IMPACT OF DEMOGRAPHIC CHANGE ON INDUSTRY STRUCTURE IN AUSTRALIA

A joint study by the Australian Bureau of Statistics, the Department of Employment and Industrial Relations, the Department of Environment, Housing and Community Development, the Department of Industry and Commerce and the Industries Assistance Commission

ESTIMATES OF THE ELASTICITY OF SUBSTITUTION BETWEEN IMPORTED AND DOMESTICALLY PRODUCED GOODS CLASSIFIED AT THE INPUT-OUTPUT LEVEL OF AGGREGATION

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The views expressed in this paper do not necessarily reflect the opinions of the participating agencies, nor of the Australian government.

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ESTIMATES OF THE ELASTICITY OF SUBSTITUTION BETWEEN IMPORTED AND DOMESTICALLY PRODUCED GOODS CLASSIFIED AT THE INPUT-OUTPUT LEVEL OF AGGREGATION

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1. INTRODUCTION

This study follows directly from that of Alaouze, Marsden and Zeitsch [1] in which estimates of the elasticity of substitution (ES) classified at the four digit ASIC level are presented. The results outlined in this study were obtained by estimating the models derived in Alaouze, Marsden and Zeitsch (AMZ) using data constructed at the input-output (IO) level of aggregation. This paper therefore only contains discussion directly pertinent to the IO estimates; for details concerning the derivation of the models, the construction of the data and the relevant literature, the reader is referred to the AMZ study.

There is a computational difference between the AMZ study and this work. The results presented here were not obtained using the computer programs developed for the AMZ study, and unlike the AMZ study the IO data were subjected to rounding at various stages in their construction; consequently marginally different results were obtained for IO industries for which there is a 1:1 correspondence between ASIC and IO categories. The differences are greatest for poorly fitting equations.

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The quarterly data used in this study are similar in construction to those used in the AMZ study and also span the period September 1968 to June 1975. However, the IO indexes used in this study contain data covering more than the forty-six ASICs estimated in the AMZ study because indexes for some ASICs for which data were available were not constructed because the coverage ratio was too low.

Before estimation, the IO data were inspected for aberrant movements which could be attributed to compositional rather than economic effects. There were no obvious aberrant movements, and therefore no vetting dummies were used in this study. The estimates listed in this paper were obtained using four period linear least squares sliding trend projections of the log of prices for the construction of anticipated prices. In the AMZ study, there was very little difference between equations estimated using three and four period projections.

The two models derived in the AMZ paper (rapid adjustment and partial adjustment) were fitted for thirty-four IO industries which cover slightly greater than thirty-five per cent of Australian merchandise imports in 1973/74. As in the AMZ paper, the rapid adjustment model was estimated for three different specifications of the expected use of the domestic good series (Clairvoyance, Naiveté and Infallibility) where possible. The Clairvoyance model could not be estimated for thirteen IOs (21.02, 21.04, 22.01, 23.01, 23.02, 23.03, 23.04, 24.01, 25.04, 27.08, 28.06, 29.01, 34.05) because the estimated coefficients of the diffusion indexes in the preliminary regressions had a negative sign. In addition the Clairvoyance model could not be estimated for IO 21.03 even though the estimated coefficient of the diffusion index had a positive sign, because the combination of a low value for the diffusion index and a negative seasonal effect combined to produce a negative index for the expected use of the domestic good in one quarter. In addition to the basic variables, the models were estimated with and without seasonal dummies.

As in the AMZ study, the indexes of the use of the domestically produced good are indexes of domestic output and as such contain exports. In cases where exports form a large part of domestic production, estimates of the ES obtained using this data could be subject to serious bias. The ratios of the value of exports to the total value of domestic production for 1971/72 were calculated and of the thirty-four IOs estimated, seven exported greater than ten per cent of output in 1971/72. These are listed in Table 1. Of the remaining twenty-seven IOs, five exported between five and ten per cent of output in 1971/72. These are listed in Table 2.

TABLE 1 - Input-output Industries for which Exports are Greater than Ten Per Cent of Domestic Output

IO Class	Description	Percentage of domestic output exported 1971/72
21.02	Milk products	13.45
21.03	Fruit and vegetable products	13.51
21.05	Flour and cereal products	16.13
21.08	Food products n.e.c. (including fish and sugar)	28.16
23.01	Prepared fibres	50.77
29.02	Other basic metals	40.00
34.05	Other manufacturing	30.89

TABLE 2 - Input-output Industries for which Exports Lie Between Five and Ten Per Cent of Domestic Output

IO Class	Description	Percentage of domestic output exported 1971/72
21.07	Confectionery	5.05
21.10	Beer and malt	5.21
23.07	Textile products n.e.c.	5.25
27.08	Oil and coal products n.e.c.	5.88
32.01	Motor vehicles and parts	6.28

2. THE MODELS

In order to facilitate the discussion of the results, the two basic models estimated for each IO are listed below :

a. The Rapid Adjustment Model

$$\ell n \left\{ \frac{x_{i2(t)}(t-3/2)}{\hat{x}_{i1(t)}(t-3/2)} \right\} = a_i + \sigma_i \ell n \left\{ \frac{\hat{P}_{i1(t-\frac{1}{2})}(t-3/2)}{P_{i2(t)}(t-3/2)} \right\}$$

$$+ \sigma_i \theta_{1i} ZP_{it} + \sigma_i \theta_{2i} ZN_{it} + u_{it} \qquad (2.1)$$

where : $x_{i2(t)}(t-3/2)$ is the amount of the imported good i ordered in (t-3/2) for consumption in t ;

$\hat{x}_{i1(t)}(t-3/2)$ is the expected order of the domestically produced good i in period (t-½) for consumption in period (t) as viewed in the import-ordering period (t-3/2) ;

$P_{i2(t)}(t-3/2)$ is the price of the imported good i in period (t) as quoted in period (t-3/2) ;

$\hat{P}_{i1(t-\frac{1}{2})}(t-3/2)$ is the price of the domestically produced good of type i expected to pertain in the domestic good ordering period $(t-\frac{1}{2})$ as viewed in the import-ordering period (t-3/2) ;

ZP_{it} and ZN_{it} are the positive and negative pressure of demand proxies respectively ;

σ_i is the ES for good i ;

θ_1 and θ_2 are parameters which weight the positive and negative pressure of demand variables used in forming the expected effective price ;

u_{it} is an error term with classical properties ;

a_i is a constant .

b. The Partial Adjustment Model

$$\ell n\, y_{it} = \lambda_i a_i + \lambda_i \sigma_i^* \ell n\, \Pi_{it} + (1-\lambda_i)\, \ell n\, y_{i(t-3/2)} + \theta_{i1} ZP_{it} + \theta_{i2} ZN_{it} + u_{it}\,, \qquad (2.2)$$

where : ZP_{it} is the positive pressure of demand proxy for good i ;

ZN_{it} is the negative pressure of demand proxy for good i ;

y_{it} is the actual quantity ratio of good i in (t) ;

Π_{it} is the ratio of long-run price expectations for good i ;

σ_i^* is the long-run elasticity of substitution for good i ;

λ_i is the coefficient of adjustment for good i ; and

$\lambda_i \sigma_i^*$ is the short-run (one period) elasticity of substitution ;

θ_{i1}, θ_{i2} are parameters which are some function of the short-run elasticity of substitution ;

u_{it} is an error term with classical properties .

a_i is a constant .

2. DISCUSSION OF RESULTS

a. General

The two models discussed above were estimated using OLS, and altogether there were either three or four basic specifications estimated for each IO (two or three for the rapid adjustment model and one for the partial model). Each of these was estimated with and without seasonal dummies. The best equations for the rapid adjustment model and partial adjustment models were selected, and these are presented in Tables 3.2 and 3.3 respectively. The equations which have the most favourable combination of explanatory power, Durbin-Watson (DW) statistic and significance of parameters were selected. It should be emphasised that this was necessarily a subjective procedure, and in some cases there was little difference between the Clairvoyance and Naiveté specifications. Generally, these two performed better than the Infallibility specification and this is reflected in the results. The expected signs of the estimated parameters of equations (2.1) and (2.2) are known; therefore, only one tail of the t distribution was used in testing their significance. The two-tailed test was used in testing the significance of the seasonal dummies. In the discussion which follows, only the twenty-seven IOs which exported less than ten per cent of their output are considered.

b. The Quota Dummies

The basic models were also estimated using dummy variables for import restrictions where appropriate. These dummies were included in the estimation of an IO industry only if a significant effect was found in at least one component ASIC estimated in the AMZ study. Significant effects were found for two ASICs in the AMZ study : 2412 (Cardigans and Pullovers) and 3211 (Motor Vehicles). The IOs to which these two ASICs are classified are : 24.01 (Knitting Mills) and 32.01 (Motor Vehicles and Parts, Transport Equipment n.e.c.) respectively. These two IOs were estimated using the same quota dummies as in the AMZ study. In the case of IO 32.01, the estimated coefficient of the dummy variable for the effects of import licensing and Tariff quotas is significant. In the case of IO 24.01, the estimated equation was unsatisfactory. When seasonal dummies were added to the rapid adjustment model (Naiveté), the DW fell from 1.93 to 0.6508. However, the estimates of the other parameters are stable and the third seasonal is significant (the fourth-order DW statistic for the (Naiveté) model without seasonals indicates that seasonals are required). When the quota dummies were added, one is significant and the DW rises slightly to 0.8141. However, the estimate of the ES fell from 1.906 with a t-statistic of 5.009 to 0.5638 with a t-statistic of 0.6114. Similar instability was evident for the partial adjustment model. Under these circumstances, no conclusion can be drawn from the estimated parameters. This result is probably due to aggregating commodities which have dissimilar economic production and retailing characteristics. This is evident from the estimates obtained for two of the ASIC components of this IO category in the AMZ study. In one case (ASIC 2411), the lagged dependent variable was significant but no seasonal dummies were significant and for ASIC 2412, significant seasonality was detected in two quarters, but the lagged dependent variable fell outside the stability bounds and was not significant. IO 24.01 is not considered below.

c. The Elasticity of Substitution

Of the remaining twenty-six IOs for which exports were less than ten per cent of domestic production, three have a negative estimate of the ES in both the rapid adjustment and partial adjustment models : IOs 21.06 (Bread, Cakes and Biscuits), 22.01 (Tobacco Products), 23.03 (Cotton, Silk and Flax Products). Predictably, all these contain four digit ASICs for which negative estimates of the ES were obtained in the AMZ study. In the following discussion we shall concentrate on the twenty-four IOs for which the ES has the correct sign in at least one of the models.

Estimates of the ES for the rapid adjustment models, together with their t-statistics and DW statistics are presented in Table 3.1. Estimates of the one period, three period and infinite period ES calculated from parameters estimated in the partial adjustment models in which the estimated price coefficient had the correct sign and the coefficient of the lagged dependent variable fell within the acceptable range $(0 < (1-\lambda_i) < 1)$ for the Koyck adjustment process are also shown in Table 3.1.

Unfortunately, there is a problem in identifying the IOs for which the estimated coefficient of the lagged dependent variable

TABLE 3.1 - Estimates of the Elasticity of Substitution

IO	Abbreviated Description	Rapid Adjustment Model			Partial Adjustment Model			
		Model	ES Estimate	DW	1 Period	3 Period	Infinite Period	Durbin h-Stat
21.04 *	Margarine, Oils and Fats	N	1.257** (3.379)	1.652	0.9679	1.4047	1.7640	IND.
21.07	Confectionery	N	0.0201 (0.0813)	1.793	Price Coefficient has Wrong Sign			
21.10 *	Beer and Malt	N	4.382** (5.338)	1.252	1.927	3.9404	5.3217	0.9489
23.02 *	Man-Made Fibres, Yarns and Fabrics	N	2.014* (2.101)	1.251	1.408	3.4289	6.9772	0.5146
23.04 *	Wool and Worsted Yarns and Fabrics	I	1.379** (2.581)	0.6242*	0.7402	1.5989	2.3686	0.4684
23.06 *	Textile Floor Coverings, Felt Products	C	0.8332* (2.052)	0.6898*	1.169	1.9776	2.2073	1.9895*
23.07	Textile Products, nec	C	1.553** (4.250)	2.592	1.001	1.6217	1.7648	IND.
24.02 *	Clothing	N	2.616** (10.66)	0.6767*	0.8685	2.0626	3.8549	0.4902
25.04 *	Furniture, Mattresses, Brooms, Brushes	I	2.085** (6.765)	0.9312*	0.9581	1.9333	2.5618	0.2399
26.01 *	Pulp, Paper and Paperboard	N	0.5537** (4.063)	1.569	0.4014	0.9008	1.4460	0.2399
27.01	Chemical Fertilisers	C	1.657** (6.140)	2.060	0.4097	0.5553	0.5675	IND.
27.05	Soap and other Detergents	N	1.290** (16.18)	1.686	$(1 - \lambda) < 0$			

The numbers in parentheses in column 4 are t values. An asterisk in the ASIC column indicates that the coefficient of the lagged dependent variable is significant. An asterisk on the Durbin-Watson statistic (DW), and the Durbin h statistic indicates significant first-order auto-correlation at the five per cent level. An asterisk on the ES estimate indicates significance at the five per cent level; the letters IND. indicate that the Durbin h statistic could not be calculated, and $(1-\lambda)$ is the coefficient of the lagged dependent variable. The letters I, N and C denote the Infallibility, Naiveté and Clairvoyance specifications.

Table 3.1 (contd)

IO	Abbreviated Description	Rapid Adjustment Model			Partial Adjustment Model			
		Model	ES Estimate	DW	1 Period	3 Period	Infinite Period	Durbin h-Stat
27.08 *	Petroleum & Coal Products		Wrong Sign		0.1959	0.3672	0.4456	IND.
28.02	Clay Products	I	1.179** (14.78)	0.8776*		$(1 - \lambda) < 0$		
28.03	Cement	N	0.6248 (1.518)	1.197	0.5595	0.6298	0.6307	IND.
28.05	Concrete Products	N	1.161** (5.921)	1.091*		$(1 - \lambda) < 0$		
28.06	Non-Metal Mineral Products	N	0.8195** (8.208)	1 693		$(1 - \lambda) < 0$		
29.01	Basic Iron and Steel	N	0.8169** (4.947)	1.436	0.7847	0.9467	0.9518	IND.
29.02	Non ferrous Metal Products	I	1.005** (23.15)	1.955		$(1 - \lambda) < 0$		
32.01 *	Motor Vehicles and Parts	C	3.657** (5.025)	1.424	1.330	3.0504	5.163	0.3450
33.03 *	Household Appliances n.e.c.	C	2.117** (7.695)	1.597	0.3419	0.8960	2.5840	0.5233
33.04	Electrical Machinery	N	0.8430** (10.84)	1.533	0.5832	0.5883	0.5883	2.8122*
34.03	Plastic Products	C	1.509* (9.271)	1.300	1.293	1.6033	1.6163	1.2979

The numbers in parentheses in column 4 are t values. An asterisk in the ASIC column indicates that the coefficient of the lagged dependent variable is significant. An asterisk on the Durbin-Watson statistic (DW), and the Durbin h statistic indicates significant first-order auto-correlation at the five per cent level. An asterisk on the ES estimate indicates significance at the five per cent level; the letters IND. indicate that the Durbin h statistic could not be calculated, and $(1-\lambda)$ is the coefficient of the lagged dependent variable. The letters I, N and C denote the Infallibility, Naiveté and Clairvoyance specifications.

(and other parameters) are significant because there is no reliable way of determining whether auto-correlation is present in the partial adjustment models. The Durbin h statistic for each IO is also listed (where appropriate) in Table 3.1; however, this can only be considered a rough guide because the associated significance test is valid for large samples only. It is therefore possible that a significant lagged dependent variable has not been detected in all cases where one is present. It is for this reason that all econometrically acceptable results from the partial adjustment models are reported in Table 3.1. Interpretation is subject to the reservation that estimates of parameters obtained from models with lagged dependent variables are inconsistent in the presence of auto-correlated residuals.

From Table 3.1 it is evident that in many cases, the estimates of the ES obtained from the rapid adjustment models correspond closely to the three period (or annual) estimates obtained from the partial adjustment models. Unfortunately, since the partial adjustment model was estimated using OLS we could not calculate the t-statistic associated with the long-run ES parameter (σ^*) because the coefficient of the price term in the partial adjustment models is the product of the coefficient of adjustment and the long-run ES, that is $(\lambda\sigma^*)$.[1]

The estimates of the ES obtained from the rapid adjustment models (shown in Table 3.1) are positive and significant in twenty-one out of the twenty-three listed. The values of the significant estimates

1. With appropriate options in an OLS package, of course, asymptotic standard errors for λ and σ^* could be computed; unfortunately, these options were lacking in the computer program available.

range from 0.5537 (IO 26.01) to 4.832 (IO 21.10), with fifteen greater than one. Of these, the estimates of the ES are regarded as biased if the lagged dependent variable is significant. In these cases the infinite period elasticity obtained from the partial adjustment model is taken as an unbiased estimate of the long-run ES and the three period elasticity as the approximate estimate of the annual response.

It is evident from Table 3.1 that the omission of the lagged dependent variable in cases where it is significant has biased the ES estimates downwards. This is exemplified by IO 27.08 which has an estimate of the ES which is negative in the rapid adjustment model, but positive in the partial adjustment model.

There are three IOs for which the DW statistic for the rapid adjustment models are close to or below the lower bound for the tabulated significance points of the DW statistic (five per cent level) and for which the estimated coefficient of the lagged dependent variable is either not significant or lies outside the stability range for a Koyck adjustment process : (IOs 28.02, 28.03, and 28.05). These contain the three ASICs for which similar results were found in the AMZ study, in which it was concluded that the auto-correlation in the residuals was not of the first-order Markov type.

TABLE 3.2 - Summary of Results for the Rapid Adjustment Model

Input-Output Category	Description	Best Model	Estimated Parameters σ	$(\sigma\theta_1)$	$(\sigma\theta_2)$	α_1	α_2	α_3	a	$\bar{R}^2$	DW	D4
21.02	Milk Products	I	1.625**	0.2481**	0.2679	-0.5085**	-0.8640**	-0.6733**	0.8329**	.8941	1.733	1.636
			(3.781)	(2.351)	(1.298)	(-7.375)	(-12.53)	(-9.647)	(12.33)			
21.03	Fruit and Vegetable Products	N	0.8330**	0.9203**	1.279**	0.4930**	0.1643	-0.8899**	0.4901**	.8804	1.875	1.458
			(2.289)	(3.623)	(2.864)	(3.497)	(1.171)	(-6.086)	(3.947)			
21.04	Margarine Oils and Fats	N	1.257**	0.0562	1.431**				0.2629	.2759	1.652	1.230
			(3.379)	(.2231)	(2.308)				(1.701)			
21.05	Flour and Cereal Products	N	1.183**	0.3581*	0.0304	0.3065**	0.2340*	0.2759**	-0.06321	.7507	1.454	1.404
			(7.756)	(2.437)	(.1064)	(3.489)	(2.621)	(2.840)	(-.7434)			
21.06	Bread, Cake and Biscuits	N	-0.1961	0.0042	0.1099	0.3720**	0.2606**	-0.0071	-0.1667**	.6745	1.344	2.144
			(-.6578)	(-.6578)	(.4847)	(4.200)	(3.412)	(-.098))	(-2.348)			
21.07	Confectionery	N	0.0201	-0.0237	0.3486				0.0998	-.0930	1.793	1.687
			(.0813)	(-.1310)	(.8664)				(1.232)			
21.08	Food Products n.e.c. (including Fish & Sugar)	I	0.058	0.4617**	0.7071	-0.0037	0.2236*	0.1829	-0.1478	.4645	1.750	1.696
			(.2873)	(3.186)	(.2477)	(-.0424)	(2.546)	(2.061)	(-1.858)			
21.10	Beer and Malt	N	4.382**	0.9656**	-0.8084	0.4934*	0.5158*	0.0539	-0.3200	.6253	1.252	1.064
			(5.338)	(3.163)	(-1.357)	(2.491)	(2.605)	(2.844)	(-1.333)			
22.01	Tobacco Products	N	-0.7238	0.4019*	0.0468				0.2011*	.1998	0.4780	1.303
			(-1.321)	(1.888)	(.1137)				(2.173)			
23.01	Prepared Fibres	N	0.2418	0.3028**	-1.284				0.1488	.4373	0.9800	2.328
			(.7524)	(4.364)	(-2.782)				(1.517)			
23.02	Man-Made Fibres, Yarns and Fabrics	N	2.014*	0.2224**	-1.310**				0.4006**	.4809	1.251	1.232
			(2.101)	(4.596)	(-3.629)				(4.770)			
23.03	Cotton, Silk & Flax Yarns, Fabrics & Household Textiles	N	-0.0623	0.0926**	0.2009	-0.0072	0.1324*	0.2554**	-0.1053*	.7108	1.271	1.490
			(-.098)	(4.364)	(1.454)	(-.1324)	(2.414)	(4.971)	(-2.115)			

Definition of Symbols : σ is the elasticity of substitution; $(\sigma\theta_1)$ and $(\sigma\theta_2)$ are the coefficients of the positive and negative pressure of demand α_1 , α_2 and α_3 are the coefficients of the seasonal dummy variables; a is the constant; $\bar{R}^2$ is R^2 adjusted for degrees of freedom; DW is the Durbin-Watson statistic; D4 is the fourth-order Durbin-Watson statistic; * indicates significance at the 5 per cent level. I represents the Infallibility specification, N the Naiveté specification and C the Clairvoyance specification. (The constant a represents the intercept for the fourth quarter: α_1 , α_2 and α_3 are additive adjustments for the first, second and third quarter respectively.)

Table 3.2 (contd)

Input-Output Category	Description	Best Model	Estimated Parameters σ	$(\sigma\theta_1)$	$(\sigma\theta_2)$	α_1	α_2	α_3	a	$\bar{R}^2$	DW	D4
23.04	Wool and Worsted Yarns and Fabrics	I	1.379	0.0888	0.3397	-0.2180	0.3263	0.5597	-0.4506	.7121	0.6242	1.416
			(2.581)	(1.474)	(.7964)	(-1.619)	(2.367)	(4.341)	(-3.298)			
23.06	Textile Floor Coverings Felt and Felt Products	C	0.8332*	0.0958**	0.8292**	0.0639	0.2118*	0.2122*	-0.2885**	.6840	0.6898	1.620
			(2.052)	(2.801)	(3.265)	(0.6934)	(2.273)	(2.302)	(-3.537)			
23.07	Textile Products n.e.c. (incl. Canvas & Rope)	C	1.553**	0.0651	0.1248				-0.0461	.5454	2.592	1.811
			(4.250)	(1.261)	(0.339)				(-.3838)			
24.01	Knitting Mills	N	1.906**	0.1025	-1.015*	0.0335	0.0669	0.6655**	0.0941	.8067	0.6508	1.639
			(5.009)	(1.248)	(-1.994)	(.2034)	(.4159)	(4.191)	(.6668)			
24.02	Clothing	N	2.616**	0.0996*	-0.5609	0.1518	-0.0349	0.6205*	-0.5257**	.9308	0.6767	1.718
			(10.66)	(1.929)	(-1.653)	(1.457)	(-.3448)	(6.206)	(-5.132)			
25.04	Furniture, Mattresses Brooms and Brushes	I	2.085**	0.1587**	0.7318*				0.1525*	.7581	0.9312	1.079
			(6.765)	(3.831)	(1.861)				(2.310)			
26.01	Pulp, Paper and Paperboard	N	0.5537**	0.0462**	0.3693**	-0.0570	0.0366	0.1684*	0.0200	.6999	1.569	1.828
			(4.063)	(2.714)	(3.764)	(-.8359)	(.5525)	(2.505)	(.3535)			
27.01	Chemical Fertilisers	C	1.657**	-0.0037	-0.2246				-0.3713**	.6756	2.060	1.285
			(6.140)	(-.0483)	(-.3768)				(-3.059)			
27.02	Industrial Chemicals n.e.c. (Plastics, Resins & other Basic Chemicals)	I	1.070**	0.0091	0.8314**				-0.1677*	.6614	1.078	1.303
			(6.343)	(.2585)	(2.705)				(-2.692			
27.05	Soap and other Detergents	N	1.290**	0.1375**	0.8614*	2.048**	0.1167	0.2056**	0.0894	.9627	1.686	2.057
			(16.18)	(3.874)	(2.634)	(3.132)	(1.828)	(3.229)	(.9980)			
27.08	Petroleum and Coal Products	N	-0.0957*	-0.0136	0.1695				0.1754**	.0173	1.668	2.017
			(-1.744)	(-.5088)	(.7189)				(4.011)			
28.02	Clay Products	I	1.179**	0.0735	-0.0407				0.4271	.9050	0.8776	1.411
			(14.78)	(1.261)	(-.1041)				(5.302)			

Definition of Symbols : σ is the elasticity of substitution; $(\sigma\theta_1)$ and $(\sigma\theta_2)$ are the coefficients of the positive and negative pressure of demand α_1 , α_2 and α_3 are the coefficients of the seasonal dummy variables; a is the constant; $\bar{R}^2$ is R^2 adjusted for degrees of freedom; DW is the Durbin-Watson statistic; D4 is the fourth-order Durbin-Watson statistic; * indicates significance at the 5 per cent level. I represents the Infallibility specification, N the Naiveté specification and C the Clairvoyance specification. (The constant a represents the intercept for the fourth quarter; α_1 , α_2 and α_3 are additive adjustments for the first, second and third quarter respectively.)

Table 3.2 (contd)

Input-Output Category	Description	Best Model	Estimated Parameters								$\bar{R}^2$	DW	D4
			σ	$(\sigma\theta_1)$	$(\sigma\theta_2)$	α_1	α_2	α_3	η	a			
28.03	Cement	N	0.6248	-0.0579	1.169*					0.0195	.0696	1.197	2.235
			(1.518)	(-.5757)	(1.796)					(.091)			
28.05	Concrete Products	N	1.161**	-0.1814	1.076					0.0505	.6179	1.091	1.116
			(5.921)	(-.9759)	(.8967)					(.2173)			
28.06	Gypsum, Plaster & other Non-Metallic Mineral Products	N	0.8195**	0.0272	0.6092*					0.0982	.7782	1.603	1.399
			(8.208)	(.6553)	(2.191)					(1.284)			
29.01	Basic Iron and Steel	N	0.8169**	0.0561	0.5895**					0.0390	.7654	1.436	1.817
			(4.947)	(1.301)	(3.196)					(.6464)			
29.02	Non-Ferrous Metal Basic Products	I	1.005**	0.0312	0.4507	0.1690	0.2534*	0.2057*		-0.0692	.9698	1.955	2.231
			(23.15)	(1.022)	(1.649)	(1.802)	(2.698)	(2.187)		(-.8352)			
32.01	Motor Vehicles and Parts	C	3.657*	0.1432*	-0.2014	-0.0001	-0.0576	0.2699	-0.6525	0.2134	.7639	1.424	1.758
			(5.025)	(2.538)	(-.5509)	(-.0006)	(.3958)	(1.842)	(-1.572)	(1.657)			
33.03	Household Appliances	C	2.117**	0.0822*	0.8521*					0.2899**	.8210	1.597	1.159
			(7.965)	(1.791)	(2.046)					(3.788)			
33.04	Electrical Machinery and Equipment n.e.c.	N	0.8430**	0.0250	0.0985					0.0622	.8882	1.533	1.022
			(10.84)	(.4587)	(.4154)					(1.016)			
34.03	Plastic & Related Products	C	1.509**	0.0731*	0.2177	0.1646	0.1925	0.1681		-0.3640	.8352	1.300	1.706
			(9.271)	(2.174)	(.8032)	(1.762)	(2.058)	(1.847)		(-4.646)			
34.05	Other Manufacturing	I	2.023**	-0.0003	0.5141	0.0925	0.2642	3.059		0.0045	.7365	1.574	1.832
			(5.460)	(-.0072)	(1.705)	(.9101)	(2.628)	(2.952)		(.0514)			

Definition of Symbols : σ is the elasticity of substitution; $(\sigma\theta_1)$ and $(\sigma\theta_2)$ are the coefficients of the positive and negative pressure of demand α_1, α_2 and α_3 are the coefficients of the seasonal dummy variables; η is the coefficient of the quota dummy; a is the constant; $\bar{R}^2$ is R^2 adjusted for degrees of freedom; DW is the Durbin-Watson statistic; D4 is the fourth-order Durbin-Watson statistic; * indicates significance at the 5 per cent level. I represents the Infallibility specification, N the Naiveté specification and C the Clairvoyance specification. (The constant a represents the intercept for the fourth quarter; α_1, α_2 and α_3 are additive adjustments for the first, second and third quarter respectively.

TABLE 3.3 - Summary of Results for the Partial Adjustment Model

Input-Output Category	Description	Estimated Parameters								$\bar{R}^2$	DW	D4
		$(\lambda\sigma^*)$	θ_1	θ_2	$(1-\lambda)$	α_1	α_2	α_3	a			
21.02	Milk Products	1.573*	0.1747	0.3083	0.0482	-0.5319*	-0.8885*	-0.6796*	0.8469*	.8590	1.999	1.549
		(2.631)	(1.286)	(1.294)	(.2007)	(-4.631)	(-6.529)	(-7.976)	(9.936)			
21.03	Fruit and Vegetable Products	0.6988*	0.7335*	1.275*	0.1686	0.4816*	0.0067	-1.066*	0.5451*	.8686	2.168	1.082
		(1.784)	(2.652)	(2.456)	(.9549)	(3.227)	(.0306)	(-4.716)	(4.078)			
21.04	Margarine Oils and Fats	0.9679*	0.2304	1.209*	0.4513*	0.1068	0.1924	0.3245*	0.0422	.3657	2.464	2.181
		(2.117)	(.9786)	(1.743)	(1.824)	(.7715)	(1.279)	(2.296)	(.2183)			
21.05	Flour and Cereal Products	1.322*	0.2938*	0.013	-0.2776	0.3261*	0.2714*	0.2709*	-0.0607	.6802	1.600	1.863
		(5.859)	(1.792)	(.0414)	(-1.144)	(3.224)	(2.547)	(2.243)	(-.6162)			
21.06	Bread, Cake and Biscuits	-0.0838	0.0009	0.1014	-0.3719	0.3497*	0.3089*	0.0581	-0.2024*	.6457	1.705	2.166
		(-.2473)	(.0072)	(.4165)	(-1.033)	(3.343)	(3.316)	(.5520)	(-2.465)			
21.07	Confectionery	-0.0694	0.0651	0.1330	0.2573				0.0396	-.1228	2.180	1.631
		(-.1724)	(.3106)	(.2609)	(.5799)				(.4197)			
21.08	Food Products n.e.c. (incl. Fish and Sugar)	-0.0822	0.3355*	-0.0814	0.4011	0.0262	0.2917*	0.1957*	-0.1749*	.4843	1.753	1.863
		(-.3445)	(1.944)	(-.2684)	(1.260)	(.2937)	(2.865)	(2.229)	(-2.165)			
21.10	Beer and Malt	1.927*	0.2984	-0.6567	0.6379*	0.4070*	0.3883*	0.0169	-0.3049	.8426	1.719	2.115
		(2.265)	(1.270)	(-1.644)	(4.540)	(3.168)	(2.971)	(.1383)	(-1.859)			
22.01	Tobacco Products	-0.8647*	-0.0043	-0.1900	0.8119*				0.0184	.8118	2.144	1.660
		(-2.069)	(-.0388)	(-.9396)	(5.979)				(.3598)			
23.01	Prepared Fibres	0.1666	0.1263	0.1409	0.6781*	-0.2731	-0.3525*	-0.1522	0.3284*	.6152	1.665	2.738
		(.5416)	(1.517)	(.2583)	(3.350)	(-1.633)	(-2.207)	(-.9791)	(2.391)			
23.02	Man-Made Fibres, Yarns and Fabrics	1.408*	0.0828*	-0.2061	0.7982*	0.0292	0.1393*	0.2591*	0.1078	.9071	2.188	1.594
		(2.899)	(2.733)	(-.9021)	(8.762)	(.6191)	(3.040)	(5.808)	(2.052)			
23.03	Cotton, Silk & Flax Yarns, Fabrics & Household Textiles	-1.434*	0.0891*	0.2651*	0.1881	-0.0065	0.1570*	0.2574*	-0.1565*	.8741	2.408	2.198
		(-2.523)	(4.760)	(2.872)	(1.216)	(-.1840)	(4.583)	(7.460)	(-4.776)			

Definition of Symbols : $(\lambda\sigma^*)$ is the coefficient of the price term; θ_1 and θ_2 are the coefficients of the positive and negative pressure of demand variables; $(1-\lambda)$ is the coefficient of the lagged dependent variable; α_1, α_2 and α_3 are the coefficients of the seasonal dummy variables; a is the constant; $\bar{R}^2$ is the R^2 adjusted for degrees of freedom; DW is the Durbin-Watson statistic; D4 is the fourth-order Durbin-Watson statistic; * indicates significance at the 5 per cent level. (The constant a represents the intercept for the fourth quarter; α_1, α_2 and α_3 are additive adjustments for the first, second and third quarter respectively.)

Table 3.3 (contd)

Input-Output Category	Description	Estimated Parameters								$\bar{R}^2$	DW	D4
		$(\lambda\sigma^*)$	θ_1	θ_2	$(1-\lambda)$	α_1	α_2	α_3	a			
23.04	Wool and Worsted Yarns and Fabrics	0.7402	0.0559	0.3786	0.6875*	-0.2250*	0.6009*	0.8187*	-0.4219	.8537	2.118	2.371
		(1.887)	(1.297)	(1.243)	(4.280)	(-2.355)	(5.094)	(7.417)	(-4.380)			
23.06	Textile Floor Coverings Felt and Felt Products	1.169*	0.0577	0.6089*	0.4704*	0.0839	0.2997*	0.2768*	-0.2879*	.8246	1.395	1.424
		(2.534)	(1.375)	(2.599)	(3.454)	(1.056)	(3.589)	(3.462)	(-4.048)			
23.07	Textile Products n.e.c. (incl. Canvas & Rope)	1.001*	-0.0024	0.4475	0.4328	0.1167	0.3372*	0.2206	-0.1690	.5500	2.505	1.746
		(1.912)	(-.0405)	(1.032)	(1.372)	(.8695)	(2.445)	(1.768)	(-1.258)			
24.01	Knitting Mills	-0.0360	-0.0598	0.9021*	1.188*	0.1026	0.7350*	1.237*	-0.4359*	.9673	1.750	1.792
		(-.1302)	(-1.556)	(3.239)	(9.866)	(1.463)	(7.762)	(14.18)	(-5.640)			
24.02	Clothing	0.8685*	0.0234	0.1586	0.7747*	0.2475*	0.2233*	0.7443*	-0.3742*	.9587	1.850	1.779
		(2.186)	(.5408)	(.5294)	(5.733)	(2.879)	(2.349)	(8.847)	(-4.285)			
25.04	Furniture, Mattresses Brooms and Brushes	0.9581*	0.0896*	0.5291*	0.6260*	0.3890*	0.2492*	0.0032	-0.0896	.9565	2.092	1.886
		(4.949)	(4.306)	(2.864)	(8.929)	(5.292)	(4.066)	(.0556)	(-1.665)			
26.01	Pulp, Paper and Paperboard	0.4014*	0.0155	0.1755	0.7224*	0.0957	0.1495	0.2498*	-0.1067	.5812	2.066	1.600
		(2.056)	(.5759)	(.6786)	(2.801)	(.9421)	(1.575)	(2.660)	(-1.277)			
27.01	Chemical Fertilisers	0.4097	-0.1860*	-0.1254	0.2780				-0.4118*	.4961	2.111	1.901
		(.8257)	(-2.289)	(-.1994)	(1.004)				(-2.540)			
27.02	Industrial Chemicals n.e.c. (Plastics, Resins & other Basic Chemicals)	1.325*	0.0388	0.2348	0.2923	0.2587*	0.1926	0.1635	-0.2401*	.7367	2.304	1.973
		(4.919)	(1.178)	(.7929)	(1.694)	(2.388)	(1.821)	(1.403)	(-2.466)			
27.05	Soap and other Detergents	1.591*	0.1228*	1.095*	-0.3953*	0.2763*	0.1373	0.2066	0.0988	.8870	2.691	2.220
		(6.786)	(1.779)	(1.741)	(-1.763)	(2.218)	(1.224)	(1.855)	(.5960)			
27.08	Petroleum and Coal Products	0.1959*	0.0649*	-0.0648	0.5604*	0.1423*	0.0442	0.0137	-0.0007	.4807	1.958	2.201
		(3.254)	(2.828)	(-.3998)	(1.850)	(2.502)	(.7465)	(.2294)	(-.0103)			
28.02	Clay Products	1.498*	0.1500*	-0.1706	-0.3750*				0.5223*	.8057	1.041	1.138
		(9.492)	(1.743)	(-.2982)	(-2.631)				(4.358)			

Definition of Symbols : $(\lambda\sigma^*)$ is the coefficient of the price term; θ_1 and θ_2 are the coefficients of the positive and negative pressure of demand variables; $(1-\lambda)$ is the coefficient of the lagged dependent variable; α_1 , α_2 and α_3 are the coefficients of the seasonal dummy variables; a is the constant; $\bar{R}^2$ is the R^2 adjusted for degrees of freedom; DW is the Durbin-Watson statistic; D4 is the fourth-order Durbin-Watson statistic; * indicates significance at the 5 per cent level. (The constant a represents the intercept for the fourth quarter; α_1 , α_2 and α_3 are additive adjustments for the first, second and third quarter respectively.)

Table 3.3 (contd)

Input-Output Category	Description	Estimated Parameters									$\bar{R}^2$	DW	D4
		$(\lambda\sigma^*)$	θ_1	θ_2	$(1-\lambda)$	α_1	α_2	α_3	η	a			
28.03	Cement	0.5595	-0.0358	1.061	0.1129					0.0019	-.0259	1.282	2.081
		(1.211)	(-.3171)	(1.549)	(.4169)					(.0070)			
28.05	Concrete Products	1.022*	0.0124	-0.2761	-0.0174					-0.2384	.3867	1.418	1.507
		(3.685)	(.0526)	(-.1805)	(-.0772)					(-.8044)			
28.06	Gypsum, Plaster & other Non-Metallic Mineral Products	0.7895*	0.0216	0.7733*	-0.0895					0.0488	.5037	1.900	1.807
		(4.240)	(.3297)	(1.781)	(-.4703)					(.3682)			
29.01	Basic Iron and Steel	0.7847*	0.0249	0.7928*	0.1756					0.1164	.6420	1.813	2.248
		(2.340)	(.3743)	(2.828)	(.8549)					(1.256)			
29.02	Non-Ferrous Metal Basic Products	1.210*	0.1510*	0.0489	-0.4283*	0.1137	0.4468*	0.3818*		-0.1641	.9223	1.702	2.479
		(12.56)	(2.672)	(.1056)	(-4.269)	(.7525)	(2.773)	(2.406)		(-1.190)			
32.01	Motor Vehicles & Parts & Transport equipt n.e.c.	1.330*	0.0380*		0.7424*	0.0090	0.1179	0.2753*	-0.5385*	0.0296	.8934	1.910	2.269
		(1.877)	(2.233)		(4.728)	(.0898)	(1.206)	(2.814)	(-2.174)	(.3447)			
33.03	Household Appliances	0.3419*	0.0192	0.2892	0.8677*	-0.0299	0.2358	0.1711*		0.0277	.9642	2.197	2.228
		(1.950)	(.8605)	(1.515)	(10.99)	(-.4926)	(.3683)	(2.805)		(.4449)			
33.04	Electrical Machinery & Equipment n.e.c.	0.8382*	-0.0115	0.1628	0.0086					0.0785	.7827	1.792	1.366
		(5.031)	(-.1439)	(.4431)	(.0429)					(.8974)			
34.03	Plastic & Related Products	1.293*	0.0627	-0.1018	0.2000	0.1558	0.2804*	0.2890*		-0.3884*	.7327	1.821	2.151
		(4.593)	(1.417)	(-.2688)	(1.041)	(1.358)	(2.409)	(2.421)		(-4.048)			
34.05	Opthalmic Articles, Jewellery, Silverware & Other Manufacturing	0.1463*	0.1304*	0.0866	0.7346*	0.2950*	0.1959*	0.1047		-0.0994	.9043	2.746	1.802
		(.4081)	(4.074)	(.4660)	(5.843)	(4.184)	(3.251)	(1.559)		(-1.763)			

Definition of Symbols : $(\lambda\sigma^*)$ is the coefficient of the price term; θ_1 and θ_2 are the coefficients of the positive and negative pressure of demand variables; $(1-\lambda)$ is the coefficient of the lagged dependent variable; α_1, α_2 and α_3 are the coefficients of the seasonal dummy variables; η is the coefficient of the quota dummy; a is the constant; $\bar{R}^2$ is the R^2 adjusted for degrees of freedom; DW is the Durbin-Watson statistic; D4 is the fourth-order Durbin-Watson statistic; * indicates significance at the 5 per cent level. (The constant a represents the intercept for the fourth quarter; α_1, α_2 and α_3 are additive adjustments for the first, second and third quarter respectively.)

d. <u>The Pressure of Demand</u>

The disaggregated pressure of demand measure used in this study (Q) is that developed in Alaouze (1977), and is derived from a question in the Survey of Industrial Trends conducted jointly by the Bank of N.S.W. and the Associated Chambers of Manufactures of Australia (ACMA-BNSW). This measure (Q) is the proportion of firms in an industry which indicate they are working at full capacity in answering a question in the survey.

The pressure of demand proxies are available disaggregated into eight industry classifications :

(1) Treatment of Non-Metal Minerals (cement, bricks, pottery, glass) ;

(2) Chemicals (paint, oils, pharmaceuticals) ,

(3) Engineering (machinery, iron and steel, electrical, industrial metals) ;

(4) Vehicle Construction and Repair (rail, bus, motor, ship, aircraft) ;

(5) Textiles (leather, clothing) ;

(6) Food (drink, tobacco) ;

(7) Paper (printing, cardboard) ;

(8) Miscellaneous (including manufactures of wood, rubber, plastics) .

Operationally, the use of these proxies in regressions using data aggregated at the ASIC level requires a concordance between each ASIC and the eight ACMA-BNSW industry groupings. The concordance used in this study (for the pressure of demand and the construction of the Clairvoyance series) may be found in the Appendix.

In the AMZ study, these measures were subjected to a non-linear transformation and partitioned to yield two series, one, ZP, which could be used to test for the "positive pressure of demand effect", (or spillover effect), during periods of high domestic activity, and the other, ZN, for the "negative pressure of demand effect" (import demand is retarded during periods of low activity because domestic producers offer non-price inducements to purchase local products).

The non linear transformation used can be written :

$$Z = (Q - Q^*) / (1 - Q) \qquad (Q < 1) \qquad (3.1)$$

where $Q^* = 0.5$.

The two measures Q and Z were partitioned about Q^* in the following manner :

$$QP = \begin{cases} 0 & \text{if } Q \leq Q^* ; \\ Q & \text{if } Q > Q^* ; \end{cases} \qquad (3.2)$$

$$QN = \begin{cases} Q & \text{if } Q \leq Q^* ; \\ 0 & \text{if } Q > Q^* ; \end{cases} \qquad (3.3)$$

where QP is the positive pressure of demand component and QN is the negative pressure of demand component, and

$$ZP = \begin{cases} 0 & \text{if } Q \leqq Q^* \ ; \\ Z & \text{if } Q > Q^* \ . \end{cases} \qquad (3.4)$$

$$ZN = \begin{cases} Z & \text{if } Q \leqq Q^* \ ; \\ 0 & \text{if } Q > Q^* \ ; \end{cases} \qquad (3.5)$$

where ZP is the positive pressure of demand component and ZN is the negative pressure of demand component of the transformed measure Z . For details, see Alaouze (1977).

To facilitate the comparison between this study and the AMZ study all the results presented in the tables relating to other sections of this paper are for the partitioned, transformed measures. However, in addition to this, all the equations in this study were also estimated for the partitioned but untransformed measures of pressure of demand, QP and QN (where QP is a proxy for the positive pressure of demand effect and QN is a proxy for the negative pressure of demand effect). In addition some of the IOs were also estimated for the untransformed and unpartitioned measure Q . The measures were partitioned to enable the independent testing of the positive and negative pressure of demand effects and the measures were transformed to allow the possibility of a non-linear response in the level of imports to changes in the pressure of demand proxy. A comprehensive discussion of these issues is presented below. However, initially the results of the partitioned transformed measures are reported to permit comparison with the AMZ study. In the discussion which follows, only the twenty-three IOs for which the ES had the correct sign and which were discussed in Section 3c are considered. As before, the partial adjustment model is chosen when the coefficient of the lagged dependent variable is significant.

Of the twenty-three IOs, the coefficient of the transformed positive pressure of demand measure has the correct sign and is significant (at the five per cent level) in five cases (IOs 25.04, 27.05, 27.08, 34.03 and 32.01) and the coefficient of the transformed negative pressure of demand variable (ZN) has the right sign and is significant (at the five per cent level) in seven cases (IOs 21.04, 23.06, 25.04, 27.05, 28.03, 28.06, and 29.01). From these results it would seem that the negative pressure of demand effect is dominant; however, this result is at variance with that of the AMZ study in which a significant positive pressure of demand effect was detected in fourteen out of thirty-two ASICs and the negative effect in five out of thirty-two. From this it is clear that the proportion of IOs in which the positive pressure of demand effect was detected is markedly lower than the AMZ study. Since the two studies cover the same range of goods, the only difference being the level of aggregation, it can be concluded that a major reason for this difference is the level of aggregation. This result is in agreement with that obtained by Gregory (1971). Gregory tested for, but could not detect, a significant non-linear import response to changes in pressure of demand using aggregate data.

4. A COMPARISON OF APPROACHES TO PRESSURE OF DEMAND VARIABLES

As mentioned above, all the equations in this study were also estimated for the partitioned but untransformed measures of pressure of demand (QP and QN), and some of the IOs were also estimated for the untransformed and unpartitioned measure Q . Estimation of import demand equations with an unpartitioned and untransformed pressure of demand measure is the most common approach to estimating pressure of demand effects in the literature.

Partitioning Q enables the independent testing of the positive and negative pressure of demand effects; that is, a significant positive effect can be detected in the absence of a negative effect and vice versa. Partitioning also permits the testing of the hypothesis that the coefficients of the positive and negative pressure of demand measures are significantly different. This is important in cases where both coefficients are significant. Transforming the partitioned measures enables us to find the IOs for which the logarithm of the ratio of imports to the use of domestic goods is a non-linear function of the pressure of demand measures. Before discussing the results in detail, it should be noted that in general, the estimates of other parameters, their t statistics and the summary statistics associated with each equation ($\bar{R}^2$, DW and D4) are all fairly insensitive to the manner in which pressure of demand is treated. The one exception to this (IO 27.08) is discussed in some detail below.

Altogether twenty-three IOs were estimated using the partitioned and the partitioned and transformed pressure of demand measures. The results were classified into six groups and are presented in Tables 4.1 to 4.6 . A significant difference between the coefficients of ZP and ZN was found in six IOs (these are marked with a double asterisk in Table 4) and in no cases are the coefficients of QP and QN significantly different.

TABLE 4 - Classification of Pressure of Demand Results

TABLE 4.1 - IOs Where Partitioning and Transforming Produces Competing Hypotheses*

IO	Q	ZP	Coefficient of ZN	QP	QN
21.04	RS-S	RS-NS	RS-S	RS-S	RS-NS
**23.06	RS-S	RS-NS	RS-S	RS-S	RS-NS
29.01	RS-S	RS-NS	RS-S	RS-S	RS-NS
**28.06	RS-S	RS-NS	RS-S	RS-S	RS-S

TABLE 4.2 - IOs Where None of the Coefficients of ZP, ZN and QP, QN are Positive and Significant*

IO	Q	ZP	ZN	QP	QN
**21.10	WS-NS	RS-NS	WS-NS	WS-NS	WS-S
23.07	RS-NS	RS-NS	RS-NS	RS-NS	RS-NS
24.02	RS-NS	RS-NS	RS-NS	RS-NS	RS-NS
26.01	RS-NS	RS-NS	RS-NS	RS-NS	WS-NS
27.01	WS-NS	WS-NS	WS-NS	WS-NS	WS-NS
28.02	RS-NS	RS-NS	WS-NS	RS-NS	RS-NS
28.05	WS-NS	RS-NS	RS-NS	WS-NS	WS-NS
29.02	RS-S	RS-NS	RS-NS	RS-NS	WS-NS
33.04	RS-NS	RS-NS	RS-NS	RS-NS	RS-NS

* WS indicates wrong sign (negative), RS indicates right sign (positive), S indicates significance (at the five per cent level), ** indicates a significant difference between the coefficients of ZP and ZN at the five per cent level; NS indicates not significant.

TABLE 4.3 - IOs Where the Coefficients of QP and QN and ZP and ZN are all Positive and Significant*

IO	ZP	ZN	QP	QN
**25.04	RS-S	RS-S	RS-S	RS-S
**27.05	RS-S	RS-S	RS-S	RS-S

TABLE 4.4 - IOs Where the Coefficients of QP and QN are in both cases Positive and Significant, but the Coefficients of ZP and ZN are not Significant*

IO	ZP	ZN	QP	QN
23.02	WS-NS	WS-NS	RS-S	RS-S
23.04	RS-NS	RS-NS	RS-S	RS-S

TABLE 4.5 - IOs Where One of the Coefficients of ZP and ZN is Positive and Significant, but Neither Coefficient of QP and QN is Significant*

IO	Q	ZP	ZN	QP	QN
27.08	RS-S	RS-S	WS-NS	RS-NS	RS-NS
28.03	RS-S	WS-NS	RS-S	RS-NS	RS-NS
**32.01	RS-S	RS-S	WS-S	WS-NS	WS-NS
34.03	RS-S	RS-S	RS-NS	RS-NS	RS-NS

TABLE 4.6 - IOs Where One of the Coefficients of QP and QN is Positive and Significant, but Neither Coefficient of ZP and ZN is Significant*

IO	Q	ZP	ZN	QP	QN
21.07	RS-NS	WS-NS	RS-NS	RS-NS	RS-S
33.03	RS-S	RS-NS	RS-NS	RS-S	RS-NS

* WS indicates wrong sign (negative), RS indicates right sign (positive), S indicates significance (at the five per cent level), ** indicates a significant difference between the coefficients of ZP and ZN at the five per cent level; NS indicates not significant.

Table 4.1 contains the IOs for which the partitioned and transformed measures indicated a significant negative pressure of demand effect and a non-significant positive pressure of demand effect and the partitioned (but untransformed) measures indicated a significant positive pressure of demand effect. Because of the similarity of the estimates of other parameters and associated statistics there were no grounds for choosing a particular treatment of pressure of demand; therefore these IOs were re-estimated using the unpartitioned measure, Q . In all four cases, the coefficient of Q was significant. In these cases therefore we have reverted to the orthodox treatment in which pressure of demand is not partitioned into positive and negative parts.

Table 4.2 contains the results for the nine IOs for which none of the coefficients of the partitioned measures was significant. These were re-estimated using Q , and in one case, IO 29.02, the coefficient of Q was found to be positive and significant.

Table 4.3 contains the results for the two IOs for which the coefficients of the parameters of all the partitioned measures are significant. The parameters of the partitioned and transformed estimates are in addition significantly different. However, despite this, there are no substantial differences between the two partitioned measures as far as the other parameters and associated statistics are concerned, and therefore there are no grounds for preferring the transformed measures above the untransformed. However, partitioning has enabled statistical verification of the existence of both positive and negative pressure of demand effects.

Table 4.4 contains the results for the two IOs for which the coefficients of QP and QN were both significant but none of the coefficients of ZP and ZN were significant. Although the coefficients of QP and QN in these two models were not significantly different, partitioning has enabled the independent estimation of positive and negative pressure of demand effects.

Table 4.5 contains the results for the four IOs for which one of the coefficients of ZP and ZN was significant but none of the coefficients of QP and QN is significant. Of these a significant positive pressure of demand effect was found in three cases (IOs 27.08, 32.01 and 34.03). A significant negative pressure of demand effect was found for IO 28.03 . These were also re-estimated using the unpartitioned measure, and in all four cases, the coefficient of Q was found to be significant.

The coefficient of ZN for IO 32.01 is negative and significant. The negative pressure of demand variable was dropped from the equations presented in this paper for this IO without causing any significant changes in the estimates of other parameters and statistics. The estimated equation for IO 27.08 using ZP and ZN is markedly superior to that obtained using QP and QN or Q . The estimated equation obtained using ZP and ZN had a higher $\bar{R}^2$, a higher DW (1.96 versus 1.43 and 1.37) and generally higher t statistics on the other parameters (especially the ES) than the models estimated using

QP and QN , and Q . Furthermore, the coefficient of the lagged depand variable for ZP and ZN was significant, whereas the estimates obtained using QP and QN , and Q were not.

Finally, Table 4.6 shows the two IOs for which one of the coefficients of QP and QN is positive and significant, but the coefficients of ZP and ZN are not. These IOs were re-estimated using Q and in one case (21.07) the coefficient of Q had the correct sign but was not significant and, in the other case, the coefficient of Q was significant.

In summary, a significant unspecified pressure of demand effect was detected for five IOs (found in Tables 4.1 and 4.2). Significant positive and negative pressure of demand effects together were found using the measures QP and QN only for two IOs (found in Table 4.4). Significant positive and negative pressure of demand effects were detected using ZP and ZN and QP and QN in two cases (found in Table 4.3). Significant positive pressure of demand effects only were found for three IOs, and a significant negative pressure of demand effect only for one IO using ZP and ZN (found in Table 4.5). A significant positive pressure of demand effect only, and a significant negative pressure of demand effect only, were found using QP and QN for IOs listed in Table 4.6 . No significant pressure of demand effects were found for eight IOs listed in Table 4.2 .

In conclusion, partitioning the pressure of demand measure into positive and negative parts seems worthwhile in many cases. A total of fifteen IO classes yielded significant pressure of demand effects. In ten of these cases, significance (of at least one of the positive or negative effects) and correct signs (of both effects) were maintained under partitioning. Four of these results were contingent upon transforming the partitioned pressure of demand measure. A significant positive pressure of demand effect was unambiguously estimated for eight IOs, and a significant negative pressure of demand effect was unambiguously estimated for six IOs out of a possible twenty-three. These results are summarised in Table 4.7 .

TABLE 4.7 - Summary of Pressure of Demand Results

IO	Brief Description	Pressure of Demand Effect				Variables with Significant Coefficients				
		Unspecified	Positive	Negative	None	Q	ZP	ZN	QP	QN
21.04	Margarine Oils and Fats	X				X				
29.02	Other Basic Metals	X				X				
23.06	Textile Floor Coverings	X				X				
29.01	Basic Iron and Steel	X				X				
28.06	Non-Metal Mineral Products	X				X				
23.02	Man-Made Fibres, Yarns		X	X					X	X
23.04	Wool and Worsted Yarns		X	X					X	X
25.04	Furniture, Mattresses		X	X			X	X	X	X
27.05	Soap and Detergents		X	X			X	X	X	X
27.08	Oil and Coal Products		X				X			
32.01	Motor Vehicles and Parts		X				X			
34.03	Plastic Products		X				X			
28.03	Cement			X				X		
33.03	Household Appliances		X						X	
21.07	Confectionery			X						X
21.10	Beer and Malt				X					
23.07	Textile Products, n.e.c.				X					
24.02	Clothing				X					
26.01	Pulp, Paper and Paperboard				X					
27.01	Chemical Fertilisers				X					
28.02	Clay Products				X					
28.05	Concrete Products				X					
33.04	Electrical Machinery				X					

5. CONCLUSIONS

The major results of this study are in basic agreement with the conclusions reached by AMZ. The ratio of imports to domestically produced goods is sensitive to changes in the ratio of domestic to import prices for a wide range of Australian commodities. The estimates of the ES obtained were generally lower than those obtained in the AMZ study. Thi result is probably due to the higher level of aggregation used in this study. The ES estimated at the IO level of aggregation in this study fell within the range of estimates of the ES of component ASICs when two or more component ASICs were estimated in the AMZ study.

It was also found that the partitioned and transformed pressure of demand measures used in the AMZ study lead to different conclusions concerning the sensitivity of imports to domestic pressure of demand. This difference appears to be due to aggregation. It can be concluded that the partitioned, transformed measures of pressure of demand do not perform well at high levels of aggregation. When the partitioned but untransformed measures of pressure of demand are used in addition to the untransformed partitioned measures the positive pressure of demand effect is predominant; however, the frequency with which the negative pressure effect is significant is higher than would be expected a priori from the results of the AMZ study.

Dummy variables were used to test for the effects of quota restrictions on imports for two IOs. In one case, a significant effect was found; however, in the other case the estimated equations were econometrically unacceptable. This result appears to be due to aggregation.

APPENDIX

CONCORDANCE OF ACMA INDUSTRY GROUPS AND IO CLASSES[a]

ACMA industry group		IO class
1	Treatment of non-metallic minerals (cement, bricks, pottery, glass)	28.02, 28.03, 28.05, 28.06
2	Chemicals	27.05
3	Engineering (machinery, iron and steel, industrial metal, electrical)	29.01, 33.04
4	Vehicles construction and repair (rail, bus, motor, ship, aircraft)	32.01
5	Textiles (leather clothing)	23.01, 23.02, 23.03, 23.04, 23.07, 24.01, 24.02
6	Food (drinks, tobacco)	21.02, 21.03, 21.04, 21.05, 21.06, 21.07, 21.08, 21.10, 22.01
7	Paper (printing, cardboard)	26.01
8	Miscellaneous (mfrs. of wood, rubber, plastics)	23.06, 25.04, 27.01, 27.02, 27.08, 29.02, 33.03, 34.03, 34.05

a Selected industries. Details of the IO classification may be found in : Australian National Accounts, INPUT-OUTPUT TABLES 1968-69, Australian Bureau of Statistics, Canberra, Australia, 1976.

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