	#N/A	#N/A	#N/A
Standard Deviation	162.188	164.841	170.700	170.700	170.700
Sample Variance	26305.181	27172.743	29138.567	29138.567	29138.567
Kurtosis	0.817	0.563	0.316	0.316	0.316
Skewness	-0.683	-0.746	-0.980	-0.980	-0.980
Range	435.236	435.236	435.236	435.236	435.236
Minimum	644.417	644.417	644.417	644.417	644.417
Maximum	1079.653	1079.653	1079.653	1079.653	1079.653
Sum	4436.201	4458.621	4524.472	4524.472	4524.472
Count	5	5	5	5	5

Confidence Level(95.0%)	201.383	204.677	211.952	211.952	211.952
NSX-RES					
Mean	766.1758	750.538	754.459	753.383	752.484
Standard Error	51.971	42.947	41.094	42.021	43.505
Median	794.205	794.205	794.205	794.205	794.205
Mode	#N/A	#N/A	#N/A	#N/A	#N/A
Standard Deviation	116.210	96.034	91.890	93.962	97.280
Sample Variance	13504.947	9222.551	8443.779	8828.927	9463.448
Kurtosis	-0.657	-0.577	0.003	0.183	0.830
Skewness	-0.357	-1.007	-1.110	-1.149	-1.280
Range	300.159	221.97	215.395	220.774	230.637
Minimum	606.832	606.832	613.407	608.028	598.165
Maximum	906.991	828.802	828.802	828.802	828.802
Sum	3830.879	3752.69	3772.297	3766.918	3762.42
Count	5	5	5	5	5
Confidence Level (95.0%)	144.294	119.242	114.096	116.669	120.789
SMALL NO. IV'S IN SAMPLE					

Table 7.3.f.1; NSX - AEI, AGR and RES, descriptive statistics output for Australian holiday's data

HOLIDAYS			
	HOLPre2 days	HOLPre1 day	HOLPst1 day
NSX-AEI			
Mean	1217.479	1211.147	1210.514
Standard Error	31.156	30.871	30.788
Median	1301.278	1301.157	1300.928
Mode	831.374	831.374	988.351
Standard Deviation	178.981	180.008	179.528
Sample Variance	32034.222	32402.908	32230.373
Kurtosis	-0.137	-0.435	-0.432
Skewness	-1.247	-1.131	-1.134
Range	544.821	539.536	538.689
Minimum	831.374	831.374	831.374
Maximum	1376.195	1370.91	1370.063
Sum	40176.839	41179.009	41157.488
Count	33	34	34
Confidence Level (95.0%)	63.463	62.807	62.640
NSX-AGR			
Mean	926.485	926.036	923.951
Standard Error	26.279	25.519	25.448
Median	946.814	948.183	936.283
Mode	627.679	627.679	1001.014
Standard Deviation	150.962	148.800	148.388
Sample Variance	22789.678	22141.588	22019.079
Kurtosis	-0.035	0.030	0.0007
Skewness	-0.952	-0.955	-0.922
Range	476.631	476.631	474.648
Minimum	627.679	627.679	627.679
Maximum	1104.31	1104.31	1102.327
Sum	30574.027	31485.251	31414.342
Count	33	34	34
Confidence Level (95.0%)	53.528	51.918	51.775

HOLIDAYS			
	HOLPre2 days	HOLPre1 day	HOLPst1 day
NSX=RES			
Mean	721.040	725.628	725.073
Standard Error	26.724	26.119	25.960
Median	757.7	756.047	752.751
Mode	809.415	784.219	784.219
Standard Deviation	153.522	152.299	151.376
Sample Variance	23569.168	23194.988	22914.930
Kurtosis	-0.293	-0.175	-0.207
Skewness	-0.719	-0.717	-0.760
Range	604.536	604.536	573.26
Minimum	380.644	380.644	380.644
Maximum	985.18	985.18	953.904
Sum	23794.341	24671.356	24652.493
Count	33	34	34
Confidence Level (95.0%)	54.436	53.139	52.817

Table 7.3.g.1; NSX - AEI, AGR and RES, descriptive statistics output for Australian federal elections data

AUSTRALIAN FEDERAL ELECTION			
	AFEPre1 day	AFEPst1 day	AFEPost2 day
NSX-AEI			
Mean	1163.344	1170.832	1178.569
Standard Error	163.344	155.857	148.119
Median	1163.344	1170.832	1178.569
Mode	#N/A	#N/A	#N/A
Standard Deviation	231.004	220.415	209.472
Sample Variance	53362.851	48582.808	43878.772
Kurtosis	#DIV/0!	#DIV/0!	#DIV/0!
Skewness	#DIV/0!	#DIV/0!	#DIV/0!
Range	326.689	311.714	296.239
Minimum	1000	1014.975	1030.45
Maximum	1326.689	1326.689	1326.689
Sum	2326.689	2341.664	2357.139
Count	2	2	2
Confidence Level (95.0%)	2075.488	1980.350	1882.036
NSX-AGR			
Mean	981.220	981.220	981.220
Standard Error	18.779	18.779	18.779
Median	981.220	981.220	981.220
Mode	#N/A	#N/A	#N/A
Standard Deviation	26.558	26.558	26.558
Sample Variance	705.339	705.339	705.339
Kurtosis	#DIV/0!	#DIV/0!	#DIV/0!
Skewness	#DIV/0!	#DIV/0!	#DIV/0!
Range	37.559	37.559	37.559
Minimum	962.441	962.441	962.441
Maximum	1000	1000	1000
Sum	1962.441	1962.441	1962.441
Count	2	2	2
Confidence Level (95.0%)	238.616	238.616	238.616

AUSTRALIAN FEDERAL ELECTION			
	AFEPre1 day	AFEPst1 day	AFEPost2 day
NSX-RES			
Mean	900.161	941.144	957.538
Standard Error	99.839	140.822	157.216
Median	900.161	941.144	957.538
Mode	#N/A	#N/A	#N/A
Standard Deviation	141.193	199.153	222.336
Sample Variance	19935.651	39661.953	49433.741
Kurtosis	#DIV/0!	#DIV/0!	#DIV/0!
Skewness	#DIV/0!	#DIV/0!	#DIV/0!
Range	199.678	281.645	314.432
Minimum	800.322	800.322	800.322
Maximum	1000	1081.967	1114.754
Sum	1800.322	1882.289	1915.076
Count	2	2	2
Confidence Level (95.0%)	1268.574	1789.319	1997.618
VERY SMALL NO. IV'S IN SAMPLE			

Table 7.3.h; NSX - AEI, AGR and RES, descriptive statistics output for US Elections

US PRESIDENTIAL ELECTION					
	USPEPre3 day	USPEPre2 day	USPEPre1 day	USPEPst1 day	USPEPst2 day
NSX-AEI					
Mean	1083.578	1079.648	1079.473	1079.473	1085.014
Standard Error	229.016	228.203	239.584	239.584	234.0425
Median	1083.578	1079.648	1079.473	1079.473	1085.0145
Mode	#N/A	#N/A	#N/A	#N/A	#N/A
Standard Deviation	323.878	322.728	338.822	338.822	330.986
Sample Variance	104897.114	104153.674	114800.986	114800.986	109551.783
Kurtosis	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Skewness	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Range	458.033	456.407	479.168	479.168	468.085
Minimum	854.562	851.445	839.889	839.889	850.972
Maximum	1312.595	1307.852	1319.057	1319.057	1319.057
Sum	2167.157	2159.297	2158.946	2158.946	2170.029
Count	2	2	2	2	2
Confidence Level(95.0%)	2909.930	2899.600	3044.203	3044.203	2973.791
NSX-AGR					
Mean	1029.735	1029.735	1026.575	1026.575	1026.575
Standard Error	0.2475	0.2475	2.9125	2.9125	2.912
Median	1029.735	1029.735	1026.575	1026.575	1026.575
Mode	#N/A	#N/A	#N/A	#N/A	#N/A
Standard Deviation	0.350	0.350	4.118	4.118	4.118
Sample Variance	0.122	0.122	16.965	16.965	16.965
Kurtosis	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Skewness	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Range	0.495	0.495	5.825	5.825	5.825
Minimum	1029.488	1029.488	1023.663	1023.663	1023.663
Maximum	1029.983	1029.983	1029.488	1029.488	1029.488
Sum	2059.471	2059.471	2053.151	2053.151	2053.151
Count	2	2	2	2	2
Confidence Level(95.0%)	3.144	3.144	37.006	37.006	37.006
NSX-RES					
Mean	637.489	624.725	631.001	631.001	631.001
Standard Error	97.903	94.105	87.829	87.829	87.829
Median	637.489	624.725	631.001	631.001	631.001
Mode	#N/A	#N/A	#N/A	#N/A	#N/A
Standard Deviation	138.456	133.084	124.208	124.208	124.208
Sample Variance	19170.190	17711.502	15427.866	15427.866	15427.866
Kurtosis	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Skewness	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Range	195.807	188.21	175.658	175.658	175.658
Minimum	539.586	530.62	543.172	543.172	543.172
Maximum	735.393	718.83	718.83	718.83	718.83
Sum	1274.97	1249.45	1262.002	1262.002	1262.002
Count	2	2	2	2	2
Confidence Level (95.0%)	1243.981	1195.717	1115.973	1115.973	1115.973
VERY SMALL NO. IV'S IN SAMPLE					

Table 7.3.i.1; NSX - AEI, AGR and RES, descriptive statistics output for the AFL Grand Final

AFL GRAND FINAL					
	AFLGFPre3 day	AFLGFPre2 day	AFLGFPre1 day	AFLGFPst1 day	AFLGFPst2 day
NSX-AEI					
Mean	1246.996	1247.670	1246.134	1246.718	1244.511
Standard Error	74.635	73.547	73.271	73.434	72.769
Median	1327.035	1328.151	1327.928	1327.273	1324.827
Mode	#N/A	#N/A	#N/A	#N/A	1324.827
Standard Deviation	182.818	180.153	179.478	179.877	178.248
Sample Variance	33422.707	32455.144	32212.667	32356.0321	31772.361
Kurtosis	5.164	5.130	5.110	5.087	5.207
Skewness	-2.2531	-2.246	-2.241	-2.235	-2.262
Range	471.562	465.266	465.898	468.202	461.826
Minimum	881.102	887.398	887.398	887.398	887.398
Maximum	1352.664	1352.664	1353.296	1355.6	1349.224
Sum	7481.977	7486.022	7476.807	7480.31	7467.068
Count	6	6	6	6	6
Confidence Level (95.0%)	191.856	189.059	188.351	188.770	187.059
NSX-AGR					
Mean	893.056	893.056	893.056	896.880	892.061
Standard Error	63.621	63.621	63.621	65.537	64.319
Median	962.441	962.441	962.441	962.441	962.235
Mode	962.441	962.441	962.441	962.441	962.441
Standard Deviation	155.839	155.839	155.839	160.532	157.550
Sample Variance	24286.007	24286.007	24286.007	25770.740	24822.304
Kurtosis	-1.121	-1.121	-1.121	-1.100	-1.005
Skewness	-0.917	-0.917	-0.917	-0.813	-0.764
Range	388.162	388.162	388.162	411.108	411.108
Minimum	657.097	657.097	657.097	657.097	657.097
Maximum	1045.259	1045.259	1045.259	1068.205	1068.205
Sum	5358.336	5358.336	5358.336	5381.282	5352.371
Count	6	6	6	6	6

Confidence Level (95.0%)	163.543	163.543	163.543	168.468	165.339
NSX-RES					
Mean	737.993	744.224	741.316	740.594	737.216
Standard Error	61.637	65.048	66.428	66.259	64.733
Median	801.930	807.349	806.2655	804.098	791.544
Mode	#N/A	#N/A	#N/A	#N/A	791.544
Standard Deviation	150.979	159.336	162.716	162.300	158.563
Sample Variance	22794.790	25388.225	26476.558	26341.542	25142.249
Kurtosis	-0.600	-0.839	-0.922	-0.914	-1.010
Skewness	-1.0517	-0.923	-0.913	-0.905	-0.816
Range	371.38	404.506	410.82	410.82	404.187
Minimum	496.516	496.516	490.202	490.202	496.835
Maximum	867.896	901.022	901.022	901.022	901.022
Sum	4427.959	4465.348	4447.9	4443.565	4423.297
Count	6	6	6	6	6
Confidence Level (95.0%)	158.443	167.213	170.760	170.324	166.401
SMALL NO. IV'S IN SAMPLE					

.

Table 7.3.j.1; NSX - AEI, AGR and RES, descriptive statistics output for the NRL Grand Final

NRL GRAND FINAL					
	NRLGFPre3 day	NRLGFPre2 day	NRLGFPre1 day	NRLGFPst1 day	NRLGFPst2 day
NSX-AEI					
Mean	1230.496	1224.189	1222.056	1222.392	1226.668
Standard Error	88.303	86.392	85.821	85.936	86.392
Median	1324.827	1322.172	1320.908	1320.082	1324.827
Mode	#N/A	#N/A	#N/A	#N/A	#N/A
Standard Deviation	197.452	193.178	191.901	192.160	193.180
Sample Variance	38987.585	37318.033	36826.304	36925.830	37318.650
Kurtosis	4.174	4.315	4.325	4.312	4.268
Skewness	-2.032	-2.066	-2.070	-2.066	-2.056
Range	464.935	455.437	448.368	450.877	453.455
Minimum	884.289	884.289	884.289	884.289	887.133
Maximum	1349.224	1339.726	1332.657	1335.166	1340.588
Sum	6152.48	6120.945	6110.281	6111.964	6133.34
Count	5	5	5	5	5
Confidence Level (95.0%)	245.169	239.863	238.277	238.599	239.865
NSX-AGR					
Mean	877.085	877.085	877.085	873.872	868.090
Standard Error	81.910	81.910	81.910	80.079	78.151
Median	962.441	962.441	962.441	962.441	962.029
Mode	#N/A	#N/A	#N/A	#N/A	#N/A
Standard Deviation	183.157	183.157	183.157	179.062	174.752
Sample Variance	33546.729	33546.729	33546.729	32063.442	30538.344
Kurtosis	-2.735	-2.735	-2.735	-2.835	-2.686
Skewness	-0.441	-0.441	-0.441	-0.500	-0.444
Range	411.108	411.108	411.108	395.046	395.046
Minimum	657.097	657.097	657.097	657.097	657.097
Maximum	1068.205	1068.205	1068.205	1052.143	1052.143
Sum	4385.425	4385.425	4385.425	4369.363	4340.452
Count	5	5	5	5	5

Confidence Level (95.0%)	227.420	227.420	227.420	222.335	216.983
NSX-RES					
Mean	729.753	728.438	725.382	725.382	740.035
Standard Error	76.750	77.286	78.982	78.982	84.624
Median	791.544	791.544	791.544	791.544	791.544
Mode	#N/A	#N/A	#N/A	#N/A	#N/A
Standard Deviation	171.620	172.818	176.611	176.611	189.226
Sample Variance	29453.531	29866.282	31191.489	31191.489	35806.661
Kurtosis	-1.815	-1.966	-2.067	-2.067	-2.374
Skewness	-0.611	-0.586	-0.577	-0.577	-0.463
Range	404.506	404.506	410.82	410.82	424.443
Minimum	496.516	496.516	490.202	490.202	496.835
Maximum	901.022	901.022	901.022	901.022	921.278
Sum	3648.768	3642.193	3626.913	3626.913	3700.177
Count	5	5	5	5	5
Confidence Level (95.0%)	213.094	214.582	219.291	219.291	234.955
SMALL NO. IV'S IN SAMPLE					

MELBOURNE CUP					
	MCPre3 day	MCPre2 day	MCPre1 day	MCPst1 day	MCPst2 day
NSX-AEI					
Mean	1208.8434	1207.271	1207.360	1207.196	1209.64
Standard Error	89.164	89.512	92.590	92.623	90.501
Median	1306.093	1306.093	1310.21	1311.4	1311.632
Mode	#N/A	#N/A	#N/A	#N/A	#N/A
Standard Deviation	199.378	200.157	207.037	207.112	202.367
Sample Variance	39751.767	40062.832	42864.700	42895.580	40952.681
Kurtosis	4.722	4.741	4.674	4.640	4.614
Skewness	-2.164	-2.169	-2.153	-2.145	-2.138
Range	458.512	461.629	479.168	479.168	468.085
Minimum	854.562	851.445	839.889	839.889	850.972
Maximum	1313.074	1313.074	1319.057	1319.057	1319.057
Sum	6044.217	6036.357	6036.801	6035.982	6048.2
Count	5	5	5	5	5
Confidence Level (95.0%)	247.561	248.527	257.071	257.164	251.272
NSX-AGR					
Mean	934.790	934.790	933.526	933.526	933.526
Standard Error	75.712	75.712	75.325	75.325	75.325
Median	1029.488	1029.488	1023.663	1023.663	1023.663
Mode	#N/A	#N/A	#N/A	#N/A	#N/A
Standard Deviation	169.299	169.299	168.432	168.432	168.432
Sample Variance	28662.254	28662.254	28369.433	28369.433	28369.433
Kurtosis	3.291	3.291	3.326	3.326	3.326
Skewness	-1.839	-1.839	-1.844	-1.844	-1.844
Range	400.842	400.842	400.842	400.842	400.842
Minimum	644.417	644.417	644.417	644.417	644.417
Maximum	1045.259	1045.259	1045.259	1045.259	1045.259
Sum	4673.951	4673.951	4667.631	4667.631	4667.631
Count	5	5	5	5	5
Confidence Level (95.0%)	210.212	210.212	209.136	209.136	209.136
NSX-RES					
Mean	672.150	667.044	669.843	669.834	670.021
Standard Error	73.241	73.414	72.794	74.133	74.186
Median	735.393	718.83	718.83	718.83	718.83
Mode	#N/A	#N/A	#N/A	#N/A	#N/A
Standard Deviation	163.773	164.159	162.772	165.767	165.886
Sample Variance	26821.781	26948.415	26494.939	27478.954	27518.276
Kurtosis	-1.730	-1.709	-1.533	-1.570	-1.582
Skewness	-0.178	-0.083	-0.129	-0.190	-0.193
Range	401.81	401.81	404.115	411.03	411.03
Minimum	470.594	470.594	468.289	461.374	461.374
Maximum	872.404	872.404	872.404	872.404	872.404
Sum	3360.751	3335.222	3349.216	3349.171	3350.108
Count	5	5	5	5	5
Confidence Level (95.0%)	203.351	203.831	202.108	205.827	205.975
SMALL NO. IV'S IN SAMPLE					

Table 7.3.k.1; NSX - AEI, AGR and RES, descriptive statistics output for the Melbourne Cup

Table 7.4.2.a.1, NSX-AEI Regression Output Inclusive of all Independent Variables

NSX-AEI Regression Output all Independent Variables				
Source	SS	df	MS	Number obs = 1369
			F(87, 1281) = 216.93	
Model	35917838.5	87	412848.718	Prob > F = 0
Residual	2437922.93	1281	1903.140	R-squared = 0.936
			Adj R-squared = 0.932	
Total	38355761.4	1368	28037.837	Root MSE = 43.625

Ind. Variable	Coef.	Std. Err.	t	P>t	95% Conf. Interval	
AGBR2yrs	366.660	36.7915	9.97	0	294.482	438.838
AGBR3yrs	-593.047	54.319	-10.92	0	-699.613	-486.482
AGBR5yrs	86.720	45.046	1.93	0.054	-1.653	175.094
AGBR10yrs	207.637	21.037	9.87	0	166.365	248.909
CRInterbankRate	11.887	13.169	0.9	0.367	-13.949	37.723
BAB30days	-173.354	25.487	-6.8	0	-223.356	-123.352
BAB90days	-250.871	30.469	-8.23	0	-310.648	-191.095
BAB180days	290.635	25.566	11.37	0	240.478	340.792
USD	2065.75	384.524	5.37	0	1311.384	2820.116
TWI	-83.188	13.513	-6.16	0	-109.7	-56.677
EUR	2689.049	188.396	14.27	0	2319.45	3058.648
JPY	4.040	1.639	2.46	0.014	0.824	7.256
GBP	-650.645	131.608	-4.94	0	-908.837	-392.453
CHFSwissFranc	-669.443	96.024	-6.97	0	-857.825	-481.060
NZD	410.681	66.630	6.16	0	279.963	541.398
CAD	-46.441	109.982	-0.42	0.673	-262.207	169.324
HKD	-8.830	8.103	-1.09	0.276	-24.727	7.066
SGD	917.680	197.727	4.64	0	529.775	1305.586
MYR	101.835	51.610	1.97	0.049	0.585	203.085
TWD	31.617	6.169	5.12	0	19.513	43.722
KRW	-0.188	0.091	-2.07	0.038	-0.367	-0.010
IDR	-0.051	0.009	-5.43	0	-0.069	-0.032

CNY	66.0571	37.226	1.77	0.076	-6.975	139.089
DOW1	-4.064	8.640	-0.47	0.638	-21.015	12.887
DOW2	-3.639	9.405	-0.39	0.699	-22.090	14.812
DOW3	-4.228	9.409	-0.45	0.653	-22.687	14.230
DOW4	-1.250	9.424	-0.13	0.894	-19.740	17.239
DOW5	-1.932	9.312	-0.21	0.836	-20.202	16.336
MOTY1	39.044	8.023	4.87	0	23.303	54.786
MOTY2	23.694	6.611	3.58	0	10.723	36.664
MOTY3	53.7307	7.531	7.13	0	38.954	68.506
MOTY4	78.184	7.8904	9.91	0	62.704	93.663
MOTY5	56.628	7.590	7.46	0	41.737	71.520
MOTY6	29.504	7.855	3.76	0	14.093	44.915
MOTY7	-3.379	7.374	-0.46	0.647	-17.846	11.087
MOTY8	-3.127	7.139	-0.44	0.661	-17.133	10.879
MOTY9	21.778	7.339	2.97	0.003	7.379	36.177
MOTY10	18.359	6.994	2.62	0.009	4.637	32.082
MOTY11	0	(omitted)				
MOTY12	-0.336	6.727	-0.05	0.96	-13.535	12.861
JTOTYPre2day	2.588	20.650	0.13	0.9	-37.925	
JTOTYPre1day	13.722	20.681	0.66	0.507	-26.850	43.101
JTOTYPost1day	-34.036	20.868	-1.63	0.103	-74.976	54.296
JTOTYPost2day	-29.724	19.897	-1.49	0.135	-68.760	6.903
JTOTYPost3day	-49.494	19.764	-2.5	0.012	-88.268	9.311
JTOTYPost4day	-54.127	19.764	-2.74	0.006	-92.901	-10.720
JTOTYPost5day	-56.543	18.873	-3	0.003	-93.569	-15.353
JTOTYPost6day	-55.382	18.872	-2.93	0.003	-92.405	-19.517
JTOTYPost7day	-55.801	18.854	-2.96	0.003	-92.790	-18.358
JTOTYPost8day	-53.420	18.834	-2.84	0.005	-90.371	-18.813
JTOTYPost9day	-56.534	20.520	-2.76	0.006	-96.791	-16.469
JTOTYPost10day	-49.059	18.839	-2.6	0.009	-86.018	-16.277
TOTMPre1day	1.013	6.398	0.16	0.874	-11.538	-12.099
TOTMPost1day	-5.757	6.409	-0.9	0.369	-18.331	13.565
TOTMPost2day	-4.716	6.414	-0.74	0.462	-17.300	6.817

TOTMPost3day	1.788	6.036	0.3	0.767	-10.053	7.866
TOTMPost4day	3.566	5.933	0.6	0.548	-8.074	13.630
EOFYAPre3day	-6.074	20.122	-0.3	0.763	-45.551	15.206
EOFYAPre2day	-9.876	20.131	-0.49	0.624	-49.370	33.402
EOFYAPre1day	3.308	21.098	0.16	0.875	-38.083	29.617
EOFYAPost1day	32.926	21.079	1.56	0.119	-8.427	44.699
EOFYAPost2day	34.794	21.057	1.65	0.099	-6.515	74.280
HOLPre2days	-0.974	8.423	-0.12	0.908	-17.500	76.105
HOLPre1day	-0.029	8.517	0	0.997	-16.739	15.551
HOLPost1day	1.749	8.551	0.2	0.838	-15.026	16.681
AFEPre1day	-21.004	31.507	-0.67	0.505	-82.817	18.524
AFEPost1day	-20.831	31.494	-0.66	0.508	-82.617	40.807
AFEPost2day	-1.718	31.506	-0.05	0.957	-63.527	40.955
USPEPre3day	10.444	40.549	0.26	0.797	-69.106	60.090
USPEPre2day	-15.305	40.747	-0.38	0.707	-95.245	89.995
USPEPre1day	-44.550	40.705	-1.09	0.274	-124.407	64.633
USPEPost1day	-56.920	40.790	-1.4	0.163	-136.943	35.306
USPEPost2day	-40.522	40.357	-1	0.316	-119.697	23.101
AFLGFPre3day	6.289	21.902	0.29	0.774	-36.680	38.651
AFLGFPre2day	10.600	22.099	0.48	0.632	-32.755	49.258
AFLGFPre1day	18.118	21.999	0.82	0.41	-25.040	53.955
AFLGFPost1day	22.616	21.828	1.04	0.3	-20.208	61.277
AFLGFPost2day	-0.035	21.792	0	0.999	-42.788	65.440
NRLGFPre3day	20.539	23.638	0.87	0.385	-25.835	42.717
NRLGFPre2day	17.239	24.036	0.72	0.473	-29.916	66.914
NRLGFPre1day	6.625	24.246	0.27	0.785	-40.941	64.395
NRLGFPost1day	9.520	24.820	0.38	0.701	-39.172	54.191
NRLGFPost2day	36.896	24.405	1.51	0.131	-10.982	58.213
MCPre3day	-21.584	25.942	-0.83	0.406	-72.478	84.776
MCPre2day	-16.053	26.279	-0.61	0.541	-67.610	29.309
MCPre1day	11.348	26.132	0.43	0.664	-39.919	35.502
MCPost1day	15.864	26.313	0.6	0.547	-35.757	62.616

MCPost2day	9.368	26.209	0.36	0.721	-42.048	67.487
_cons	1671.301	99.563	16.79	0	1475.976	60.786

Note: MOTY11 omitted because of collinearity

Table 7.4.3.a.1; NSX-AEI Piecewise Regression Results All Macroeconomic Variables

NSX-AEI Piecewise Regression Results Macroeconomic Variables

Source	SS	df	MS	
				Number of obs = 1370
				F(23, 1346) = 684.2
Model	35342037.8	23	1536610.34	Prob > F = 0
Residual	3022894.47	1346	2245.835	R-squared = 0.921
				Adj R-squared = 0.919
Total	38364932.3	1369	28024.055	Root MSE = 47.39

Ind. Var.	Coef.	Std. Err.	t	P>t	95% Conf. Interval	
AGBR2yrs	266.243	37.508	7.1	0	192.661	339.825
AGBR3yrs	-552.033	54.984	-10.04	0	-659.898	-444.169
AGBR5yrs	130.580	45.587	2.86	0.004	41.150	220.011
AGBR10yrs	167.994	21.244	7.91	0	126.319	209.670
CRInterbankRate	9.825	13.251	0.74	0.459	-16.170	35.821
BAB30days	-172.178	25.799	-6.67	0	-222.789	-121.567
BAB90days	-298.380	30.638	-9.74	0	-358.484	-238.276
BAB180days	360.530	25.938	13.9	0	309.645	411.415
USD	2010.456	375.638	5.35	0	1273.555	2747.356
TWI	-81.035	13.748	-5.89	0	-108.005	-54.065
EUR	2296.434	196.701	11.67	0	1910.559	2682.308
JPY	6.704	1.682	3.98	0	3.403	10.005
GBP	-327.748	127.049	-2.58	0.01	-576.984	-78.512
CHFSwissFranc	-669.741	91.677	-7.31	0	-849.588	-489.894
NZD	457.133	68.599	6.66	0	322.560	591.706
CAD	-253.155	112.146	-2.26	0.024	-473.155	-33.155
HKD	-3.596	8.012	-0.45	0.654	-19.314	12.121
SGD	1613.132	174.926	9.22	0	1269.974	1956.29
MYR	-146.302	50.300	-2.91	0.004	-244.978	-47.627
TWD	7.508	5.510	1.36	0.173	-3.301	18.318
KRW	0.054	0.092	0.59	0.553	-0.126	0.235
IDR	-0.055	0.008	-6.26	0	-0.072	-0.038
CNY	126.910	36.024	3.52	0	56.239	197.581

_cons	1667.903	97.057	17.18	0	1477.503	1858.303

Table 7.4.3.b.1, NSX-AEI Piecewise Regression Results All Calendar Variables

NSX-AEI Piecewise Regression Results Calendar Variables						
note: MOTY10 omitted because of collinearity						
Source	SS	df	MS	Number of obs	=	1369
				F(41, 1327)	=	0.99
Model	1140075.6	41	27806.7219	Prob > F	=	0.4871
Residual	37215685.8	1327	28044.978	R-squared	=	0.0297
-				Adj R-squared	=	-0.0003
Total	38355761.4	1368	28037.8373	Root MSE	=	167.47
Ind. Var.	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
DOW1	91.22039	123.7565	0.74	0.461	-151.5593	334.0001
DOW2	93.35281	123.3736	0.76	0.449	-148.6758	335.3815
DOW3	94.15765	123.6391	0.76	0.446	-148.3917	336.707
DOW4	97.67906	123.6764	0.79	0.43	-144.9436	340.3017
DOW5	94.43649	123.7599	0.76	0.446	-148.3499	337.2229
MOTY1	14.74508	27.7114	0.53	0.595	-39.61786	69.10801
MOTY2	27.59018	22.31715	1.24	0.217	-16.19056	71.37092
MOTY3	51.11636	22.08889	2.31	0.021	7.783408	94.4493
MOTY4	40.78467	22.72597	1.79	0.073	-3.798066	85.36741
MOTY5	32.5526	22.4468	1.45	0.147	-11.48248	76.58768
MOTY6	29.00494	24.3601	1.19	0.234	-18.78357	76.79345
MOTY7	14.65336	23.42088	0.63	0.532	-31.29263	60.59934
MOTY8	21.02585	23.13719	0.91	0.364	-24.3636	66.41531
MOTY9	14.26985	22.97345	0.62	0.535	-30.79838	59.33809
MOTY10	0	(omitted)				
MOTY11	-10.37716	22.72655	-0.46	0.648	-54.96104	34.20671

MOTY12	-48.02692	23.10934	-2.08	0.038	-93.36175	-2.692085
JTOTYPre2days	-25.61378	78.57555	-0.33	0.744	-179.7596	128.5321
JTOTYPre1day	15.71372	78.30211	0.2	0.841	-137.8957	169.3232
JTOTYPost1day	-59.93074	79.50442	-0.75	0.451	-215.8988	96.03732
JTOTYPost2day	-60.73485	75.64112	-0.8	0.422	-209.1241	87.65436
JTOTYPost3day	-62.5081	75.3885	-0.83	0.407	-210.4017	85.38553
JTOTYPost4day	-61.86223	75.43696	-0.82	0.412	-209.8509	86.12647
JTOTYPost5day	-58.78113	72.07767	-0.82	0.415	-200.1797	82.61748
JTOTYPost6day	-58.54461	72.05489	-0.81	0.417	-199.8985	82.80931
JTOTYPost7day	-60.65624	72.0515	-0.84	0.4	-202.0035	80.69102
JTOTYPost8day	-61.8699	72.06264	-0.86	0.391	-203.239	79.49921
JTOTYPost9day	-60.97589	72.06253	-0.85	0.398	-202.3448	80.39302
JTOTYPost10day	-62.35713	72.07767	-0.87	0.387	-203.7557	79.04148
TOTMPre1day	-2.452262	23.47055	-0.1	0.917	-48.49568	43.59116
TOTMPost1day	2.616144	23.38912	0.11	0.911	-43.26753	48.49982
TOTMPost2day	1.556963	23.43723	0.07	0.947	-44.42111	47.53503
TOTMPost3day	2.104866	22.42404	0.09	0.925	-41.88558	46.09531
TOTMPost4day	2.34234	22.42299	0.1	0.917	-41.64603	46.33071
EOFYAPre3day	-14.05222	77.12201	-0.18	0.855	-165.3466	137.2421
EOFYAPre2day	-16.25002	77.12201	-0.21	0.833	-167.5444	135.0443
EOFYAPre1day	-0.9627602	80.53548	-0.01	0.99	-158.9535	157.028
EOFYAPost1day	8.002023	80.18373	0.1	0.921	-149.2987	165.3027
EOFYAPost2day	8.407003	80.19944	0.1	0.917	-148.9245	165.7385
HOLPre2days	-3.441521	31.78775	-0.11	0.914	-65.80124	58.91819
HOLPre1day	-6.084525	32.12397	-0.19	0.85	-69.10383	56.93478
HOLPost1day	1.053886	33.28038	0.03	0.975	-64.234	66.34177
_cons	1118.886	124.555	8.98	0	874.5403	1363.233

Table 7.4.3.c, NSX-AEI Piecewise Regression Results All Event Variables Only

NSX-AEI Piecewise Regression Results Event Variables						
Source	SS	df	MS	Number of obs	=	1370
				F(23, 1346)	=	0.48
Model	313097.341	23	13612.9279	Prob > F	=	0.982
Residual	38051835	1346	28270.3083	R-squared	=	0.0082
-				Adj R-squared	=	-0.0088
Total	38364932.3	1369	28024.0557	Root MSE	=	168.14
Ind. Var.	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
AFEPre1day	-63.22889	118.9825	-0.53	0.595	-296.6403	170.1825
AFEPost1day	-55.74139	118.9825	-0.47	0.64	-289.1528	177.67
AFEPost2day	-48.00389	118.9825	-0.4	0.687	-281.4153	185.4075
USPEPre3day	-208.7748	153.4881	-1.36	0.174	-509.8767	92.32703
USPEPre2day	-212.7048	153.4881	-1.39	0.166	-513.8067	88.39703
USPEPre1day	-213.1453	153.4881	-1.39	0.165	-514.2472	87.95653
USPEPost1day	-212.8723	153.4881	-1.39	0.166	-513.9742	88.22953
USPEPost2day	-207.7092	153.4881	-1.35	0.176	-508.811	93.3927
AFLGFPre3day	26.37353	82.11025	0.32	0.748	-134.7044	187.4515
AFLGFPre2day	31.84163	82.11025	0.39	0.698	-129.2363	192.9196
AFLGFPre1day	31.17101	82.11025	0.38	0.704	-129.907	192.249
AFLGFPost1day	31.76463	82.11025	0.39	0.699	-129.3133	192.8426
AFLGFPost2day	25.55806	82.11025	0.31	0.756	-135.5199	186.636
NRLGFPre3day	-11.90151	89.91281	-0.13	0.895	-188.286	164.483
NRLGFPre2day	-21.48936	89.91281	-0.24	0.811	-197.8738	154.8951
NRLGFPre1day	-23.21979	89.91281	-0.26	0.796	-199.6043	153.1647
NRLGFPost1day	-23.23936	89.91281	-0.26	0.796	-199.6238	153.1451

NRLGFPost2day	-15.24022	89.91281	-0.17	0.865	-191.6247	161.1443
MCPre3day	65.77995	97.18605	0.68	0.499	-124.8726	256.4325
MCPre2day	65.77995	97.18605	0.68	0.499	-124.8726	256.4325
MCPre1day	66.04495	97.18605	0.68	0.497	-124.6076	256.6975
MCPost1day	65.77195	97.18605	0.68	0.499	-124.8806	256.4245
MCPost2day	66.15028	97.18605	0.68	0.496	-124.5023	256.8029
_cons	1226.573	4.657421	263.36	0	1217.437	1235.71

Table 7.4.4.a.1, NSX-AGR Regression Results All Independent Variables

NSX-AGR Regression Results Independent Variables						
note: MOTY11 omitted because of collinearity						
Source	SS	df	MS	Number of obs	=	1369
				F(87, 1281)	=	108.78
Model	28127019	87	323299.069	Prob > F	=	0
Residual	3807083.28	1281	2971.96197	R-squared	=	0.8808
				Adj R-squared	=	0.8727
Total	31934102.3	1368	23343.642	Root MSE	=	54.516
Ind. Variable	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
AGBR2yrs	-236.5507	45.97629	-5.15	0	-326.7478	-146.3536
AGBR3yrs	364.7418	67.88026	5.37	0	231.5732	497.9105
AGBR5yrs	-406.5839	56.29257	-7.22	0	-517.0197	-296.1482
AGBR10yrs	218.2892	26.28956	8.3	0	166.7139	269.8646
CRInterbankRate	-74.71472	16.45747	-4.54	0	-107.0013	-42.42817
BAB30days	17.10088	31.85055	0.54	0.591	-45.38408	79.58585
BAB90days	-80.52222	38.07646	-2.11	0.035	-155.2213	-5.823142
BAB180days	133.7498	31.94915	4.19	0	71.07138	196.4282
USD	-4811.238	480.518	-10.01	0	-5753.927	-3868.55
TWI	253.0388	16.8873	14.98	0	219.909	286.1687
EUR	-3319.805	235.428	-14.1	0	-3781.672	-2857.938
JPY	-35.23282	2.048491	-17.2	0	-39.25158	-31.21405
GBP	-2682.472	164.464	-16.31	0	-3005.12	-2359.824
CHFSwissFranc	153.0097	119.9964	1.28	0.202	-82.40144	388.4208
NZD	-1385.443	83.26457	-16.64	0	-1548.793	-1222.093

CAD	254.6224	137.4394	1.85	0.064	-15.00858	524.2533
HKD	12.08728	10.12604	1.19	0.233	-7.778167	31.95272
SGD	1019.501	247.0889	4.13	0	534.758	1504.245
MYR	-1171.827	64.4944	-18.17	0	-1298.353	-1045.301
TWD	79.48722	7.710273	10.31	0	64.36107	94.61337
KRW	-2.063816	0.1139291	-18.11	0	-2.287324	-1.840308
IDR	0.0958286	0.0118112	8.11	0	0.0726572	0.1190001
CNY	-705.1898	46.52041	-15.16	0	-796.4544	-613.9253
DOW1	-7.115598	10.79791	-0.66	0.51	-28.29913	14.06794
DOW2	-12.42049	11.75309	-1.06	0.291	-35.47791	10.63692
DOW3	-7.809945	11.75807	-0.66	0.507	-30.87713	15.25724
DOW4	-6.948158	11.77787	-0.59	0.555	-30.05418	16.15787
DOW5	-6.758372	11.63765	-0.58	0.562	-29.58931	16.07257
MOTY1	-17.90618	10.02686	-1.79	0.074	-37.57704	1.764684
MOTY2	3.088814	8.262168	0.37	0.709	-13.12005	19.29768
MOTY3	38.41992	9.411912	4.08	0	19.95547	56.88438
MOTY4	44.66045	9.860188	4.53	0	25.31656	64.00434
MOTY5	53.70881	9.48554	5.66	0	35.09991	72.31771
MOTY6	32.87829	9.816567	3.35	0.001	13.61998	52.13661
MOTY7	14.61303	9.215301	1.59	0.113	-3.46571	32.69177
MOTY8	-30.39115	8.921925	-3.41	0.001	-47.89434	-12.88796
MOTY9	-33.27787	9.171958	-3.63	0	-51.27158	-15.28416
MOTY10	7.633142	8.741038	0.87	0.383	-9.51518	24.78146
MOTY11	0	(omitted)				
MOTY12	9.284411	8.407073	1.1	0.27	-7.208732	25.77755
Ind. Variable	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]

JTOTYPre2days	-7.939478	25.80629	-0.31	0.758	-58.56672	42.68776
JTOTYPre1day	-4.099385	25.84444	-0.16	0.874	-54.80146	46.60269
JTOTYPost1day	33.98533	26.07805	1.3	0.193	-17.17505	85.14571
JTOTYPost2day	16.63641	24.86526	0.67	0.504	-32.14469	65.41752
JTOTYPost3day	22.11908	24.69835	0.9	0.371	-26.33459	70.57274
JTOTYPost4day	6.990225	24.69819	0.28	0.777	-41.46311	55.44356
JTOTYPost5day	-1.912071	23.58493	-0.08	0.935	-48.1814	44.35726
JTOTYPost6day	-9.293273	23.58331	-0.39	0.694	-55.55942	36.97287
JTOTYPost7day	-3.715431	23.5611	-0.16	0.875	-49.93802	42.50716
JTOTYPost8day	-2.040043	23.53702	-0.09	0.931	-48.21539	44.1353
JTOTYPost9day	11.50043	25.64312	0.45	0.654	-38.8067	61.80756
JTOTYPost10day	0.183678	23.54272	0.01	0.994	-46.00284	46.3702
TOTMPre1day	0.1893737	7.995381	0.02	0.981	-15.49611	15.87485
TOTMPost1day	-5.820575	8.00969	-0.73	0.468	-21.53413	9.892976
TOTMPost2day	-7.387009	8.015575	-0.92	0.357	-23.11211	8.338087
TOTMPost3day	-5.058281	7.5431	-0.67	0.503	-19.85647	9.739904
TOTMPost4day	-3.688456	7.41484	-0.5	0.619	-18.23502	10.85811
EOFYAPre3day	-2.959003	25.14634	-0.12	0.906	-52.29154	46.37353
EOFYAPre2day	0.2842883	25.15713	0.01	0.991	-49.06941	49.63799
EOFYAPre1day	9.572065	26.36545	0.36	0.717	-42.15214	61.29627
EOFYAPost1day	45.22691	26.34163	1.72	0.086	-6.450564	96.90438
EOFYAPost2day	47.0549	26.31412	1.79	0.074	-4.568595	98.6784
HOLPre2days	14.61123	10.52678	1.39	0.165	-6.040387	35.26285
HOLPre1day	7.482061	10.64441	0.7	0.482	-13.40032	28.36444
HOLPost1day	8.945888	10.68575	0.84	0.403	-12.01761	29.90938
AFEPre1day	101.0808	39.3734	2.57	0.01	23.83737	178.3242
AFEPost1day	100.3345	39.35666	2.55	0.011	23.12394	177.5451

AFEPost2day	112.0022	39.37128	2.84	0.005	34.76289	189.2414
USPEPre3day	39.2712	50.67262	0.77	0.438	-60.13924	138.6816
USPEPre2day	44.99512	50.91997	0.88	0.377	-54.90058	144.8908
USPEPre1day	36.14287	50.86724	0.71	0.478	-63.64937	135.9351
USPEPost1day	34.09416	50.97321	0.67	0.504	-65.90597	134.0943
USPEPost2day	10.25985	50.43265	0.2	0.839	-88.67982	109.1995
AFLGFPre3day	40.57091	27.37085	1.48	0.139	-13.12571	94.26752
AFLGFPre2day	38.18482	27.61685	1.38	0.167	-15.99441	92.36405
AFLGFPre1day	42.01367	27.49159	1.53	0.127	-11.91981	95.94715
AFLGFPost1day	31.8219	27.27838	1.17	0.244	-21.6933	85.3371
AFLGFPost2day	50.91362	27.23288	1.87	0.062	-2.512327	104.3396
NRLGFPre3day	-13.15129	29.54011	-0.45	0.656	-71.1036	44.80102
NRLGFPre2day	-18.50818	30.03727	-0.62	0.538	-77.43582	40.41947
NRLGFPre1day	-19.10889	30.2991	-0.63	0.528	-78.55019	40.33241
NRLGFPost1day	-15.87558	31.01672	-0.51	0.609	-76.72472	44.97356
NRLGFPost2day	-43.56368	30.49822	-1.43	0.153	-103.3956	16.26826
MCPre3day	-23.59235	32.41868	-0.73	0.467	-87.19189	40.00718
MCPre2day	-25.06682	32.84041	-0.76	0.445	-89.49372	39.36008
MCPre1day	-24.61296	32.65681	-0.75	0.451	-88.67966	39.45375
MCPost1day	-20.08835	32.88272	-0.61	0.541	-84.59826	44.42155
MCPost2day	-10.90704	32.75205	-0.33	0.739	-75.1606	53.34652
_cons	1285.6	124.4187	10.33	0	1041.514	1529.687

Table 7.4.5.a.1, NSX-AGR Piecewise Regression Results All Macroeconomic Variables

NSX-AGR Piecewise Regression Results Macroeconomic Variables						
Source	SS	df	MS	Number of obs	=	1370
				F(23, 1346)	=	358.52
Model	27479648.4	23	1194767.32	Prob > F	=	0
Residual	4485524.23	1346	3332.48457	R-squared	=	0.8597
-				Adj R-squared	=	0.8573
Total	31965172.6	1369	23349.286	Root MSE	=	57.728
Ind. Var.	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
AGBR2yrs	-305.4109	45.69074	-6.68	0	-395.0437	-215.7781
AGBR3yrs	390.5782	66.97853	5.83	0	259.1846	521.9719
AGBR5yrs	-408.879	55.53189	-7.36	0	-517.8175	-299.9405
AGBR10yrs	226.1239	25.87834	8.74	0	175.3577	276.8902
CRInterbankRate	-91.83598	16.14216	-5.69	0	-123.5025	-60.16945
BAB30days	0.8624988	31.42696	0.03	0.978	-60.78864	62.51364
BAB90days	-53.09664	37.32139	-1.42	0.155	-126.3111	20.11777
BAB180days	148.7721	31.59683	4.71	0	86.78775	210.7565
USD	-5246.488	457.5781	-11.47	0	-6144.132	-4348.844
TWI	251.5626	16.74699	15.02	0	218.7096	284.4157
EUR	-3391.915	239.6088	-14.16	0	-3861.963	-2921.868
JPY	-31.81557	2.049608	-15.52	0	-35.83634	-27.7948
GBP	-2504.16	154.7629	-16.18	0	-2807.763	-2200.557
CHFSwissFranc	149.2894	111.6759	1.34	0.182	-69.78827	368.367
NZD	-1303.858	83.56305	-15.6	0	-1467.786	-1139.93
CAD	262.2539	136.609	1.92	0.055	-5.735929	530.2436

HKD	11.69123	9.759815	1.2	0.231	-7.45487	30.83733
SGD	1517.157	213.0838	7.12	0	1099.145	1935.169
MYR	-1313.282	61.27234	-21.43	0	-1433.481	-1193.082
TWD	46.59307	6.712623	6.94	0	33.42473	59.76141
KRW	-1.796433	0.1123442	-15.99	0	-2.016822	-1.576045
IDR	0.0912673	0.010806	8.45	0	0.0700688	0.1124657
CNY	-562.8112	43.88321	-12.83	0	-648.8981	-476.7243
_cons	1091.676	118.2288	9.23	0	859.743	1323.608

Table 7.4.5.b.1, NSX-AGR Piecewise Regression Results All Calendar Variables

NSX-AGR Piecewise Regression Results Calendar Variables						
note: MOTY10 omitted because of collinearity						
Source	SS	df	MS	Number of obs	=	1369
				F(41, 1327)	=	1.41
Model	1332486.36	41	32499.6674	Prob > F	=	0.0461
Residual	30601615.9	1327	23060.7505	R-squared	=	0.0417
-				Adj R-squared	=	0.0121
Total	31934102.3	1368	23343.642	Root MSE	=	151.86
Ind. Var.	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
DOW1	-129.0138	112.2218	-1.15	0.251	-349.1653	91.13767
DOW2	-131.8359	111.8746	-1.18	0.239	-351.3063	87.63453
DOW3	-129.8541	112.1153	-1.16	0.247	-349.7967	90.08846
DOW4	-131.714	112.1492	-1.17	0.24	-351.7231	88.29501
DOW5	-131.2433	112.2249	-1.17	0.242	-351.4008	88.91416
MOTY1	18.34074	25.12856	0.73	0.466	-30.9553	67.63678
MOTY2	18.96518	20.23708	0.94	0.349	-20.73498	58.66534
MOTY3	20.258	20.0301	1.01	0.312	-19.0361	59.55211
MOTY4	35.51734	20.6078	1.72	0.085	-4.910074	75.94475
MOTY5	10.69512	20.35465	0.53	0.599	-29.23568	50.62591
MOTY6	-23.97531	22.08962	-1.09	0.278	-67.30969	19.35908
MOTY7	-39.7545	21.23794	-1.87	0.061	-81.4181	1.909098
MOTY8	-62.99818	20.98069	-3	0.003	-104.1571	-21.83924
MOTY9	-42.35694	20.83221	-2.03	0.042	-83.22459	-1.48928
MOTY10	0	(omitted)				
MOTY11	26.3759	20.60832	1.28	0.201	-14.05254	66.80434

MOTY12	25.87585	20.95544	1.23	0.217	-15.23355	66.98525
JTOTYPre2days	-22.46459	71.25193	-0.32	0.753	-162.2433	117.3141
JTOTYPre1day	9.516265	71.00397	0.13	0.893	-129.776	148.8085
JTOTYPost1day	30.77927	72.09422	0.43	0.669	-110.6518	172.2103
JTOTYPost2day	21.12261	68.591	0.31	0.758	-113.436	155.6812
JTOTYPost3day	17.82801	68.36192	0.26	0.794	-116.2812	151.9372
JTOTYPost4day	12.63426	68.40586	0.18	0.853	-121.5612	146.8297
JTOTYPost5day	6.72495	65.35968	0.1	0.918	-121.4946	134.9445
JTOTYPost6day	6.555016	65.33902	0.1	0.92	-121.624	134.7341
JTOTYPost7day	6.613156	65.33595	0.1	0.919	-121.5599	134.7862
JTOTYPost8day	5.304117	65.34605	0.08	0.935	-122.8887	133.4969
JTOTYPost9day	2.731736	65.34595	0.04	0.967	-125.4609	130.9244
JTOTYPost10day	-3.263883	65.35968	-0.05	0.96	-131.4835	124.9557
TOTMPre1day	-1.98381	21.28298	-0.09	0.926	-43.73576	39.76814
TOTMPost1day	-5.840127	21.20914	-0.28	0.783	-47.44722	35.76697
TOTMPost2day	-6.351624	21.25277	-0.3	0.765	-48.04431	35.34107
TOTMPost3day	-4.875229	20.33401	-0.24	0.811	-44.76555	35.01509
TOTMPost4day	-2.514027	20.33305	-0.12	0.902	-42.40246	37.37441
EOFYAPre3day	0.0431398	69.93386	0	1	-137.1498	137.2361
EOFYAPre2day	4.52714	69.93386	0.06	0.948	-132.6658	141.7201
EOFYAPre1day	19.68115	73.02918	0.27	0.788	-123.5841	162.9464
EOFYAPost1day	39.31666	72.71022	0.54	0.589	-103.3228	181.9562
EOFYAPost2day	39.82816	72.72446	0.55	0.584	-102.8393	182.4956
HOLPre2days	-1.981307	28.82497	-0.07	0.945	-58.52879	54.56618
HOLPre1day	-3.245935	29.12986	-0.11	0.911	-60.39153	53.89966
HOLPost1day	-14.52797	30.17848	-0.48	0.63	-73.7307	44.67477
_cons	1041.905	112.9458	9.22	0	820.3327	1263.476

Table 7.4.5.c, NSX-AGR Piecewise Regression Results All Event Variables

NSX-AGR Piecewise Regression Results Event Variables						
Source	SS	df	MS	Number of obs	=	1370
				F(23, 1346)	=	0.41
Model	223121.913	23	9700.95275	Prob > F	=	0.994
Residual	31742050.7	1346	23582.5042	R-squared	=	0.007
-				Adj R-squared	=	-0.01
Total	31965172.6	1369	23349.286	Root MSE	=	153.57
Ind. Var.	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
AFEPre1day	70.18932	108.6708	0.65	0.518	-142.9933	283.3719
AFEPost1day	70.18932	108.6708	0.65	0.518	-142.9933	283.3719
AFEPost2day	70.18932	108.6708	0.65	0.518	-142.9933	283.3719
USPEPre3day	158.2422	140.1859	1.13	0.259	-116.7644	433.2488
USPEPre2day	158.2422	140.1859	1.13	0.259	-116.7644	433.2488
USPEPre1day	155.0822	140.1859	1.11	0.269	-119.9244	430.0888
USPEPost1day	155.0822	140.1859	1.11	0.269	-119.9244	430.0888
USPEPost2day	155.0822	140.1859	1.11	0.269	-119.9244	430.0888
AFLGFPre3day	-1.431558	74.99409	-0.02	0.985	-148.5496	145.6865
AFLGFPre2day	-1.431558	74.99409	-0.02	0.985	-148.5496	145.6865
AFLGFPre1day	-1.431558	74.99409	-0.02	0.985	-148.5496	145.6865
AFLGFPost1day	6.326347	74.99409	0.08	0.933	-140.7917	153.4444
AFLGFPost2day	3.572918	74.99409	0.05	0.962	-143.5451	150.6909
NRLGFPre3day	-33.08725	82.12044	-0.4	0.687	-194.1852	128.0107
NRLGFPre2day	-33.08725	82.12044	-0.4	0.687	-194.1852	128.0107
NRLGFPre1day	-33.08725	82.12044	-0.4	0.687	-194.1852	128.0107
NRLGFPost1day	-40.95439	82.12044	-0.5	0.618	-202.0524	120.1436

NRLGFPost2day	-45.08453	82.12044	-0.55	0.583	-206.1825	116.0134
MCPre3day	-39.53785	88.76333	-0.45	0.656	-213.6674	134.5917
MCPre2day	-39.53785	88.76333	-0.45	0.656	-213.6674	134.5917
MCPre1day	-39.53785	88.76333	-0.45	0.656	-213.6674	134.5917
MCPost1day	-39.53785	88.76333	-0.45	0.656	-213.6674	134.5917
MCPost2day	-39.53785	88.76333	-0.45	0.656	-213.6674	134.5917
_cons	911.0312	4.253781	214.17	0	902.6864	919.3759

Table 7.4.6.a.1, NSX-RES Regression Results All Independent Variables

NSX-RES Regression Results Independent Variables						
note: MOTY11 omitted because of collinearity						
Source	SS	df	MS	Number of obs	=	1369
				F(87, 1281)	=	128.45
Model	27266437.6	87	313407.328	Prob > F	=	0
Residual	3125592.64	1281	2439.96303	R-squared	=	0.8972
				Adj R-squared	=	0.8902
Total	30392030.2	1368	22216.3964	Root MSE	=	49.396
Ind. Variable	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
AGBR2yrs	-25.36606	41.65853	-0.61	0.543	-107.0925	56.36038
AGBR3yrs	100.647	61.50543	1.64	0.102	-20.01544	221.3094
AGBR5yrs	-224.6127	51.00598	-4.4	0	-324.6772	-124.5483
AGBR10yrs	111.2742	23.82063	4.67	0	64.54247	158.0059
CRInterbankRate	-39.43582	14.9119	-2.64	0.008	-68.69025	-10.18139
BAB30days	29.15677	28.85937	1.01	0.313	-27.46006	85.77359
BAB90days	-251.6596	34.5006	-7.29	0	-319.3435	-183.9757
BAB180days	266.0642	28.94871	9.19	0	209.2721	322.8563
USD	-5073.931	435.3912	-11.65	0	-5928.089	-4219.773
TWI	162.6545	15.30137	10.63	0	132.636	192.673
EUR	-1780.969	213.3183	-8.35	0	-2199.461	-1362.478
JPY	-17.7292	1.856111	-9.55	0	-21.37056	-14.08785
GBP	-2146.02	149.0187	-14.4	0	-2438.367	-1853.672
CHFSwissFranc	-116.8936	108.7272	-1.08	0.283	-330.1966	96.4094

NZD	-306.0265	75.44497	-4.06	0	-454.0358	-158.0173
CAD	29.28583	124.532	0.24	0.814	-215.0233	273.595
HKD	-16.58755	9.175076	-1.81	0.071	-34.58737	1.412278
SGD	-1214.678	223.8841	-5.43	0	-1653.898	-775.4586
MYR	-260.991	58.43755	-4.47	0	-375.6348	-146.3472
TWD	-87.79463	6.98618	-12.57	0	-101.5002	-74.08902
KRW	0.0203626	0.1032297	0.2	0.844	-0.1821551	0.2228804
IDR	-0.1077015	0.010702	-10.06	0	-0.1286969	-0.0867062
CNY	487.1113	42.15155	11.56	0	404.4176	569.8049
DOW1	-0.3189001	9.783851	-0.03	0.974	-19.51303	18.87523
DOW2	1.55562	10.64932	0.15	0.884	-19.3364	22.44764
DOW3	0.5898489	10.65383	0.06	0.956	-20.31103	21.49073
DOW4	3.379171	10.67177	0.32	0.752	-17.5569	24.31524
DOW5	2.475512	10.54472	0.23	0.814	-18.21131	23.16234
MOTY1	-17.62276	9.085206	-1.94	0.053	-35.44627	0.2007612
MOTY2	-38.95036	7.486245	-5.2	0	-53.63701	-24.26371
MOTY3	14.53065	8.528013	1.7	0.089	-2.199758	31.26105
MOTY4	29.95068	8.93419	3.35	0.001	12.42342	47.47793
MOTY5	2.739058	8.594727	0.32	0.75	-14.12223	19.60034
MOTY6	-9.356624	8.894666	-1.05	0.293	-26.80634	8.093088
MOTY7	-0.4910822	8.349867	-0.06	0.953	-16.872	15.88983
MOTY8	11.18567	8.084042	1.38	0.167	-4.673751	27.04508
MOTY9	13.69231	8.310594	1.65	0.1	-2.611564	29.99617
MOTY10	18.97104	7.920143	2.4	0.017	3.433165	34.50892
MOTY11	0	(omitted)				
MOTY12	-6.953881	7.617541	-0.91	0.361	-21.89811	7.990345

Ind. Variable	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
JTOTYPre2days	15.83654	23.38275	0.68	0.498	-30.03616	61.70924
JTOTYPre1day	23.36138	23.41732	1	0.319	-22.57912	69.30188
JTOTYPost1day	24.15011	23.62899	1.02	0.307	-22.20566	70.50588
JTOTYPost2day	23.07846	22.5301	1.02	0.306	-21.12148	67.2784
JTOTYPost3day	19.81874	22.37886	0.89	0.376	-24.08451	63.72199
JTOTYPost4day	19.24139	22.37871	0.86	0.39	-24.66156	63.14434
JTOTYPost5day	11.73615	21.37	0.55	0.583	-30.1879	53.66019
JTOTYPost6day	13.46509	21.36853	0.63	0.529	-28.45607	55.38625
JTOTYPost7day	9.854681	21.34841	0.46	0.644	-32.02701	51.73638
JTOTYPost8day	13.29089	21.32659	0.62	0.533	-28.54799	55.12978
JTOTYPost9day	-3.599657	23.23491	-0.15	0.877	-49.18231	41.98299
JTOTYPost10day	19.21181	21.33176	0.9	0.368	-22.63721	61.06082
TOTMPre1day	2.539449	7.244512	0.35	0.726	-11.67296	16.75186
TOTMPost1day	-3.093682	7.257478	-0.43	0.67	-17.33153	11.14417
TOTMPost2day	-1.834346	7.26281	-0.25	0.801	-16.08265	12.41396
TOTMPost3day	0.6710072	6.834706	0.1	0.922	-12.73744	14.07945
TOTMPost4day	-0.2676163	6.718492	-0.04	0.968	-13.44807	12.91284
EOFYAPre3day	8.188585	22.78478	0.36	0.719	-36.51099	52.88816
EOFYAPre2day	-3.497279	22.79455	-0.15	0.878	-48.21604	41.22148
EOFYAPre1day	2.826945	23.8894	0.12	0.906	-44.03969	49.69358
EOFYAPost1day	-6.231113	23.86781	-0.26	0.794	-53.05541	40.59318
EOFYAPost2day	-6.177642	23.84289	-0.26	0.796	-52.95303	40.59775
HOLPre2days	-2.029938	9.538178	-0.21	0.831	-20.7421	16.68223
HOLPre1day	-3.893952	9.64476	-0.4	0.686	-22.81521	15.02731
HOLPost1day	-3.4141	9.682223	-0.35	0.724	-22.40885	15.58065
AFEPre1day	1.923811	35.67573	0.05	0.957	-68.06546	71.91309

AFEPost1day	46.36977	35.66056	1.3	0.194	-23.58974	116.3293
AFEPost2day	66.423	35.67382	1.86	0.063	-3.562514	136.4085
USPEPre3day	10.19258	45.91381	0.22	0.824	-79.88194	100.2671
USPEPre2day	-2.225494	46.13794	-0.05	0.962	-92.73971	88.28872
USPEPre1day	4.345004	46.09015	0.09	0.925	-86.07547	94.76548
USPEPost1day	13.07311	46.18617	0.28	0.777	-77.53573	103.682
USPEPost2day	-3.363484	45.69638	-0.07	0.941	-93.01145	86.28448
AFLGFPre3day	19.63607	24.80038	0.79	0.429	-29.01775	68.28988
AFLGFPre2day	29.2316	25.02328	1.17	0.243	-19.8595	78.32271
AFLGFPre1day	36.11487	24.90977	1.45	0.147	-12.75356	84.9833
AFLGFPost1day	38.67809	24.71659	1.56	0.118	-9.811345	87.16753
AFLGFPost2day	15.3217	24.67536	0.62	0.535	-33.08687	63.73026
NRLGFPre3day	10.06021	26.76592	0.38	0.707	-42.44963	62.57006
NRLGFPre2day	-2.774513	27.21638	-0.1	0.919	-56.1681	50.61907
NRLGFPre1day	-1.151583	27.45362	-0.04	0.967	-55.01058	52.70742
NRLGFPost1day	7.922586	28.10385	0.28	0.778	-47.21204	63.05721
NRLGFPost2day	19.31675	27.63405	0.7	0.485	-34.89621	73.5297
MCPre3day	-16.43458	29.37415	-0.56	0.576	-74.0613	41.19215
MCPre2day	-15.67525	29.75628	-0.53	0.598	-74.05164	42.70114
MCPre1day	-9.104931	29.58992	-0.31	0.758	-67.15495	48.94509
MCPost1day	2.273178	29.79462	0.08	0.939	-56.17842	60.72478
MCPost2day	17.52698	29.67622	0.59	0.555	-40.69234	75.7463
_cons	1225.938	112.7342	10.87	0	1004.774	1447.102

Table 7.4.7.a.1, NSX-RES Piecewise Regression Results All Macroeconomic Variables

NSXRES Piecewise Regression Results Macroeconomic Variables						
Source	SS	df	MS	Number of obs	=	1370
				F(23, 1346)	=	446.6
Model	26898395	23	1169495.44	Prob > F	=	0
Residual	3524753.48	1346	2618.68758	R-squared	=	0.8841
-				Adj R-squared	=	0.8822
Total	30423148.5	1369	22222.8988	Root MSE	=	51.173
Ind. Var.	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
AGBR2yrs	-60.7221	40.50288	-1.5	0.134	-140.1777	18.73353
AGBR3yrs	97.31413	59.3736	1.64	0.101	-19.16072	213.789
AGBR5yrs	-140.507	49.22665	-2.85	0.004	-237.0763	-43.9378
AGBR10yrs	39.87661	22.94004	1.74	0.082	-5.12551	84.87873
CRInterbankRate	-18.29281	14.30934	-1.28	0.201	-46.36383	9.778217
BAB30days	7.414141	27.85865	0.27	0.79	-47.23696	62.06524
BAB90days	-245.9506	33.08381	-7.43	0	-310.852	-181.049
BAB180days	275.7832	28.00924	9.85	0	220.8367	330.7297
USD	-5666.16	405.6234	-13.97	0	-6461.882	-4870.44
TWI	189.2087	14.84549	12.75	0	160.0859	218.3315
EUR	-2284.695	212.4029	-10.76	0	-2701.372	-1868.02
JPY	-19.9083	1.81689	-10.96	0	-23.47254	-16.3441
GBP	-2223.023	137.1907	-16.2	0	-2492.154	-1953.89
CHFSwissFranc	-184.4897	98.99587	-1.86	0.063	-378.6927	9.713218
NZD	-385.5883	74.07507	-5.21	0	-530.9034	-240.273
CAD	-133.1398	121.0981	-1.1	0.272	-370.7012	104.4217

HKD	-14.30947	8.651658	-1.65	0.098	-31.28167	2.662734
SGD	-1459.788	188.8896	-7.73	0	-1830.338	-1089.24
MYR	-342.2676	54.31531	-6.3	0	-448.8195	-235.716
TWD	-81.07964	5.950453	-13.63	0	-92.75281	-69.4065
KRW	0.0994689	0.099588	1	0.318	-0.095896	0.294834
IDR	-0.1216385	0.009579	-12.7	0	-0.14043	-0.10285
CNY	476.7495	38.90059	12.26	0	400.4371	553.0618
_cons	1285.815	104.8048	12.27	0	1080.216	1491.413

Table 7.4.7.b.1, NSX-RES Piecewise Regression Results All Calendar Variables

NSX-RES Piecewise Regression Results Calendar Variables						
note: MOTY10 omitted because of collinearity						
Source	SS	df	MS	Number of obs	=	1369
				F(41, 1327)	=	1.51
Model	1356545.88	41	33086.4848	Prob > F	=	0.0208
Residual	29035484.3	1327	21880.5458	R-squared	=	0.0446
-				Adj R-squared	=	0.0151
Total	30392030.2	1368	22216.3964	Root MSE	=	147.92
Ind. Var.	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
DOW1	-94.95469	109.3124	-0.87	0.385	-309.3987	119.4893
DOW2	-95.90074	108.9743	-0.88	0.379	-309.6813	117.8799
DOW3	-96.48612	109.2087	-0.88	0.377	-310.7267	117.7544
DOW4	-94.5698	109.2417	-0.87	0.387	-308.8751	119.7355
DOW5	-97.46594	109.3154	-0.89	0.373	-311.9158	116.984
MOTY1	-33.81129	24.4771	-1.38	0.167	-81.82933	14.20674
MOTY2	-47.48237	19.71243	-2.41	0.016	-86.1533	-8.81145
MOTY3	6.647917	19.51081	0.34	0.733	-31.62749	44.92332
MOTY4	27.87529	20.07354	1.39	0.165	-11.50403	67.25462
MOTY5	39.27142	19.82695	1.98	0.048	0.3758289	78.167
MOTY6	61.7663	21.51695	2.87	0.004	19.55536	103.9772
MOTY7	43.23069	20.68734	2.09	0.037	2.647228	83.81416
MOTY8	34.50017	20.43676	1.69	0.092	-5.591719	74.59206
MOTY9	23.65953	20.29213	1.17	0.244	-16.14863	63.46769
MOTY10	0	(omitted)				
MOTY11	-26.98554	20.07405	-1.34	0.179	-66.36587	12.39479

MOTY12	-0.1390639	20.41217	-0.01	0.995	-40.1827	39.90457
JTOTYPre2days	22.42625	69.40471	0.32	0.747	-113.7287	158.5812
JTOTYPre1day	-19.72275	69.16319	-0.29	0.776	-155.4039	115.9584
JTOTYPost1day	21.7506	70.22517	0.31	0.757	-116.0139	159.5151
JTOTYPost2day	30.25837	66.81277	0.45	0.651	-100.8118	161.3285
JTOTYPost3day	31.09276	66.58963	0.47	0.641	-99.53967	161.7252
JTOTYPost4day	30.42725	66.63244	0.46	0.648	-100.2892	161.1437
JTOTYPost5day	33.91556	63.66523	0.53	0.594	-90.97991	158.811
JTOTYPost6day	34.78068	63.6451	0.55	0.585	-90.07531	159.6367
JTOTYPost7day	33.74117	63.64211	0.53	0.596	-91.10895	158.5913
JTOTYPost8day	34.12968	63.65194	0.54	0.592	-90.73973	158.9991
JTOTYPost9day	26.23515	63.65185	0.41	0.68	-98.63408	151.1044
JTOTYPost10day	25.26806	63.66523	0.4	0.692	-99.62741	150.1635
TOTMPre1day	7.848773	20.73121	0.38	0.705	-32.82075	48.5183
TOTMPost1day	-0.5834517	20.65929	-0.03	0.977	-41.11188	39.94497
TOTMPost2day	-1.098039	20.70179	-0.05	0.958	-41.70984	39.51377
TOTMPost3day	1.033922	19.80685	0.05	0.958	-37.82224	39.89008
TOTMPost4day	1.707068	19.80592	0.09	0.931	-37.14726	40.56139
EOFYAPre3day	3.813287	68.12082	0.06	0.955	-129.8229	137.4495
EOFYAPre2day	-11.82451	68.12082	-0.17	0.862	-145.4607	121.8117
EOFYAPre1day	-15.75189	71.1359	-0.22	0.825	-155.303	123.7992
EOFYAPost1day	10.14014	70.8252	0.14	0.886	-128.8014	149.0817
EOFYAPost2day	9.75513	70.83907	0.14	0.89	-129.2137	148.7239
HOLPre2days	13.76671	28.07768	0.49	0.624	-41.31478	68.84819
HOLPre1day	17.90114	28.37466	0.63	0.528	-37.76295	73.56523
HOLPost1day	11.01502	29.3961	0.37	0.708	-46.65288	68.68291
_cons	796.4717	110.0177	7.24	0	580.6441	1012.299

Table 7.4.7.c.1 NSX-RES Piecewise Regression Results All Event Variables

NSX-RES Piecewise Regression Results Event Variables						
Source	SS	df	MS	Number of obs	=	1370
				F(23, 1346)	=	0.76
Model	390487.127	23	16977.7012	Prob > F	=	0.7828
Residual	30032661.4	1346	22312.527	R-squared	=	0.0128
-				Adj R-squared	=	-0.004
Total	30423148.5	1369	22222.8988	Root MSE	=	149.37
Ind. Var.	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
AFEPre1day	187.9776	105.7042	1.78	0.076	-19.38535	395.3405
AFEPost1day	228.9611	105.7042	2.17	0.03	21.59815	436.324
AFEPost2day	245.3546	105.7042	2.32	0.02	37.99165	452.7175
USPEPre3day	-57.76783	136.359	-0.42	0.672	-325.2671	209.7314
USPEPre2day	-70.53233	136.359	-0.52	0.605	-338.0316	196.9669
USPEPre1day	-64.737	136.359	-0.47	0.635	-332.2362	202.7622
USPEPost1day	-64.722	136.359	-0.47	0.635	-332.2212	202.7772
USPEPost2day	-65.03433	136.359	-0.48	0.633	-332.5336	202.4649
AFLGFPre3day	24.32095	72.94684	0.33	0.739	-118.7809	167.4228
AFLGFPre2day	34.16238	72.94684	0.47	0.64	-108.9395	177.2642
AFLGFPre1day	32.19095	72.94684	0.44	0.659	-110.9109	175.2928
AFLGFPost1day	31.1588	72.94684	0.43	0.669	-111.9431	174.2607
AFLGFPost2day	15.8668	72.94684	0.22	0.828	-127.2351	158.9687
NRLGFPre3day	2.977624	79.87865	0.04	0.97	-153.7226	159.6778
NRLGFPre2day	-4.242233	79.87865	-0.05	0.958	-160.9424	152.4579
NRLGFPre1day	-6.115376	79.87865	-0.08	0.939	-162.8156	150.5848
NRLGFPost1day	-5.49609	79.87865	-0.07	0.945	-162.1963	151.2041
NRLGFPost2day	18.33191	79.87865	0.23	0.819	-138.3683	175.0321
MCPre3day	-16.92607	86.34019	-0.2	0.845	-186.3021	152.4499
MCPre2day	-16.92607	86.34019	-0.2	0.845	-186.3021	152.4499
MCPre1day	-16.44541	86.34019	-0.19	0.849	-185.8214	152.9306
MCPost1day	-16.46041	86.34019	-0.19	0.849	-185.8364	152.9156
MCPost2day	-16.14807	86.34019	-0.19	0.852	-185.5241	153.2279
_cons	712.1834	4.137658	172.12	0	704.0664	720.3004