CHANGES IN THE SIZE OF THE TRADED GOODS SECTOR:

THEORY AND APPLICATIONS .

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Abstract

This paper first presents price-quantity data for traded and nontraded goods in the U.S. and Australia. In the U.S. from the early 1950s to the early 1970s, the relative size of the traded goods sector (as measured by its share in total expenditure) fell by 10 per cent; in Australia over roughly the same period it fell by 36 per cent. This decline is analysed with a consumer demand model, which enables us to decompose the change in the size of this sector into a number of components for each year. The fall in the relative price of traded goods accounts for a substantial part of the decline in this sector in both countries. In addition, changes in tastes away from traded goods is an important factor for Australia.

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1. Introduction

The distinction between traded and nontraded goods is important in a number of branches of international economics.¹ Traded goods are those which can enter into international trade while nontraded goods represent everything else. As an analytical device, the traded/nontraded goods distinction allows features of the open and closed economy to operate simultaneously. This distinction is well summarized by Corden (1977, p.8): "Tradeables consist of exportables and importables. Exportables, in turn, consist of actual exports as well as close substitutes for exports that are sold domestically, like beef sold to Argentinians. Importables consist of imports as well as goods produced domestically and sold domestically that are close substitutes for imports, i.e. import-competing goods. These tradeables have their domestic prices determined broadly by the world market, subject only to tariffs, export subsidies, international transport costs, and, of course, the exchange rate. Finally, nontradeables consist of all those goods and services the prices of which are determined by supply and demand domestically. This category generally consists mainly of services."

In 1952-53 expenditure on traded goods in the U.S. accounted for 44 per cent of the total, while by 1970-71 this share had fallen to 39 per cent; see the first column of Table 1. For Australia the reduction in the size of the traded goods sector is more dramatic. The traded goods share fell from 52 per cent in 1950-51 to 33 per cent in 1975-76; see the first column of Table 2. Details regarding the construction of these data are given in the Appendix.² The objective of this paper is to explain the reduction in the size of the traded goods sector in these two countries. In Section 2 we develop a simple framework for decomposing the observed change into income, relative price and residual components. Section 3 contains the empirical results and concluding comments are given in Section 4.

TABLE 1
TRADED AND NONTRADED GOODS DATA:
UNITED STATES, 1952-71

	<u>Budget share</u>		<u>Quantity log-change</u>		<u>Price log-change</u>	
	Traded	Nontraded	Traded	Nontraded	Traded	Nontraded
1952-53	43.71	56.29	5.30	.26	-4.15	6.45
1953-54	42.76	57.24	-3.99	-3.58	.70	2.42
1954-55	43.42	56.58	11.06	1.65	.11	2.01
1955-56	43.97	56.03	-.86	-.23	2.18	4.59
1956-57	43.21	56.79	-1.27	-.42	2.37	4.70
1957-58	41.86	58.14	-1.09	-2.73	-2.91	6.61
1958-59	41.51	58.49	10.41	1.12	-.89	3.35
1959-60	42.00	58.00	-.80	-.21	1.47	1.92
1960-61	41.23	58.77	-2.12	1.81	.21	1.60
1961-62	40.80	59.20	8.53	2.55	-1.42	2.77
1962-63	40.97	59.03	2.95	2.00	.56	1.88
1963-64	41.07	58.93	3.88	2.90	1.82	1.59
1964-65	41.60	58.40	6.45	3.54	1.95	1.74
1965-66	42.14	57.86	6.81	5.26	2.43	2.64
1966-67	41.39	58.61	.09	3.20	-.06	4.36
1967-68	40.27	59.73	4.98	4.16	2.52	5.08
1968-69	39.98	60.02	2.89	1.22	3.17	5.50
1969-70	39.69	60.31	-3.42	-.69	5.96	5.00
1970-71	39.26	60.74	.83	2.84	4.64	4.45
Sample mean	41.62	58.38	2.66	1.30	1.09	3.61

The period 1952-53 refers to the pair of calendar years 1952 & 1953, and so on. The budget share for a good is the arithmetic average over the years $t-1$ and t of its share in total expenditure. The log-changes are approximately annual percentage changes. The quantity log-changes are per capita. All entries are to be divided by 100. Source: Clements (1981).

TABLE 2
TRADED AND NONTRADED GOODS DATA:
AUSTRALIA, 1950-76

	Budget share		Quantity log-change		Price log-change	
	Traded	Nontraded	Traded	Nontraded	Traded	Nontraded
1950-51	51.60	48.40	-6.59	.88	28.28	16.49
1951-52	53.35	46.65	22.27	6.80	1.37	7.14
1952-53	49.85	50.15	-15.19	-12.35	-4.53	30.40
1953-54	46.06	53.94	11.51	-1.60	-.12	5.56
1954-55	47.54	52.46	13.87	2.09	-3.31	4.01
1955-56	47.72	52.28	7.01	-3.23	-3.99	9.28
1956-57	45.72	54.28	-9.58	.37	4.89	8.04
1957-58	44.35	55.65	4.51	3.65	.77	-.43
1958-59	44.74	55.26	10.10	-2.82	-6.57	5.22
1959-60	44.63	55.37	6.55	2.68	1.24	7.11
1960-61	44.48	55.52	4.69	-2.35	-.55	5.74
1961-62	42.76	57.24	-7.38	3.92	-.95	2.60
1962-63	41.47	58.53	10.80	.33	-3.66	2.41
1963-64	41.58	58.42	-3.23	6.78	8.05	1.59
1964-65	41.85	58.15	12.50	1.57	-.10	5.05
1965-66	41.89	58.11	-.75	4.99	2.71	2.40
1966-67	41.18	58.82	2.55	2.44	2.36	2.88
1967-68	40.41	59.59	4.43	5.43	-.85	4.11
1968-69	39.64	60.36	5.40	2.82	1.30	4.32
1969-70	38.61	61.39	1.39	5.03	1.29	5.87
1970-71	37.05	62.95	2.95	3.26	1.83	6.54
1971-72	35.77	64.23	-1.24	1.11	4.90	8.67
1972-73	34.20	65.80	-6.66	4.00	10.59	7.57
1973-74	35.03	64.97	12.59	1.15	14.29	10.97
1974-75	35.38	64.62	.68	3.15	9.21	18.32
1975-76	33.23	66.77	-1.79	3.28	12.13	14.50
Sample mean	42.31	57.69	3.13	1.67	3.10	7.55

The period 1950-51 refers to the pair of fiscal years 1949-50 & 1950-51, and so on.
All entries are to be divided by 100. See notes on Table 1. Source: Clements and

2. The Analytical Framework

We write p_i and q_i for the price and quantity demanded of good i ($i=T, N$ for traded and nontraded), $M = p_T q_T + p_N q_N$ for total expenditure ("income" for short), and $w_i = p_i q_i / M$ for the i^{th} budget share. The change in the traded goods share is $dw_T = w_T d(\log p_T) + w_T d(\log q_T) - w_T d(\log M)$. This can be expressed in terms of the relative price of traded goods and real income by adding and subtracting from the right hand side the Divisia cost of living index $d(\log P) = w_T d(\log p_T) + w_N d(\log p_N)$. This gives

$$(1) \quad dw_T = w_T d(\log p_T/P) + w_T d(\log q_T) - w_T d(\log Q),$$

where $d(\log p_T/P) = d(\log p_T) - d(\log P)$ is the change in the relative price of traded goods and $d(\log Q) = d(\log M) - d(\log P) = w_T d(\log q_T) + w_N d(\log q_N)$ is the change in real income. Eq. (1) states that dw_T is made up of relative price, quantity and real income components.

From the consumer's viewpoint prices and income are given, while the quantity demanded is to be determined. Thus the next step is to use the consumer's demand equation to express the quantity component of (1) in terms of prices and income. Under general conditions the demand for traded goods can be expressed as [Theil (1975/76, 1980)]

$$(2) \quad w_T d(\log q_T) = \theta_T d(\log Q) + v_{TT} d(\log p_T/P') + v_{TN} d(\log p_N/P'),$$

where $\theta_T = \partial(p_T q_T) / \partial M$ is the marginal share of traded goods; the v 's are price coefficients; and $d(\log P') = \theta_T d(\log p_T) + (1-\theta_T) d(\log p_N)$ is the Frisch price index.

The change in the demand for traded goods is explained by (2) in terms of changes in real income and prices. The prices are deflated by the Frisch index and are thus interpreted as relative prices. By dividing (2) by w_T we find that θ_T/w_T is the income elasticity of demand for traded goods, and that v_{TT}/w_T and v_{TN}/w_T are the own- and cross-price elasticities.

The marginal share θ_T and the price coefficients are related according to

$$(3) \quad v_{TT} + v_{TN} = \phi \theta_T,$$

where $\phi = (\partial \log \lambda / \partial \log M)^{-1} < 0$ is the reciprocal of the income elasticity of the marginal utility of income (λ). We shall refer to ϕ as the income flexibility.

When traded and nontraded goods are preference independent, the utility function can be written in the additive form $u(q_T, q_N) = u_T(q_T) + u_N(q_N)$ and it can be shown that the price coefficient v_{TN} in (2) is zero and that $\theta_T > 0$ [Theil (1975/76)]. From (3) we obtain $v_{TT} = \phi \theta_T < 0$ and the demand equation becomes

$$(4) \quad w_T d(\log q_T) = \theta_T d(\log Q) + \phi \theta_T d(\log p_T/P').$$

In fact in the two good case we can postulate preference independence with complete generality; however, it is not possible to test the validity of that postulate.³ We shall thus use (4) as our demand model.

Substituting (4) in (1) gives

$$(5) \quad dw_T = (\theta_T - w_T) d(\log Q) + \phi \theta_T d(\log p_T/P') + w_T d(\log p_T/P).$$

Thus a rise in income causes the budget share of traded goods to increase if the marginal share (θ_T) is greater than the average (w_T), i.e. if these goods are luxuries. The second term on the right of (5) is the substitution effect of a change in the relative price of traded goods on w_T ; this is an indirect effect of the relative price on w_T in that it operates via q_T . A rise in this relative price induces the consumer to substitute away from traded goods ($\phi \theta_T < 0$), causing w_T to fall on this count. The final term in (5) is the direct effect of the relative price on w_T , with an increase in the relative price of traded goods causing its share to rise. Note that the deflators in the two relative price terms differ; one uses marginal shares as weights, the other average.⁴

To apply this framework to finite-change data requires some adjustments. We use the Rotterdam parameterization of treating the coefficients in (4) as constants and replace infinitesimal logarithmic changes by finite

log-changes from period $t-1$ to t and the budget share w_T by its arithmetic average in $t-1$ and t [Theil (1975/76)]. The estimating form of the demand equation is

$$(6) \quad \bar{w}_{Tt} DQ_{Tt} = \theta_T DQ_t + \phi \theta_T (DP_{Tt} - DP'_t) + \epsilon_{Tt},$$

where $\bar{w}_{Tt} = (w_{Tt} + w_{T,t-1})/2$; D is the log-change operator [$Dx_t = \log(x_t/x_{t-1})$]; and ϵ_{Tt} is a normally distributed random disturbance with the usual classical properties. The resulting finite-change version of (5) is

$$(7) \quad \Delta w_{Tt} = (\theta_T - \bar{w}_{Tt}) DQ_t + \phi \theta_T (DP_{Tt} - DP'_t) + \bar{w}_{Tt} (DP_{Tt} - DP'_t) + \epsilon_{Tt} + O_3,$$

where $\Delta w_{Tt} = w_{Tt} - w_{T,t-1}$ and O_3 is a remainder term of third degree [Theil (1975/76, pp.37-40, 215)].

3. Empirical Results

We estimate (6) with the U.S. and Australian Data given in Tables 1 and 2. Both data sets are annual and have quantities divided by population in order to induce homoscedasticity. For the U.S. there are 19 observations, 26 for Australia.

The ML estimates are given in Table 3.⁵ It was found necessary to add a constant term to (6) to take account of trend-like changes in tastes, etc. The constant is negative for both countries, indicating a shift of preferences away from traded goods, toward nontraded. The estimated marginal shares are quite high and indicate that when income rises by one dollar, expenditure on traded goods increases by 63 cents in the U.S. and 83 cents in Australia; these shares are estimated with a high degree of precision. The estimates of the income flexibility are not all that well determined, having asymptotic t -values of about 2.5. The point estimates of ϕ are nonetheless broadly consistent with previous findings.⁶

TABLE 3

MAXIMUM LIKELIHOOD PARAMETER ESTIMATES OF TRADED GOODS DEMAND

EQUATION: UNITED STATES, 1952-71 AND AUSTRALIA, 1950-76

	Constant α_T x100	Marginal share θ_T	Income flexibility ϕ	R^2	D.W.	χ^2
United States	-.365 (.213)	.627 (.051)	-.505 (.207)	.89	1.30	1.52
Australia	-1.280 (.333)	.830 (.054)	-1.049 (.412)	.90	2.31	.21

Asymptotic standard errors (derived from the information matrix) are given in parentheses. The χ^2 values are the likelihood ratio test statistics of the one restriction of the model; the critical value of χ^2 (1) at the 5 percent level is 3.84.

The compatibility of (6) with the data can be verified by means of a likelihood ratio test. The unrestricted version of (6) expresses the left-hand variable linearly in a constant term, the change in real income DQ and the two undeflated price log-changes Dp_T and Dp_N . Asymptotically, minus twice the log-likelihood value for (6), with a constant term included, and that for the unrestricted model is distributed as $\chi^2(1)$.⁷ The one restriction implicit in (6) is that of homogeneity.⁸ The observed χ^2 values are 1.52 (U.S.) and .21 (Australia), both much less than the critical value at the 5 per cent level. Hence the restrictions are not rejected by the data.

The demand elasticities (evaluated at sample means) are given in Table 4.⁹ In both countries traded goods are a luxury and own-price elasticities are quite large.

We use the estimates given in Table 3 to decompose the change in the budget share of traded goods Δw_T into the various components of eq. (7). The constant term in the demand equation means that this is an additional component of Δw_T . The results are given in Tables 5 (U.S.) and 6 (Australia).¹⁰

TABLE 4

DEMAND ELASTICITIES

	Income elasticity	Elasticity with respect to deflated own-price
<u>United States</u>		
Traded goods	1.51	-.76
Nontraded goods	.64	-.32
<u>Australia</u>		
Traded goods	1.96	-2.06
Nontraded goods	.29	-.31

The first row of Table 5 indicates that from 1952 to 1953 the budget share of traded goods fell by 1.4 percentage points. The shift in preferences away from these goods accounts for .4 percentage points of the fall. The growth in real income, together with the fact that traded goods are a luxury, has an offsetting effect causing w_T to rise by .5 points. The relative price of traded goods fell over this period (see Table 1) so that the quantity demanded increased, inducing a positive price substitution component which causes w_T to rise by 1.3 points. The direct effect of this lower relative price is to lower w_T by 2.6 points. The final component is the unexplained residual of -.1 points. The sum of these five components is approximately equal to the observed value of Δw_T . Thus for this period, the most important component is the direct relative price, followed by price substitution.

For all years the direct relative price component dominates price substitution by a factor of about two. In years of high income growth such as 1965-66 (see Table 1) the income component is larger than the two price components. In some years the residual component is relatively large. The last row of Table 5 gives the means of Δw_T and the various components. On

TABLE 5

DECOMPOSITION OF CHANGE IN SIZE OF TRADED GOODS SECTOR:

UNITED STATES, 1952-71

	Change in budget share of traded goods Δw_T (1)	Components of Δw_T				
		Constant α_T (2)	Income ($\theta_T - \bar{w}_T$) DQ (3)	Price substitution $\phi \theta_T (Dp_T - DP')$ (4)	Direct relative price $\bar{w}_T (Dp_T - DP)$ (5)	Demand equation residual ϵ_T (6)
1952-53	-1.36	-.37	.47	1.25	-2.61	-.12
1953-54	-.53	-.37	-.75	.20	-.42	.81
1954-55	1.85	-.37	1.11	.22	-.47	1.35
1955-56	-.75	-.37	-.10	.28	-.59	.02
1956-57	-.78	-.37	-.15	.28	-.57	.04
1957-58	-1.92	-.37	-.43	1.12	-2.32	.07
1958-59	1.23	-.37	1.06	.50	-1.03	1.06
1959-60	-.25	-.37	-.09	.05	-.11	.26
1960-61	-1.29	-.37	.04	.16	-.34	-.79
1961-62	.43	-.37	1.09	.50	-1.01	.22
1962-63	-.09	-.37	.52	.16	-.32	-.08
1963-64	.29	-.37	.72	-.03	.06	-.09
1964-65	.76	-.37	1.00	-.03	.05	.10
1965-66	.33	-.37	1.22	.03	-.05	-.50
1966-67	-1.83	-.37	.41	.52	-1.07	-1.32
1967-68	-.42	-.37	1.01	.30	-.62	-.75
1968-69	-.16	-.37	.43	.28	-.56	.06
1969-70	-.42	-.37	-.41	-.11	.23	.23
1970-71	-.43	-.37	.48	-.02	.05	-.57
Sample mean	-.28	-.37	.40	.30	-.62	0

Column (1) = (2) + (3) + (4) + (5) + (6) + a remainder term of third degree. The period 1952-53 refers to the transition from calendar year 1952 to 1953, and so on. All entries are to be divided by 100.

average the budget share of traded goods falls by .3 percentage points per year. The most important explanation of this is the lower relative price of traded goods. On average the direct relative price component is -.6 and the price substitution component is .3. The next most important component is income (.4 percentage points), followed by the shift in preferences (-.4).

Turning to the Table 6 results for Australia, it can be seen that in general the change in the budget share of traded goods and its components are both larger and more variable than for the U.S. The average fall in w_T is .7 percentage points per year. The constant term representing the shift in tastes away from traded goods accounts for 1.3 percentage points of this fall, which is quite large. The income component is positive in all but four years, reflecting income growth over this period; on average this component causes w_T to increase by 1 percentage point per year. As for the U.S., the direct relative price component dominates price substitution in all years. Price substitution due to the lower price of traded goods causes w_T to rise on average by .7 points per year, while the direct relative price component causes it to fall by 1.1 points. As before, the residual component is relatively large in some years.

The conclusion which emerges from Table 6 is that for Australia the most important explanation of the decline in the traded goods sector is the shift in preferences away from those goods. This is followed by relative prices and then income.

To analyse further the role of changes in tastes we reestimated the demand equation without the constant term. The results are given in Table A1 of the Appendix. In relation to the estimates given in Table 3, when the constant is omitted the marginal shares do not change a great deal, while the income flexibility for both countries falls (in absolute value) substantially. This instability of the ϕ -estimates is to be expected as they are not estimated with much precision. When the constant is omitted the model fails the likelihood ratio test for both countries. This is in sharp contrast to the situation

TABLE 6

DECOMPOSITION OF CHANGE IN SIZE OF TRADED GOODS SECTOR:

AUSTRALIA, 1950-76

	Change in budget share of traded goods Δw_T	Components of Δw_T				
		Constant α_T	Income $(\theta_T - \bar{w}_T) DQ$	Price substitution $\phi \theta_T (DP_T - DP')$	Direct relative price $\bar{w}_T (DP_T - DP)$	Demand equation residual ϵ_T
		(1)	(2)	(3)	(4)	(5)
1950-51	1.08	-1.28	-.93	-1.75	2.94	2.10
1951-52	2.41	-1.28	4.46	.86	-1.44	-.19
1952-53	-9.41	-1.28	-4.56	5.18	-8.73	-.04
1953-54	1.85	-1.28	1.64	.84	-1.41	2.06
1954-55	1.11	-1.28	2.73	1.09	-1.83	.41
1955-56	-.76	-1.28	.59	1.97	-3.31	1.28
1956-57	-3.25	-1.28	-1.56	.47	-.78	-.10
1957-58	.51	-1.28	1.56	-.18	.30	.11
1958-59	.28	-1.28	1.13	1.75	-2.92	1.59
1959-60	-.49	-1.28	1.69	.87	-1.45	-.32
1960-61	.19	-1.28	.30	.93	-1.55	1.79
1961-62	-3.63	-1.28	-.37	.53	-.87	-1.65
1962-63	1.07	-1.28	1.94	.90	-1.47	.98
1963-64	-.86	-1.28	1.08	-.96	1.57	-1.28
1964-65	1.41	-1.28	2.53	.76	-1.25	.65
1965-66	-1.32	-1.28	1.06	-.05	.08	-1.14
1966-67	-.10	-1.28	1.04	.08	-.13	.19
1967-68	-1.44	-1.28	2.14	.74	-1.20	-1.84
1968-69	-.10	-1.28	1.67	.45	-.72	-.22
1969-70	-1.95	-1.28	1.61	.68	-1.09	-1.87
1970-71	-1.17	-1.28	1.45	.70	-1.10	-.93
1971-72	-1.40	-1.28	.13	.56	-.87	.06
1972-73	-1.72	-1.28	.17	-.45	.68	-.84
1973-74	3.36	-1.28	2.47	-.49	.76	1.90
1974-75	-2.65	-1.28	1.09	1.35	-2.08	-1.72
1975-76	-1.65	-1.28	.79	.35	-.53	-.99
Sample mean	-.72	-1.28	.99	.66	-1.09	0

Column (1) = (2) + (3) + (4) + (5) + (6) + a remainder term of third degree.

The period 1950-51 refers to the transition from fiscal year 1949-50 to

1950-51, and so on. All entries are to be divided by 100.

with the constant included, where the test indicates that for both countries the restrictions of the model are not rejected by the data; see Table 3. Accordingly, the constant term is required for both countries in order to give acceptable results. Furthermore, the estimates of the constant given in Table 3 are both significantly different from zero (at the 10 per cent level for the U.S. and 1 per cent level for Australia). All this indicates that there does seem to be a noticeable shift in preferences away from traded goods.

4. Concluding Comments

In this paper we have developed a simple framework for analysing the decline in the size of the traded goods sector in the U.S. and Australia over the postwar period. In the U.S. from the early 1950s to the early 1970s, the relative size of this sector (as measured by its share in total expenditure) fell by 10 per cent; in Australia over roughly the same period it fell by 36 per cent. Using a consumer demand model, this fall is expressed in terms of real income and relative prices. We estimated the demand model for the two countries and found that in addition to income and prices, it was necessary to take account of trend-like changes in tastes away from traded goods, toward nontraded. A notable feature of the estimation results was that the restrictions of the theoretical model were not inconsistent with the data. The estimates were then used to decompose the change in the size of the traded goods sector into the various components for each year. The results indicated that the fall in the relative price of traded goods accounted for a substantial part of the decline in the size of this sector in both countries. In addition, the change in tastes away from traded goods was an important factor for Australia.

APPENDIX

The Data

The U.S. data, from Clements (1981), represent an exhaustive reclassification of the U.S. National Accounts expenditure categories into exportables, importables and nontraded goods. This is done by matching the disaggregated national accounts categories with the international trade by product data; goods are classified as exportable or importable on the basis of the net trade flow, with nontraded goods the residual. Expenditure on traded goods is the sum of exportable and importable expenditure.

Dp_T is computed as a weighted mean of the price log-changes of exportables and importables, the weights being arithmetic averages over the years $t-1$ and t of the value shares of these two goods in total traded goods.

The Australian data use GDP by industry of origin to classify as traded goods (i) agriculture, forestry, fishing and hunting, (ii) mining and (iii) manufacturing. The remainder consists mainly of construction, services and government, which is classified as nontraded. Full details are given in Clements and Nguyen (1979).

The Demand Equation Without a Constant

Table A1 gives the estimation results when the constant term is suppressed.

TABLE A1

MAXIMUM LIKELIHOOD PARAMETER ESTIMATES OF TRADED GOODS DEMAND

EQUATION WITHOUT A CONSTANT TERM: UNITED STATES, 1952-71 AND AUSTRALIA, 1950-76

	Marginal share θ_T	Income flexibility ϕ	R^2	D.W.	χ^2
United States	.585 (.048)	-.287 (.166)	.87	1.34	4.22
Australia	.713 (.057)	-.370 (.170)	.84	1.88	5.27

Asymptotic standard errors (derived from the information matrix) are given in parentheses. The χ^2 values are the likelihood ratio test statistics of the one restriction of the model; the critical value of χ^2 (1) at the 5 per cent level is 3.84. The unrestricted model expresses the left-hand variable linearly in the change in real income DQ and the two undeflated price log-changes Dp_T and Dp_N (no constant term).

FOOTNOTES

1. See, e.g., Aukrust (1970), Dornbusch (1973, 1974a,b), Edgren, Faxén and Odhner (1969, 1973), Goldstein and Officer (1979), Komiya (1967), McDougall (1970), Melvin (1968) and Sjaastad (1980).
2. In essence, the procedure used to construct these data is the same as that of Goldstein and Officer (1979) who use GDP by industry of origin to classify the total into traded and nontraded goods and form price indexes as ratios of current to constant price output. Goldstein and Officer argue that such procedures have a number of desirable properties in relation to alternative measures. For an innovative application of the Goldstein-Officer data to the demand for imports, see Goldstein et. al (1980).

It should be noted that there are a number of ways of measuring the size of a sector, the budget share being only one. However, as the budget share is proportional to expenditure on the good, it does have the advantage of representing the importance of the good in the consumer's budget. Also, the ratio of traded to nontraded goods (in expenditure terms) can be used to measure the openness of the economy [see, e.g., Stern (1978, p.53)]; this is equal to the ratio of the budget share of traded goods to that of nontraded goods.
3. With no separability restrictions the price coefficients of (2) are not identified. Preference independence for two goods yields one constraint, and (2) needs one constraint in order to be identified [Theil (1975/76, p.55)].
4. For a further analysis, see Theil (1975/76, pp.31-32).
5. The U.S. data have been previously used to estimate the absolute price version of the Rotterdam model [Clements (1978)]; the current application of the relative price version of the model to the U.S. data is new. We use Wymer's (1977) estimation program.

6. A weighted average of the two ϕ -estimates with weights inversely proportional to sampling variances is $-.687$. This value is consistent with results obtained by Clements and Nguyen (1980), Clements and Theil (1979) and Theil (1975/76, 1980). Note, however, that a lower value of $|\phi|$ for the U.S. is not consistent with Frisch's (1959, p.189) conjecture according to which $|\phi|$ rises as the consumer becomes more affluent (the U.S. being richer than Australia). This lack of support for Frisch's conjecture is consistent with the findings of Clements and Theil (1979) and others.
7. For the unrestricted model we adjust four unconstrained coefficients; for the restricted model we adjust three, the constant, θ_T and ϕ .
8. In the two good case, homogeneity also implies Slutsky symmetry.
9. The income and own-price elasticities for nontraded goods are $(1-\theta_T)/(1-\bar{w}_T)$ and $\phi(1-\theta_T)/(1-\bar{w}_T)$, respectively.
10. It should be noted that $\Delta w_{Tt} = \Delta(p_{Tt}q_{Tt}/M_t)$ is the change in the observed budget share from year $t-1$ to t ; it is not the change in the arithmetic average of the budget share $\bar{w}_{Tt}$ given in Tables 1 and 2.

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