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THE PRICE ELASTICITY OF DEMAND FOR EXPORTS: A COMMENT ON THROSBY AND RUTLEDGE*

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In a recent article in this *Journal* Throsby and Rutledge (hereafter T-R) undertake an econometric study of the Australian agricultural sector. While applauding their empirical efforts, our attention is drawn to their claim (p. 159) that:

> 'Because of Australia's significant power in trade in some important commodities (wool, food grains, dairy products), export prices cannot be regarded as entirely exogenous in a model of this type.'

The framework for their empirical work on the export sector then follows (quite logically) from the premise that Australia has significant world market power with its agricultural exports. Leaving aside wool, we do not share their view that the export demand curves facing Australian farm products have any significant inelasticity.

The magnitude of the price elasticity of demand for a country's exports is an important element in setting tariff and exchange rate policies. Should it be the case that an export commodity does face some inelasticity in the world demand curve, it will be in the exporting country's interest to reduce the quantity of the good reaching world markets. This impediment may take the form of export taxes or quotas, differential exchange rates or distortion of internal prices. This argument will be recognised as the case for an 'optimal tariff' whose value varies inversely with the elasticity of demand for exports (Johnson 1968, p. 151). So that *were* the Australian dairy industry, for example, to have significant power in world trade, one would expect to see policies (explicit or implicit) which acted as impediments to domestic production. The long-standing and substantial transfers made from consumers to cows, augmenting the (free-trade) output of dairy products, do not seem consistent with the market power hypothesis of T-R.

Additionally, the magnitude of the price elasticity of demand for exports has been an important element in the debate concerning the efficacy of devaluation as a policy instrument for restoring external balance.[1] Results from the first fledgling statistical efforts to estimate the price elasticities of traded goods indicated that currency devaluation might well lead to a worsening of the balance of payments, due to the apparent inelastic demands for traded goods. A convenient summary of many of these studies is given by Cheng (1959). The resulting doctrine of 'pessimism', received its first major setback with the work led by

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[1] The strengths, limitations and confusion surrounding the Marshall-Lerner condition are succinctly discussed by Takayama (1972, ch. 8).

Orcutt (1950). The inadequacies of the earlier statistical techniques were shown to have resulted in estimates of the trade inelasticities which were biased downward. Other work (e.g. Harberger 1957; Kemp 1962; Johnson 1968; Johnson 1971; Kakwani 1972; Scobie 1973; Scobie and Johnson 1975) has generally revealed much higher estimates. However, despite the increasing number of empirical studies attesting to often highly elastic export demand, the ranks of the 'pessimists' still include some notable economists (e.g. Turnovsky 1968; Klein 1972). The approach used by T-R (reflected in the quote from their paper) is symptomatic of the residual pervasiveness of the view that trade elasticities are small, and countries consequently enjoy 'significant market power'.

There are a number of approaches to estimating the elasticity of demand for exports, but one that is simple (and home-grown) was first applied by Horner (1952, p. 327).[2] If the world is divided into Australia and the rest, then the quantity demanded from Australia (at a given price) will be simply the total quantity demanded less that supplied by the rest of the world. Symbolically (and ignoring inventory level changes)

$$X = D - S$$

where X is Australian exports, D the total world demand and S the quantity supplied by the rest of the world.[3] Differentiating with respect to price and converting to elasticities, the elasticity of export demand for the i-th good becomes

$$\eta^x{}_i = (D_i/X_i)\delta_i - (S_i/X_i)\varepsilon_i$$

where δ_i and ε_i are the demand and supply elasticities in the rest of the world. T-R aggregate exports into three groups, so that to find the elasticty of export demand for the j-th group, we will need

$$\eta^x{}_j = \Sigma_i\, w_{ij}\, \eta^x{}_{ij},$$

where $\Sigma_i w_{ij} = 1$ and j refers to food, unprocessed (uf) or processed (pf), and unprocessed nonfood (un). In the analysis that follows, we have set aside the category (un), comprised principally of the exports of greasy wool. That Australia may face a relatively low elasticity of export demand for fine wools does not seem implausible (Emmery 1967, p. 47).

A *Journal* reviewer has correctly reminded us that forming a group elasticity ($\eta^x{}_j$) in the manner proposed above may lead to inappropriate values. In particular, if all the individual goods within a group are close substitutes (implying relatively high (absolute) own price elasticities of demand), there is no reason to suppose that the group average should lie within the range of the individual elasticities (a result which always follows from a weighted average). In fact, as the 'grouped' commodity may have only imperfect substitutes, the value of $\eta^x{}_j$ could logically be less than any of the individual elasticities. Alternatively, a

[2] The earliest presentation of the formula of which we are aware, is to be found in Yntema's Ph.D. thesis, University of Chicago, 1929, subsequently published by that university.

[3] In this formulation we assume that commodities in X, D and S are homogeneous, as do T-R when they include competing suppliers' exports in their export equations.

weighted average of the elasticities of disparate, want-independent goods may more truly reflect the group elasticity. The reader may choose to ignore the values of η^x_j given in Table 1, and concentrate on the *export* elasticities of the individual goods. Our aggregation to η^x_{uf} and η^x_{pf} simply follows the groupings used by T-R. It would appear that their grouping includes some strongly separable goods (wheat and tangerines?) together with some which would generally be regarded as closer substitutes (beef and lamb).

In making the calculations we have chosen a wide range of products from within the *uf* category; for the *pf* category we examine dairy products, cited by T-R. We used data for 1965, the midpoint of the T-R series. In order to be as conservative as possible, we have taken all demand elasticities to be —0·1 and all supply elasticities to be zero.[4] In an actual application one would want to use the best available estimates of δ_i and ε_i. Our purpose is to provide an estimate of the extreme lower bonds of the $|\eta^x_j|$. The weights (w_{ij}) are based on the 1965 export values of the commodities listed. Even with these highly conservative assumptions, we find little support

TABLE 1

Estimates of the Elasticity of Export Demand for Australian Unprocessed Food (uf) and Processed Food (pf): 1965[a]

Category	Product	X_i[d]	D_i[e]	w_{ij}	η^x_{ij}
		kt	kt		
Unprocessed food ($j=uf$)[b]	Beef and veal	321	32 938	0·33	— 10·3
	Mutton and lamb	99	5 923	0·07	— 6·0
	Wheat	5 715	265 808	0·49	— 4·7
	Barley	369	104 769	0·02	— 28·4
	Oats	366	46 844	0·02	— 12·8
	Rice	65	165 227	0·01	—254·2
	Apples	134	19 199	0·04	— 14·3
	Pears	30	5 214	0·01	— 17·4
	Oranges and tangerines	23	21 321	0·01	— 92·7
				η^x_{uf} =	— 11·2
Processed food ($j=pf$)	Milk and cream[c]	76	6 279	0·21	— 8·3
	Butter	97	5 476	0·67	— 5·6
	Cheese and curd	28	5 086	0·12	— 18.2
				η^x_{pf} =	— 7·7

[a] 1965 is the midpoint of the data series used by T-R.
[b] The products chosen here include over 90 per cent of the value of *uf* exports used by T-R (see Throsby 1973, p. 54).
[c] Dried, evaporated and condensed.
[d] From FAO *Trade Yearbook*, 1966.
[e] From FAO *Production Yearbook*, 1966.

[4] Inspection of the expression for η^x_i, reveals immediately that $\delta|\eta^x_i|/\delta\epsilon_i > 0$.

for the view that Australia has significant market power.[5] In the case of unprocessed food, the optimal tariff (an index of market power given by $1/|\eta^x_j + 1|$) is only about 10 per cent.

Our analysis would suggest that any attempt to explain export prices by the quantity of Australian exports would be largely unsuccessful. None of the coefficients in the export price equations (for *uf*, *un* and *pf*) estimated by T-R are significant (p. 164). In fact, with the exception of the intercepts and the lagged export prices, only one coefficient is significant in the three equations (and that has the wrong sign). Similarly, in their equations for the quantity of exports, price is not significant in the *uf* and *pf* cases, and only marginally so in the case of *un* (principally wool).[6]

We would not generally expect the demand elasticity for broad aggregates to be sufficiently low as to confer any significant market power on a single country. We find no surprises, therefore, in the econometric results presented by T-R. What is surprising is that, based on a set of estimates which are perhaps less than satisfactory, they conclude 'some progress can be made towards integrating the external sector into models such as these especially when the country has significant international market power . . .' (p. 167). Modest as their claim may be, we would argue that, in building economic models of the Australian export sector, analysts will distort reality little by treating export prices as exogenous.

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[5] Since preparing this paper we discovered that an Industries Assistance Commission Report (1976, p. 270) provides estimates of the elasticity of demand for eight Australian export commodities. With the exception of wool, the range for all commodities encompasses —10·0.

[6] Given the nature of the data, we were unable to estimate η^x_j directly from the T-R equations. Given their concern with market power, it would have been helpful if they could have presented the implied elasticities.

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