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THE AUSTRALIAN SYSTEM OF TARIFF PREFERENCES: ASEAN EXPERIENCE

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This paper assesses the overall effectiveness of Australia's preferential scheme in improving the market access of ASEAN imports and quantifies the effects of such preferences on Australia-ASEAN trade. A market model for Australia's imports is developed with its postulates drawn from constrained equilibrium principles. The results indicate the efficacy of the preferences beginning in 1974 when the scheme was revised, but the trade gains derived by the ASEAN countries are marginal. Moreover, they demonstrate that increased trade between Australia and ASEAN can occur without adversely affecting Australia's trade with the nonpreferred countries. The findings further support the view that realization of the potential value of preferences depends on the economic climate in the preference-granting country and the ability of the preference-receiving country to respond to the preference stimulus.

1. Introduction

The Australian scheme of preferences for selected imports from developing countries has operated for about 18 years. Its main objective is to place developing countries in a better position to compete in the Australian market in an effort to increase their foreign exchange earnings and facilitate the process of industrialization (Australian Department of Trade and Resources, 1976, p. 1). However, this scheme was subjected to extensive criticisms by the ASEAN countries, particularly during the 1970s. The main objection concerned the scheme's failure to increase substantially ASEAN exports to Australia[1] . In this inquiry, an attempt is made to investigate the

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[1] This criticism is recorded in Frank Frost (1977, p. 3). It runs as follows: "Although Australia was the first developed country to grant tariff preferences to the developing countries, the benefits therefrom have been far below the expectations of the ASEAN member countries. In fact, the Australian system of tariff preferences has not really contributed towards any substantial increase in exports of the ASEAN member countries to Australia because of the scheme's limited product coverage, the low level of tariff reductions, the existence of a quota system and the stringent definition of handicrafts." For further discussion of its significance, see Tongzon (1982).

overall effectiveness of Australia's preferential scheme in improving the market access of ASEAN imports and quantify the effects of such preferences on trade.

The second section provides a theoretical basis with some of its postulates drawn from constrained equilibrium principles. This forms the foundation for the econometric formulation and estimation to be discussed in the third section. The fourth section presents the estimation results, and the inquiry is rounded up with a brief summary of the findings and some policy implications.

2. Theoretical Model

The prevailing recession, particularly in the 1970s, has thrown the problem inherent in Australia's preferential tariff treatment of ASEAN imports into sharp relief: Australia's import-competing industries have been sales-constrained in the *Barro-Grossman* sense (1971) and may view tariff liberalization as inappropriate, and increased protection in some industries may be seen as necessary for their survival.[2] This domestic consideration conflicts with Australia's expressed intention to assist the development of the ASEAN region. The ASEAN export industries, on the other hand, have been handicapped by a shortage of capital and intermediate inputs in meeting the limited opportunities offered by the preferences. This argument about ASEAN export supply is based on the institutional characteristics of developing countries and in particular on the long standing concept of the dual market structure which makes a distinction between the traditional (subsistence) and industrial (modern) sectors of the developing economy (Lewis, 1955; Ranis and Fei, 1964). Thus, the evaluation of the efficacy of the scheme is based on the circumstances described: the ASEAN export industries seek greater access to the Australian market at a less than propitious time from both the Australian and ASEAN viewpoints.

2.1 *Australian Demand for Goods from ASEAN and Other Countries*

The Australian demand for imports is one aspect of an integrated household plan where the functional form of import and other demand functions is conditioned by the arguments in the household

[2] Australian producers are not able to sell to realize their sales plan. Because profits are distributed to Australian households, the latter's income is therefore constrained. Further, the inflexibility of wages in the downward direction results in a state of involuntary unemployment which puts additional constraint on Australian households.

utility function and other constraints confronting the Australian households. Australian households purchase four types of commodities, namely (1) a domestically-produced nontraded good (C_1) which is marketed exclusively in Australia and has small cross price effects with imports, (2) a domestically-produced tradable good (C_2) which is a gross substitute for imports, (3) imports from countries receiving preferential tariff treatment (C_a), and (4) imports from non-preferred sources (C_f).

Household preferences are constrained in two ways: firstly the Australian economy has been and is subject to a state of involuntary unemployment; the maximum employment available to households ($\overline{L}$) remains below the notional supply of labour ($L^s - \overline{L} > O$) and following Neary (1980), the quantity of labour supplied is not chosen by the households if the employment constraint binds. Further, the two sets of Australian producers are sales-constrained and their effective supplies (X_i^s) are subject to constraint ($\overline{X}_i$) as follows:

$$(1) \quad X_i^s \leqslant \overline{X}_i, \qquad i = 1, 2.$$

The impact of this sales constraint is to restrict the households' income (Casson, 1981, p. 84). Secondly, the money wage (W) paid to labour is inflexible and does not adjust to restore full employment. The combination of these conditions produces a Barro-Grossman (1971; 1976) state of Generalized Excess Supply in the context of an open economy, that is, a concurrent excess supply of commodities and of labour, and the household problem subject to these restrictions is written as:

$$(2) \quad Max\ U = U(C_1, C_2, C_a, C_f, L, M)$$

$$S.T.$$

$$y^h = \sum_{i=1}^{2} P_i C_i + P_a^m C_a + P^f C_f + S + T$$

$$L^s \geqslant \overline{L}; \quad S = M^D - M_{-1}$$

The Australian households consume quantities of the two domestic commodities (C_1 and C_2), and the imports from two sources (C_a and C_f); save by accumulating cash balances ($S = M^D - M_{-1}$); and pay taxes to the government.[3] Australian household income (y^h) is dis-

[3] It is assumed in this theoretical part of the study that taxes are paid as a lump sum to the government to avoid any substitution effect on labour. This assumption facilitates the formulation of Australia's labour supply equation (Casson, 1981).

tributed over consumption, savings and taxation, and the effective supply of labour is constrained. This description of Australian households provides the following Australian household constrained demands

$$C_1^d = C_1(y^h, p_1, p_2, p_a^m, p^f, M_{-1}, T, \overline{L})$$
$$+ \quad - \quad + \quad + \quad + \quad + \quad - \quad +$$

$$C_2^d = C_2(y^h, p_1, p_2, p_a^m, p^f, M_{-1}, T, \overline{L})$$
$$+ \quad + \quad - \quad + \quad + \quad + \quad - \quad +$$

(3)

$$C_a^d = C_a(y^h, p_1, p_2, p_a^m, p^f, M_{-1}, T, \overline{L})$$
$$+ \quad + \quad + \quad - \quad + \quad + \quad - \quad +$$

$$C_f^d = C_f(y^h, p_1, p_2, p_a^m, p^f, M_{-1}, T, \overline{L})$$
$$+ \quad + \quad + \quad + \quad - \quad + \quad - \quad +$$

$$M^D = M(y^h, p_1, p_2, p_a^m, p^f, M_{-1}, T, \overline{L})$$
$$+ \quad + \quad + \quad + \quad + \quad - \quad - \quad +$$

$$L^s = \overline{L}$$

The signs of parametric shifts are indicated by the usual economic postulates. The positive impact of the household income variable (y^h) on demand, for instance, coincides with the Keynesian theory of consumption. These effective demands relate to an economy with unemployment and commodity excess supply. They have a different functional form if different constraints apply: for example, the money wage and non-labour income appear as separate arguments if households are not confronted with an income constraint and firms by sales constraint. Further, quantitative restrictions imposed on imports may have the effect of rationing household purchases of imports and creating a notional excess demand for them. The import demand functions in (3), C_a^d *and* C_f^d will be modified to incorporate this constraint. However, quotas are product specific and their incorporation is delayed until the lag structure of the econometric model which follows is formulated.

To focus on the issue of tariff preferences and relative prices, two modifications of (3) are proposed: firstly the parameters M_{-1}, T *and* $\overline{L}$ are assumed to be given, and secondly, the system (3) is homogeneous of degree 0 so that the remaining arguments in (3) may be written in terms relative to the price of nontraded goods (P_1). The

following functional forms represent a basis for empirical work:

$$C_a^d = C_a(y^h/P_1,\ p_2/p_1,\ P_a^m/p_1,\ p^f/p_1)$$

(4) $\qquad +\quad +\quad -\quad +$

$$C_f^d = C_f(y^h/p_1,\ p_2/p_1,\ p_a^m/p_1,\ p^f/p_1)$$

$\qquad +\quad +\quad +\quad -$

The postulated relationships in the above import demand functions are based on the economic theory of a rational consumer, and the homogeneity postulate is consistent with utility-maximization assumption (Samuelson, 1947, p. 10).

Since these functions only reflect the Australian household behaviour subject to employment and sales constraints, one may argue that an equally important aspect of Australian-ASEAN trade is ignored — Australian imports of intermediate goods from ASEAN. This issue can be justifiably incorporated in the analysis since input demand is a derived one, and a firm's output level is determined in the market for final goods. Since Australian firms are sales-constrained both in their home and overseas markets due to world recession, their level of output becomes exogenous. The exogeneity of output is commonly assumed in earlier studies (for instance, Rosen and Quandt, 1978, p. 373) for empirical tractability. But the presence of sales constraints provides a clear rationale for treating output as exogenous to Australian firms. It is also reasonable to postulate that the Australian producers are unconstrained in their demand for imported inputs. Quantitative restrictions apply mostly to consumer items and the by-law system under Australia's Customs Tariff Act provides Australian importers of inputs some relief from the protective effect of a tariff. Now the two sets of Australian producers have the same production pattern, hire labour at the common wage (w) and buy non-labour inputs from three sources: domestic producers $(I_1$ and $I_2)$, preference-receiving (I_a) and nonpreferred countries (I_f). Thus, their short-run resource employment plan is governed by cost minimization subject to the exogeneity of output. The i^{th} Australian firm's problem is represented as follows:

$$Min\ Z_i = WL_i + V_a^m I_{ai} + V^f I_{fi} + V^n I_{1i} + V^h I_{2i}$$

(5) $\qquad (L_i,\ I_{ai},\ I_{fi},\ I_{1i},\ I_{2i}$

$$S.T. \qquad x_i \leqslant \overline{X}_i \qquad i = 1, 2$$

where $\overline{X}_i$ is the restricted output as perceived by the Australian firms and may vary depending on market conditions in Australia and overseas, and where I_1 and I_2 represent domestically-produced non-traded input and domestically-produced tradable input, respectively. Cost minimization yields the following effective demand functions for imported inputs corresponding to (4), classified by source of origin:

$$
\begin{aligned}
I^d_{ai} &= I_{ai}(\overline{X}_i,\ W/V^n,\ V^m_a/V^n,\ V^f/V^n,\ V^h/V^n) \\
&\qquad +\quad -\quad -\quad +\quad + \\
I^d_{fi} &= I_{fi}(\overline{X}_i,\ W/V^n,\ V^m_a/V^n,\ V^f/V^n,\ V^h/V^n) \qquad i = 1, 2 \\
&\qquad +\quad -\quad +\quad -\quad +
\end{aligned}
\tag{6}
$$

where the functions are homogeneous of degree 0 with respect to the prices. The sign of the wage rate variable *(W)* is negative on the assumption that labour and intermediate goods are complements, i.e. $\partial^2 F_i/\partial L_i\ \partial I_i > 0$ — a most appropriate assumption for a short-run analysis (Steigum, 1980, p. 22). It is clear from (4) and (6) that there are two components of Australia's import demand: the households' purchases of foreign produced consumer goods (C^d_a and C^d_f) and Australian firms' imports of intermediate goods (I^d_a and $I_f{}^d$. Thus, we have an important aggregation problem, one which is identified by writers such as Philips (1974, pp. 99), but it is a problem which is too often ignored. It cannot be avoided in the present problem because tariff preferences extend to imported inputs, in addition to imports of consumer items. Further consideration of the issue is delayed until the problem of aggregation is discussed in section 3.

2.2 *ASEAN Export Supply to Australia*

The ASEAN export industries are concerned with the supply of manufactures, and hence, may be regarded as an integral part of the industrial sector. Hence, they behave in a fashion similar to their counterparts in the developed world: they maximize profits subject to constraints imposed by their production function, and following Jorgenson (1961) and Sen (1966), a short-run neoclassical production function is relevant to them. This includes labour and non-labour inputs. One issue which should be accommodated is the limited supply of capital and non-labour inputs in ASEAN which has generally been viewed as an important restriction on their industrial development. Thus, the short-run behaviour of ASEAN export producers may be summarized in the following constrained problem:

$$
Max\ \pi_A = P^X_A\ X^S_A - W_A L_A - V_A I_A - FC \tag{7}
$$

$$S.T. \quad X_A^S(L_A, I_A)$$

$$I_A \leqslant \bar{I}_A$$

where:

π_A : profit of ASEAN exporters;

P_A^X : export price in ASEAN currency;

X_A^S : supply of ASEAN exports to Australia;

L_A : amount of labour services;

W_A : average nominal wages paid;

I_A : amount of non-labour inputs;

V_A : price of non-labour inputs;

FC : fixed costs.

ASEAN export producers maximize profits with respect to output and resource usage subject to production function and shortage of non-labour inputs. Constrained profit maximization provides the following export and employment plans where signs of partial effects are indicated:

$$X_A^S = X_A^S(P_A^X, W_A, \bar{I}_A) \qquad (8)$$
$$\qquad\quad + \quad - \quad +$$

$$L_A^d = L_A^d(P_A^X, W_A, \bar{I}_A)$$
$$\qquad\quad + \quad - \quad +$$

where $I_A = \bar{I}_A$

Finally, to complete the market model it is possible to introduce a constrained equilibrium situation in which the effective supply of imports from ASEAN (X_A^S) is matched by Australia's constrained demand for ASEAN imports (X_A^d). This market equilibrium occurs at less than full employment in Australia as Australian firms are bound to production at a level less than full employment, and in ASEAN countries as ASEAN exporters are short of capital funds to purchase more imports for their export-oriented industrialization programme.

3. Econometric Formulation and Estimation Method

The relationships (4), (6) and (8) provide the basis for a systematic econometric evaluation of the efficacy of the preferences in the context of Australia-ASEAN trade. A discussion of the aggregation problem, determination of prices and treatment of tariff preferences is now warranted.

3.1 *The Aggregation Problem*

The following solution of this problem is offered. If imports of final consumer items and of non-labour inputs are measured in constant dollar terms, then the functional forms of the constant dollar value of imports from both the preference-receiving ASEAN (X_A^d) and nonpreferred countries (X_F^d) may be written as follows:

$$X_A^d = C_a^d(y^h, p_1, p_2, p_a^m, p^f) + \sum_{i=1}^{2} I_{ai}^d(W, V^n, V_a^m, V^f, V^h, \overline{X}_i)$$

(9)

$$X_F^d = C_f^d(y^h, p_1, p_2, p_a^m, p^f) + \sum_{i=1}^{2} I_{fi}^d(W, V^n, V_a^m, V^f, V^h, \overline{X}_i)$$

With a derivation of an aggregate income term (y^H) which incorporates W and $\overline{X}_i$,[4] these aggregate import demand functions depend on Australia's aggregate income (y^H), commodity prices (P_1, P_2, P_a^m P^f) and the prices of non-labour inputs (V^n, V_a^m, V^f, V^h). The y^H term is not a simple unweighted Σy_i^H but is rather a summation weighted by the marginal contribution to imports. Since the marginal

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[4] The derivation of the aggregate income term (y^H) which includes the productive activity of the Australian industries ($\overline{X}_i$), wage rates (W) and households' income (y^h) is as follows:

$$Y^h = W\overline{L}^S + \Sigma \pi_i \qquad S.T. \qquad L^S = L_1 + L_2$$

$$But \quad \Sigma \pi_i = P_1X_1 - WL_1^d - VI_1 - FC + P_2X_2 - WL_2^d - VI_2 - FC$$

$$y^h = W\overline{L}^S - W\Sigma L_i^d + P_1X_1 + P_2X_2 - 2(VI_i) - 2FC$$

$$y^h = P_1X_1 + P_2X_2 - 2(VI_i) - 2FC$$

$$P_1X_1 + P_2X_2 = y^h + 2(VI_i) + 2FC$$

$$y^H = P_1X_1 + P_2X_2 = y^h + 2(VI_i) + 2FC$$

Therefore, Australia's aggregate income (y^H) is identical to Australia's total expenditure on tradable (X_2) and nontraded goods (X_1), or Australia's aggregate output.

responses are unknown, it is here argued that aggregate output or income is distributed among producers and consumers according to a certain rule so that an increase in aggregate income (y^H) results in an increase of every component of y^H in a regular fashion (Leamer and Stern, 1970, p. 44). Similarly, the price terms are weighted averages representing the influence of the prices of intermediate and consumer goods:

$$
\begin{aligned}
P_A^M &= \alpha_1 P_a^m + \alpha_2 V_a^m, \\
P^F &= \beta_1 P^f + \beta_2 V^f \\
P^N &= \gamma_1 P_1 + \gamma_2 V^h \\
P^H &= \&_1 P_2 + \&_2 V^h
\end{aligned}
\tag{10}
$$

where $\sum_i \alpha_1 = 1$

$\sum_i \beta_i = 1$

$\Sigma \gamma_i = 1$

$\sum_i \&_i = 1, \quad i = 1, 2.$

where $\alpha_1 + \alpha_2$, $\beta_1 + \beta_2$, $\gamma_1 + \gamma_2$, and $\&_1 + \&_2$ are weights based on the proportions of intermediate and consumer imports in the total import basket. Thus, Australia's aggregate import demand functions by source can be written as

$$
\begin{aligned}
X_A^d &= X_A^d(Y^H/P^N, P_A^M/P^N, P^H/P^N, P^F/P^N) \\
X_F^d &= X_F^d(Y^H/P^N, P_A^M/P^N, P^H/P^N, P^F/P^N)
\end{aligned}
\tag{11}
$$

where X_A^d and X_F^d relate to all imports from ASEAN and nonpreferred groups of countries, respectively, at constant value and the respective prices are Laspeyres price indices. The homogeneity assumption underlying (11) rests upon the homogeneity postulate for Australian households and firms.

3.2 *Determination of Prices*

The prices in (11) are prices paid by Australian purchasers and are related to prices received by home producers, ASEAN and nonpreferred exporters as follows:

$$P^H = P^X(1 + r_1) \tag{12a}$$

(12b) $P^X = P^X(ULC, P_0^f, t)$

(13a) $P_A^M = e_1 P_A^X (1 + r_2 + \theta_1) \qquad 0 < \theta_1 < 1$

(13b) $P_A^X = P_A^X (P^W)$

(14a) $P^F = e_2 P_F^X (1 + r_3 + \theta_2) \qquad 0 < \theta_2 < 1$

(14b) $P_F^X = P_F^X (P^W)$

where:

P^X : weighted average price of domestically-produced substitutes net of sales tax, if any, in Australian currency;

P_A^X : weighted average f.o.b. price of imports (supply price) from ASEAN in ASEAN currencies;

P_F^X : weighted average f.o.b. price of imports from nonpreferred countries in their currencies;

r_1 : sales tax on domestically-produced substitutes (tradables);

r_2, r_3 : costs of insurance and freight on ASEAN and nonpreferred goods, respectively, plus any direct sales taxes;

θ_1 : weighted average tariff rate on imports from ASEAN;

θ_2 : weighted average tariff rate on imports from nonpreferred countries;

e_1 : exchange rate between Australian and ASEAN currencies;

e_2 : exchange rate between Australian and nonpreferred countries' currencies.

Individual countries' shares in Australia's total imports are used as weights. One feature of the price structure in (12a), (13a) and (14a) is the definition of the price of domestic substitutes (P^H) which is just the price received (P^X) by Australian domestic producers marked up by a sales tax (r_1). It differentiates import prices $(P_A^M$ and $P^F)$ by exchange rate adjustments and differential tariff structure provided relative differences in transport costs and sales taxes, if any, are constant over the preference period. But, its major feature concerns the determination of prices in (12b), (13b) and (14b). The price of domestic substitutes net of sales tax (P^X) is administered according to a cost mark-up rule whereas the supply prices of imports $(P_A^X$ and $P_F^X)$ are world-determined. In contrast to previous mark-up formulae, however, the percentage mark-up is not constant, but rather depends also on the overall price of foreign substitutes (P_0^f). Moreover, the small country assumption does not necessarily imply perfect goods arbitrage equating the prices of imports to the world price (P^W) in the short run. It is conceivable for a small coun-

try with a negligible impact on the world economy to produce goods that are not perfect substitutes for those produced in other economies (Calmfors and Herin, 1979, p. 276). This deviates from the traditional tariff theory (Norman, 1975) which assumes perfect substitutability postulate. This implies that the effect of the world price (P^W) on the price of imports may be influenced by varying degrees of substitution between sources of supply.

3.3 *Demand Functions and Tariff Preferences*

The structural form of the import demand equations is based on the behavioural relationships in (11), but here we take the opportunity to incorporate some specific characteristics. First, they are estimated in log-linear form. Aside from the elasticities directly obtainable from the estimated coefficients which may prove useful in any future welfare analysis, this facilitates discussion of the trade creation and diversion effects of the preferences. The preference issue is essentially concerned with changes in ASEAN imports induced by the preferences. Therefore, the variables to be explained are not the demand for or supply of ASEAN imports at a point in time, but changes in these magnitudes over time. Secondly, the difficulty of capturing the influence of quantitative restrictions on import demand in an aggregate sense is alluded to, but their effect may be incorporated by resorting to a well-known econometric technique. Quotas imposed on the import of specific commodities rations the purchasers and delays their purchases. This implies a partial adjustment process towards a desired level as the proportion of quota items covered by the scheme gradually decreases over time, and as quota levels on some items are gradually expanded. An inclusion of the value of the dependent variable lagged by one period catches the dynamic and partial adjustments of demand in response to the preference stimulus. This is the Koyck distributed lag in which weights are assumed to decline geometrically (Kmenta, 1971, p. 476).

The selective nature of the preference scheme implies that the analysis should only include those commodities covered by the scheme. The average price effect of preferences can then be measured from this group of preferred commodities. This is not only impractical but also inappropriate because the progressive expansion of the scheme may have a significant impact on the volume of trade which cannot be represented by preference margins alone. The preference scheme affects the aggregate level of ASEAN imports in two ways: by reducing the price of ASEAN imports relative to other substitutes, and by extending its coverage to other commodities. This consideration justifies the use of a binary variable technique for estimating the overall impact of Australia's preferences. The use of a binary variable can indicate any shift in the demand relationship that may

be brought about by price and other non-price effects described earlier. Two binary variables, TP_4 and TP_6 are employed to represent the impact of two major revisions of the scheme: one implemented in January 1974 and the other in July 1976. The variable TP_4 assumes a value of 0 prior to 1974, and 1, otherwise while TP_6 assumes a value of 0 prior to 1976 and 1, otherwise. This follows from the hypothesis that prior to 1974 the impact of the scheme on ASEAN imports was not significant until the beginning of 1974 with a notable improvement in July 1976 as a result of the expansion of the scheme's coverage and further preferential tariff concessions for developing countries. Interpretation of the dummy variable should, however, be made with caution. Income and price elasticities might not have been particularly stable in 1974 and 1976 due to a series of revaluations of the Australian dollar and across-the-board tariff reductions in 1973.

4. Estimation Results

4.1 Preferred Relationships

A summary of preferred estimates is presented in Table 1. These are based on quarterly observations from 1963 (1) to 1979 (4). All equations are estimated by OLS, except for the demand and supply equations (5)—(7) which are estimated by 2SLS due to the presence of current endogenous explanatory variables (Kmenta, 1971, pp. 537-546). The data, as explained in the Appendix, are obtained from the Reserve Bank of Australia and Australian Bureau of Statistics. The price determination estimates (1)—(2) of Table 1 are consistent with the postulates described in 3.2. The supply price of ASEAN imports (P_A^X) and of imports from nonpreferred countries (P_F^X) is solely determined by the world price (P^W), as indicated by (1) and (2), respectively. The values of their price coefficients also indicate the absence of perfect arbitrage. A unidirectional test, following Sims (1972), does not provide evidence of unidirectional causality, as shown by (3). This reverse causation is not surprising when product differentiation allows the ASEAN exporters to deviate to some extent from the world price so that a one-way causation is not established. Estimates of the price equation for domestic substitutes, as shown by (4), are consistent with the cost mark-up principle. Both the overall import price (P_0^f) and unit labour cost (ULC) coefficients are significant at the one per cent level, and the inclusion of a trend variable (t) improves the efficiency of the estimates. In previous studies (for example, Gregory, 1978), time trend (t) is used to represent technological change, or other variables not incorporated in the estimated equation. Since productivity changes due to technological

Table 1 — Regression Estimates: Demand and Supply Analysis
1963 (1) — 1979 (4)

	Constant	ULC (t)	$P^f_{0\,(t)}$	$P^W_{(t)}$	$P^M_{A\,(t)}$	$\hat{P}^F_{(t)}$	$\hat{P}^H_{(t)}$	$\hat{y}^H_{(t)}$	$TP_4\hat{Y}^H$	$TP_6\hat{Y}^H_{(t)}$	$P^X_{A\,(t)}$	$W_{A\,(t)}$	$X^d_{A\,(t-1)}$	$SD_{2\,(t)}$	$SD_{3\,(t)}$	$SD_{4\,(t)}$	$P^X_{A\,(t-1)}$	$P^W_{(t-1)}$	t	$\bar{R}^2$	D.W.	h	Wallis
(1) $P^X_{A\,(t)}$	2.68			1.40										-0.82	-3.41	-2.53				0.51	1.94		
	(1.94)			(4.18)										(-0.60)	(2.27)	(-1.89)							
(2) $P^X_{F\,(t)}$	1.13													0.06	-0.05	0.005		0.39					
	(1.61)													(0.07)	(-0.06)	(0.006)		(2.19)		0.16	2.03		
(3) $P^W_{(t)}$	1.08													0.05	0.30	0.15	0.08						
	(2.28)													(0.86)	(0.52)	(0.29)	(2.06)			0.27	2.04		
(4) $P^X_{(t)}$	0.04	0.42	0.08											-0.19	-0.05	-0.25			0.02				
	(0.16)	(7.06)	(2.93)											(-0.83)	(-0.21)	(-1.13)			(4.93)	0.79	1.82		
(5) $X^d_{A\,(t)}$	-1.26				-0.24	0.48	0.18	0.14	0.01	0.02			0.67	0.06	0.13	-0.02							
	(0.25)				(1.96)	(1.29)	(0.20)	(0.42)	(1.64)	(2.70)			(7.40)	(1.45)	(3.75)	(-0.36)				0.70	2.04	-0.24	1.95
(6) $X^S_{A\,(t)}$	1.23										0.70	0.21		0.021	0.11	0.05							
	(2.72)										(2.60)	(0.77)		(0.70)	(3.50)	(1.64)				0.91	2.00		1.92
(7) $X^d_{F\,(t)}$	0.86				-0.20	-0.71	1.61	0.51	0.031	0.007				0.04	0.06	0.03							
	(0.18)				(-1.64)	(-1.93)	(1.48)	(4.40)	(2.90)	(1.01)				(1.70)	(2.20)	(0.94)				0.89	2.06		1.98

Notes:
(1) Figures in parentheses are t-statistics.
(2) All equations are estimated by OLS, except for equations (5), (6) and (7) which are estimated by 2SLS.
(3) All equations are expressed in log-linear form, except for equations (1) — (4) which are expressed in proportional time derivative form to eliminate evidence of serial correlation (Leamer and Stern, 1970; Godfrey, 1978, p. 1300).
(4) $\hat{}$ indicates prices and income relative to P^N.

change are already reflected in the ULC variable, it is logical to expect t to represent the effect of other excluded factors. The significance of P_0^f suggests the sensitivity of the mark-up pricing behaviour to the overall price of imports (P_0^f). The size of its coefficient is, however, relatively small and less significant. A hundred per cent increase in ULC, for example, means *ceteris paribus* an increase in P^X by 42 per cent whereas a 100 per cent increase in P_0^f only leads to 8 per cent increase in P^X. If P_0^f is excluded from the equation, there is only a marginal fall in $\bar{R}^2$ by 3 per cent.

The estimates for Australia's import demand function are shown in (5) of Table 1. The representation of the impact of the preferences by a shift in Australia's income elasticity of import demand is chosen based on economic and statistical criteria after several experiments were tried using all possible effects of the preferences in terms of shifts in the intercept and slope of the demand relation. The use of income elasticity to capture the price as well as the income effect of the preferences was adopted in previous studies on integration: for example, Balassa (1967) and Ramcharran (1978). Several forms of the equation including different lags were tried, but due to space limitation, are not reported here. The $\bar{R}^2$ and D.W. are satisfactory, but the estimates are not well-determined. The cross-price coefficients are positive, but insignificant at the 5 per cent level, and the homogeneity postulate is not satisfied. This must be due to the aggregate nature of the analysis and the estimation procedure followed. Since all prices moved together when they were deflated by the same consumer price index, partial cross-price effects must have been nullified (Resnick and Truman, 1975, p. 61). However, they provide an empirical relationship useful for the present inquiry. The significance of $TP_4\hat{y}^H$ and $TP_6\hat{y}^H$ provide evidence for the efficacy of the preferences on ASEAN imports beginning in 1974. $TP_4\hat{y}^H$ is significant at the five per cent level (using a one-tailed t-test) and $TP_6\hat{y}^H$, at the one per cent level which is consistent with the *a priori* information: the progressive expansion of the scheme's coverage and the relative improvement of preference margins between January 1974 and July 1976. The insignificance of $\hat{y}^H$ is surprising, but highlights the significant growth of ASEAN imports and its significant correlation with the growth of Australia's income after 1974. The slow growth of ASEAN imports (2.14%) relative to that of Australia's aggregate income (3.4%) prior to 1974, and the fact that ASEAN imports still constitute a small portion of Australia's expenditure explain the result. However, in the latter half of the 1970s, the growth of ASEAN imports (10.0%) exceeded that of Australia's income (3.7%), and the significant increases in X_A^d were associated with increases in y^H— a trend captured by the binary variable.

The preferred estimates in (6) of Table 1 describe the ASEAN export supply function. The equation is estimated on the assumption that restriction on I is perceived by ASEAN exporters to be constant so that W_A and P_A^X are the only relevant variables. The price coefficient is positive and significant at the one per cent level, but the money wage is not significant. This occurs because increases in money wage rates in ASEAN were marginal and were offset by more than proportionate increases in prices received for their exports. This finding provides further support for the view that the price of ASEAN exports is world-determined, but may also differ to a certain extent from the price of other competing imports due to product differentiation. The low export supply elasticity (0.70) reflects the effect of the resource constraint (I) on the ability of the ASEAN exporters to respond to changes in market opportunities.

4.2 Gross Trade Creation

The significance of the preference variables suggests the presence of structural shifts during the second half of the seventies at the time when the preference scheme was significantly improved. These shifts could have been an accurate measure of the trade effect of the preference scheme had there been no other major event at that time: The 1973 general tariff reductions and a series of revaluations, for instance, are not source-specific but could also be contributing factors. To get an idea of the role of the preferences in the growth of ASEAN imports, the proportion of imports eligible for preferences from ASEAN grew from 2.6 per cent share in 1971-72 to 27.2 per cent in 1974-75. However, this proportion declined from 1975-76 to 1977-78 when imports eligible for duty-free treatment under MFN rates grew substantially in the midst of a slow growth of ASEAN imports eligible for preferences particularly in 1977-78. The relative importance of MFN duty-free products in the growth of ASEAN imports is more evident in 1979-80; a significant increase in the proportion of preferential imports results from the inclusion of products that were previously duty-free at MFN rates, but which have enjoyed a preference margin of 2 per cent since 1979-80 when they were liable to a 2 per cent revenue duty except those coming from the developing countries. In the case of Indonesia, for instance, the incorporation of petroleum under the "preferential imports" category for enjoying a 2 per cent margin caused a tremendous increase in Indonesia's preferential import share from 1.1 in 1978-79 to 19.4 per cent in 1979-80.

The estimated coefficients of the preference dummies may be used to quantify the trade effects of the preferences with those limitations in mind. The trade effects of the preferences can be

measured by comparing the flows of ASEAN imports with and without the dummy variables, and then isolating the preference-induced increase in ASEAN imports by using the preferential import shares observed above. This procedure produces the following results[5] :

Table 2 — Changes in ASEAN Imports Due to the Tariff Preferences: 1974-1979 (A$'000 in real values)

	1974	1975	1976	1977	1978	1979	Total
TP = 0	896.8	784.2	963.2	1049.0	1178.8	1233.7	6105.0
Tp= 1	912.1	797.7	1020.7	1111.7	1249.2	1309.5	6400.8
Difference	4.2	3.4	14.2	11.9	15.1	21.5	70.3

The calculations reveal that only about 1.1 per cent of the total ASEAN imports (in real terms) over the period under consideration could be attributed to the granting of preferences. This suggests that the role of the preferences in the growth of ASEAN imports over the past decade was marginal.

4.3 Trade Diversion

A related issue concerns the impacts of the preferences, if any, on imports from the nonpreferred countries. Theoretically, preferences are expected to divert trade from the nonpreferred sources. Thus, to quantify the trade diversion effect requires an estimation of Australia's import demand with respect to the nonpreferred countries. The estimates are in (7) of Table 1. The same results are observed: The homogeneity postulate is not fulfilled, and the cross-price coefficients are not significant at the five per cent level. These results are again attributable to the aggregate nature of the analysis and the estimation procedure adopted, as explained in 4.1. However, the most relevant variables are the preference dummies which have positive signs, indicating positive structural shifts. This shows that the pre-

[5] The simulation involves a comparison of alternative states, one in which the tariff preference scheme exists ($TP = 1$), and the other in which there is no tariff preference scheme ($TP = 0$). Two different sets of estimates of X_A^d are produced from these alternative scenarios, and the difference between the first ($TP = 1$) and the second set ($TP = 0$) of estimates is attributed to the preference scheme, *ceteris paribus*.

ferences did not have any adverse effect on the growth of overall imports from the nonpreferred countries. This is not surprising when preferential imports accounted for only about 5 per cent of Australia's total imports from the nonpreferred countries over the 1974-1975 to 1979-1980 period, on average. The trade diversion effect of the preferences must have been overshadowed by the overall increase in Australia's effective demand for imports. To measure the trade diversion effect requires a different approach which could be another subject for investigation. It suffices to establish that preferences did not have any significant effect on the growth of Australia's total imports from the nonpreferred countries. This does not imply an absence of trade diversion from those nonpreferred exporters directly affected by the preferences.

5. Summary and Policy Implications

The main objective is to formulate and estimate an econometric model to measure the overall trade effect of Australia's preferences on ASEAN imports. The worldwide recession particularly in the '70s, and the circumstances surrounding the Australian import market and ASEAN's developing industrial sector call for an approach that explicitly considers the behaviour of economic agents in the midst of these constraints. The empirical results validate the major assumptions of the model. The absence of perfect substitutability and the departure from the "law of one price" imply that the effect of the preferences is governed by the degree of substitution between sources. The cost mark-up pricing behaviour has important implications for Australia. The response of import competition has predominantly been to ask for more protection, rather than to lower their prices in line with the price of imports. The main empirical findings of this inquiry are the inefficacy of the preference scheme prior to 1974 in relation to ASEAN imports, and the marginal trade gains derived by ASEAN from the preferences. The scheme also demonstrated that increased trade between Australia and ASEAN can occur without adversely affecting the overall flow of imports from the nonpreferred countries. This is due to the selective and restrictive nature of the scheme. The depressed state of the Australian economy and the relatively low supply elasticity in ASEAN constrained the maximization of potential benefits from preferential trade. The prospect for realization of the potential value of preferences, therefore, depends on the future economic climate in Australia and the ability of the ASEAN countries to respond to market opportunities offered by preferences.

APPENDIX

Data Sources

The structural equations are estimated using quarterly data for the period 1963 (1) to 1979 (4). The aggregate nature of the model considers prices of all types of imports that entered Australia, and thus, aggregate import prices classified by source of origin are relevant for this purpose. The aggregate import prices are represented by RBA-published import price indices in the absence of more suitable price data. Although these constructed price indices are mostly based on unit values and are not as disaggregated by country of origin as the study would require, these indices can at least serve as consistent price indicators as they are based on a fixed weighting system, and thus, the weighting problem in aggregation can be avoided. Further, these price indices are adjusted for the shipping lags. Prices of ASEAN imports (P_A^X, P_A^M) are import price indices falling under "other countries" classification excluding mineral fuels. Prices of nonpreferred imports (P_F^X, P^F) are weighted averages of import price series of EEC, USA, Canada and Japan — all published in the Reserve Bank of Australia (RBA), *Statistical Bulletin*. Prices of domestic substitutes (P^X, P^H) are represented by wholesale prices of Australian manufactures as published in Australian Bureau of Statistics (ABS), *Price Indexes of Articles Produced by Manufacturing Industry*, Australia (Cat. No. 6412.0). Australia's income (y^H) is represented by Australia's gross domestic product (*GDP*). The value of Australia's total production is a more appropriate scale variable than Australia's personal disposable income in an aggregated model as the former also captures intermediate goods (Richardson, 1973). The volume of imports is constructed by deflating the current value of Australian imports by the appropriate price index. The price of nontraded goods (P^N) is represented by Australia's consumer price indices (*CPI*).

The factor cost per unit of output (ULC) is constructed by dividing total payments to labour (wages and salaries) by the total output in the manufacturing sector deflated by the average wholesale price of manufactures. These statistics are published in ABS, *Australia's Manufacturing Establishments: Summary of Operations* (Cat. No. 8202.0). Since they are on an annual basis, they are equally prorated over the four quarters in a year to preserve consistency with other price series.

The overall price of foreign substitutes (P_0^f) is represented by the overall Australian import price indices published by the RBA. These are weighted averages of import price indices from all sources, and thus, capture average import prices in Australia over the period. The difficulty encountered concerns the suitable representation of the world market price. Since it is not clear on *a priori* grounds how the world market price should be defined in operational terms (Calmfors and Herin, 1979), the average (weighted) wholesale price index of manufactured goods produced in other OECD countries is used as proxy. These wholesale indices are obtained from the OECD-published *Main Economic Indicators* (1979). Detailed description of the construction of these indices is found in the *Sources and Methods* booklets published with issues of *Main Economic Indicators.* They are essentially designed to measure average changes in the prices of home-produced goods at the stage of sale by the producers to both the domestic and export market. The raw data are disaggregated by OECD member countries and follow a common base year (1975 = 100). Thus, to make this series consistent with other time series price data, the series is rebased to 1963 = 100. A weighted average of the indices is then derived using the individual countries' shares in Australia's foreign trade as weights. There are of course a few problems associated with the use of wholesale price indices. Differences in weights and commodity coverage between wholesale price indices and the RBA-published price indices are likely to produce discrepancies. It is impossible to correct these discrepancies. However, the use of this sort of index avoids the statistical bias associated with the use of Australia's overall import price index, and it is at least the most suitable index available as the OECD countries still account for the bulk of Australia's imports.

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