THE U.K. TARIFF AND PROTECTION

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1. Traditionally the protective effect of tariff has been

regarded as that part which causes a direct increase in the price of the product imported, thus distorting the relative prices of factors engaged in its production in favour of the tariff imposing country. It is thought for example that the tariff rate of 30% on a car affords the car industry approximately that much protection. However, in recent years, the theory and empirical investigation of tariff have been concerned not only with its explicit rate but also with its 'implicit' effectiveness as a protective measure for home industry.

The input-output system enables us to trace the effect of traffic on the protecti on of industry in a more general equilibrium setting. Here the tariff imposed on products, some of/which are used as inputs to other products, is taken into consideration when the final protective effect of tariff on the latter products is calculated. This approach of general equilibrium analysis has great merit over that of traditional, partial equilibrium analysis since many of the 'hidden' effects of tariff are revealed.

Several works, on both the theoretical and empiricallevel, have been done in recent years.(1) A

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(1) C.L. Barber, "Canadian Tariff Policy", *Canadian Journal of Economics and Political Science* (November 1955) W.M. Corden, "The Tariff" in A. Hunter ed. *The Economics of Australian Industry* (Melbourne, Melbourne University Press, 1963). W.M. Corden, "The Structure of a Tariff System and the Effective Protective Rate," *Journal of Political Economy* (June 1966), H.G. Johnson, "The Theory of Tariff Structure, with special reference to World Trade and Development: Some Theorectical Issues", *Trade and Develoment* (Geneva, Libraire Droz, 1965), B. Balassa, "Tariff Protection in Industrial Countries: An Evaluation", *Journal of Political Economy* (Decembr 1965), G. Basevi, "The U.S. Tariff Structure: Estimates of Effective Rates of Protection of U.S Industries and Industrial Labour", *Review of Economics and Statistics* (May 1966) H.Grubel and H.G. Johnson, "Nominal Tariffs, Indirect Taxes and Effective Rates of Protection: The Common Market Countries 1959" *Economic Journal* (Deceber 1967).

study of the effective rates of tariff protection of British industry has been made by B. Balassa as a part of his intercountry comparison between EEC, UK, USA, Sweden and Japan. He has used the input coefficients of the lowest tariff countries, Netherlands and Belgium as good approximates for all countries, on the assumption of technical conditions being the same in all countries concerned. Although his results present an interesting aspect of the British tariff structure, his results could be improved by applying more relevant coefficients and tariff data.

This paper will be only concerned with an investigation into the effective rates of tariff protection of British industry in 1966. In the next section a theoretical aspect of effective rate of tariff protection will be discussed. The results will be given in the third seection together with some qualifications and interpretations.

The following notations will be used.[2]

A Input-output matrix (at 1960 prices for the UK)

A' Transpose of matrix A

a_{ij} Input coefficient

P_q Vector of price indices of outputs (Paasche 1960=1,00)

P_a Vector of price indices of inputs (Paasche 1960=1.00)

t Vector of weighted average of nominal tariff rates

t^* Vector of effective rate of tariff protection

t_j Nominal tariff rate of jth output

t_j^* Effective tariff rate of jth out put

f Vector of values added per unit of output in the absence of tariff

f^* Vector of values added per unit of output in the presence of tariff

f_j Value added in jth industry in the absence of tariff

f_j^* Value added in jth industry in the presence of tariff

I Unit matrix

i Unit vector

$\wedge$ Diagonal matrix

Following the analysis of the input-output system, we define

(2) For these notations and other relevant matrices, see Department of Applied Economics, University of Cambridge, Series for *A Programme for Growth*; especially *A Computable Model of Economic Growth* (1961) and *The Input-output Relationship*, 1954-1966 (1964).

$$f_j=1-\sum_i^n a_{ij} \tag{1}$$

when there is no tariff.

$$f_j^*=1(1+t_j)-\sum_i^n a_{ij}(1+t_i) \tag{2}$$

when tariff is imposed.

The assumptions in difinition (2) are that imports and home outputs are perfect substitutes and that the supply of imports are infitely elastic, thus raising domestic prices by the full rate of tariff imposed.

The effective rate of tariff protection is defined as percentage change in value added due to tariff imposition, i.e.

$$t_j^*=\frac{f_j^*-f_j}{f_j} \tag{3}$$

By substiuting (1) and (2) into (3), we get,

$$f_j^*=\frac{t_j-\sum_i^n a_{ij}t_i}{f_j} \tag{3a}$$

The formula (3a) is used by B. Balassa for estimating his results. Whilst Balassa went to great pains to express the domestic value in terms of free world market value by using the input coefficients of the lowest tariff countries, Basevi, and Grubel and Johnson following him, went to great pains to calculate the free word market value by deflating the domestic value in terms of tariff.[3]

These seemingly different formulae prove to be the same when the input-output system is explained by matrix algvebra. In matrix form, we make the following defintions.

$$f=P_q-A'P_a \tag{1a}$$

when there is no tariff. When there is tariff,

$$f^*=[I+\hat{t}]\hat{p}_q-A'[I+\hat{t}]\hat{p}_a \tag{2a}$$

The effective rate of tariff protection is now defined as

$$t^*=[\hat{f}^*-\hat{f}]\hat{f}^{-1}i \tag{3b}$$

By substituting (1a) and (2a) into (3b), we get,

(3) Basevi, *op.cit.* p. 149 Grubel and Johnson, *op. cit.*, p. 763. Their formula is shown as follows.

$$t_j^*=\frac{V_j^*}{\frac{S_j^*}{1+t_j}-\frac{\sum_i^n M_{ij}^*}{1+t_i}}-1$$

where S_j^* is the sales value of jth output, and $\sum_i^n M_{ij}^*$ the sum of intermediate inputs both valued at domestic martek prices.

$$t^* = [\hat{p}_q - A'\hat{p}_a]\hat{t}[\hat{p}_q - A'\hat{p}_a]^{-1}i \qquad (3c)$$

3. Based on the formula (3c) and using the input-output matrix for the U.K. at 1960 prices estimated from 1954 Census of production (1960 Control Totals and 1972 Forecast), the vector of effective rates of protection for 1966 is computed. The results are given in Table 1.

Table 1. The U.K. Tarifi Rates: Nominal vs. Effective, 1966.

Industry	Nominal	Effective	Industry	Nominal	Effective
Raw Tobacco	0	0	Motors	19.3	32.5
Raw Meat	1.3	−0.3	Aircraft	2.6	1.3
Cereals	0.6	−3.6	Vehicles n.e.s.	10.5	14.6
Other Agri.	3.4	3.7	Metals n.e.s.	11.8	21.2
Coal	0	−2.1	Fibres	1.8	0.2
Crude Oil	0	−1.4	Textiles	7.7	12.0
Iron Ore	0	−1.4	Clothing	6.9	7.0
Non. fer. Ores	0	−1.4	Building Material	6.4	9.7
Mining n.e.s.	1.2	0.3	Pottery & Glass	20.2	32.6
Cereal Prod.	1.8	1.8	Timber	1.6	0.8
Butter	0	−3.5	Timber Produ.	7.0	11.0
Meat	3.4	6.8	Woodpulp	0	0
Beverage	0	0	Paper and B	3.2	4.4
Food n.e.s	3.1	2.2	Paper Product.	4.1	5.0
Drink	0.7	−1.5	Rubber	7.7	10.8
Tobacco	0	−1.4	Manf. n.e.s.	10.4	16.0
Coke	0	−0.6	Construction	0	−3.7
Oil	0.4	0.1	Gas	0	−1.4
Chemicals	4.3	4.7	Electiricity	0	−1.4
Iron & Steel	4.3	5.7	Water	0	−1.0
Non. fer. Metals	0.4	−0.4	Transport	0	−1.7
Engineering	7.8	10.1	Distribution	0	−2.2
Ship	0.3	−3.7	Service s	0.8	−1.3

Notes: n.e.s. Nor elsewhere specified.

There are several qualifications in interpreting our results. These relate specifically to the aggregation problem, the nominal tariff rate calculation, and the basis of coefficients estimates. The estimates of coefficient matrices are based on 1954 Census of Production and disaggregated into 46 industries. Out of these 46 industries, 18 are agricultural or raw material sectors which are sometimes heavily subsidised by the government and 7 industries are non-trading sectors. This leaves 21 manufacturing industries, the study of which is comparable with that of Balassa.

The explicit nominal tariff rates were found by dividing the vector of tariff rates by the vector of imports.[4] In calculating this rate customs duties on products which are not prodced

in Britain or on which the similar amount of excise duties are levied are exempted. This leaves the protective duties collected in accordance with the Import Duties Act 1958. This is due to the assumption that the epual imposition of customs and excise duties will not affect the competitiveness of the British industry concerned.

The results shown in Table 1 reveal that although the nominal rates are all positive except where there is no tariff, some of the industries notably ship building, non-ferrous metals, all nontrading sectors and most of the food and raw materials sectors are 'anti-protected', showing negative protective rates. It is is self-evident that the non-trading sectors are implicitly anti-protected' relative to the trading sectors where tariff raises the factor prices for these protected sectors. Although some of the food and raw material sectors are shown to be 'anti-protected', it does not follow that they actually are. Because of the peculiar British farm supporting system, i.e. direct subsidisation by the government, unlike in the EEC countries where a price supporting system is used, the results in these sectors do not reveal the actual rate of protection or 'anti-protection'.

4. These results show that too much emphasis should not be placed on the explicit nominal rates of tariff in discovering the usefulness of tariff as a measure of protection of home industry. Although the rank correlation between the nominal rates and effective rates show a high degree of association (Spearman rank correlation coefficient being 0.982), the relative dispersion is larger in the effective rates. This illustrates that nominal rates should not be the only rates to be considered when the protection of home industry is discussed. The common sense conclusion from this study is that tariff on inputs which are used in the production process of final output should be lowered or even abolished if the protective measures of tariff are to be made made more effective.

5. An approach similar to that suggested in this study can be applied to an investigation of the protective aspect of the Korean tariff structure. Although tariff is not imposed exclusively to protect home industry in Korea, in those cases where it is, it may be useful to trace its effects through the entire production process. This sort of study will be relevant not only to the rationalisation of protective tariff structure in Korea but also will provide very useful information for future policy makers who may be negotiating for or against the reduction or even abolition of customs duties to implement a closer trade relatiohship with other Asian countries.

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(4) Grubel and Johnson (*op.cit.* p. 764) use a similar method.