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DISCUSSION PAPER

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Federal Government of Brazil

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Minister Roberto Mangabeira Unger

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ON THE MEASUREMENT OF PROTECTION FOR DEVELOPING COUNTRIES

by

William G. Tyler*

I. INTRODUCTION

The effect of different economic policies on the profitability of domestic production in developing countries is a question of considerable importance to policy-makers. While some policies may serve to promote certain economic activities, other policies may in effect discriminate against those activities. What is important is the net effect of the various policies taken together. This paper presents a measure of net protection (or promotion) designed to measure the net effect. Our measure differs from the concepts of either effective protection or domestic resource costs in that if focuses on the unit profitability of domestic production as affected by various economic policies. Comparisions are made between the prices of domestically produced and imported goods as they are affected by different policies.

Section II of the paper presents a discussion of the concept of net effective protection and the development of an alternative measure which we term net protection. In Section III some comparisons between the two measures are made.

II. MEASUREMENTS OF PROTECTION

The major contribution of the effective protection concept is the consideration of the effects of protection on inputs. Analyzing the protection afforded to value added, the well known effective protection

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measure g is written as[1]

$$(1) \qquad g_j = \frac{\tau_j - \sum_i a_{ij} t_i}{1 - \sum a_{ij}}$$

where τ_j represents the rate of nominal protection of product j, the a_{ij}'s are the technical coefficients of the free trade input-output table, and t_i represents the nominal protection on input i. The rate of nominal protection can be thought of an implicit tariff, thereby incorporating the effects of both tariff and non-tariff protection.

Since the rate of effection protection g_j is measured relative to international value added converted into domestic prices, exchange rate overvaluation, frequently observed in developing countries, will result in an overstatement of the level of protection afforded to a process. To incorporate the effects of exchange rate policy on protection, the concept of net effective protection has been developed.[2] The net effective rate of protection g´ can be written as

$$(2) \qquad g'_j = \frac{r}{r^*} (1 + g_j) - 1$$

where r is the actual price of foreign exchange in terms of domestic currency and r* is the shadow exchange rate, again expressed as the price of foreign exchange in domestic currency.

One question not explicitly addressed in the conversion of effective protection to the net effective protection measure is the valuation of any imported inputs. Overvaluation of the exchange rate, while discriminating against domestic production, does present a partially offsetting cost advantage. If inputs can be imported at the overvalued exchange rate, production costs

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[1] The pioneering papers are Bela Balassa, "Tariff Protection in Industrail countries: An Evaluation," Journal of Political Economy, Vol. 73, No. 6 (December 1965) pp. 372-383 and W.M. Corden, "The Structure of a Tariff System and the Effective Protective Rate," Journal of Political Economy, Vol. 74, No. 3 (June 1966), pp. 221-237.

[2] See Bela Balassa and Associates, The Structure of Protection in Developing Countries (Baltimore: The Johns Hopkins Press, 1971), pp. 324-332.

are concomitantly reduced. This advantage is increased to the extent that any tariffs or indirect taxes on imported inputs are exempted under industrial promotion schemes such as, for example, a drawback system. Our alternative measure of protection directly incorporates such considerations.

Another advantage of the proposed alternative[2] measure is that it can be used to directly address the question of how much protection or subsidization for an industry is required to offset economic policies that (1) overvalue the domestic currency and (2) increase the prices of the industry's inputs. A sorting out of the effects of various distortions is not provided by the net effective protection measure.

Our measure of net protection (p) is an index involving two distinct components. We can write:

$$(3) \qquad p_j = \frac{\tau_j}{\theta_j}$$

where τ_j represents an index of nominal, direct protection for product j and θ_j is equal to a coefficient of distortion. Tariff protection, border taxes, port and maritime charges, import deposits, financial subsidies, fiscal subsidies and quota arrangements are all reflected in τ_j. These policies directly affect the profitability of domestic producers vis-á-vis foreign producers. The coefficient of distortion θ_j, on the other hand, reflects exchange rate policy and protection of the inputs used to produce product j.

If there is no nominal, direct protection, no exchange rate distortions, and free trade in product j's inputs, the index of net protection would be equal to 1.0. To the extent that there is net protection through economic policies the index p_j would be greater than 1.0. A value of p_j, for example,

of 1.4 would indicate a 40 percent level of net protection for domestic producers relative to their ex factory price. If p_j is less than 1.0, the production process for product j is disprotected by economic policies.

The measure of nominal, direct protection τ_j is equal to the ratio of import to domestic prices available to the domestic purchaser of product j. It is written $\tau_j = P_{Mj}/P_{Dj}$. The buyer's import price reflects all prevailing tariff restrictions, import deposits, border taxes, and other surcharges levied on top of the CIF import price valued at the official exchange rate. The buyer's price of the domestically produced product j likewise reflects indirect taxes and the effects of any fiscal and/or financial subsidies. The point of departure for the analysis of the effects of all such policies on nominal, direct protection is that the CIF import price at the official exchange rate and the ex factory, non-subsidized domestic price are equal. The further assumptions are that the possible buyer prices of imports and domestic production reflect the prevailing policies and that consumer choice is a function of relative prices. Discounting foreign freight changes, the costs of production of the foreign and domestic product are held to be the same for the purposes of analyzing the price effects of policies. The question is to what extent do policies favor or disfavor the domestic producer. The measure τ_j can be thought of as an implicit tariff (plus 1). If direct price comparisons can be undertaken they should be used for estimation purposes. Frequently in practice, however, such data are not available, expecially for the protection on inputs t_f.

Turning to the coefficient of distortion Θ_j, the concept is intended

to reflect (1) distortions in exchange rate policy and (2) policies protecting the inputs used in the production of product j. Such policies protecting inputs of course raise their prices and serve to render the process of producting product j less internationally competitive. Both the distortions coming from exchange rate overvaluation (or undervaluation) and protection of inputs must be taken into consideration in assessing the net protection for product j. Our coefficient of distortion Θ_j is taken here to be the sum of three effects, or

$$(4) \qquad \Theta_j = 1 + \frac{r^*-r}{r} + \frac{\sum_i a_{ij}t_i}{\sum_i a_{ij}} \cdot \sum_i a_{ij} - \left(\frac{r^*}{r}-1\right) \sum_i m_{ij} \left(\frac{1}{t'_i+1}\right)$$

or, simplifying

$$(4a) \qquad \Theta_j = \frac{r^*}{r} + \sum_i a_{ij}t_i - \left(\frac{r^*}{r}-1\right) \sum_i m_{ij} \left(\frac{1}{t'_i+1}\right)$$

where the m_{ij}'s represent the import coefficients of imported inputs i used in the production of product j. The tariffs on inputs i, as indicated by t'_i are realized tariffs, as opposed to the nominal protection on inputs i.

The term $\frac{r^*-r}{r}$ measures the amount of exchange rate overvaluation (or undervaluation, in negative). The value of the shadow exchange rate r* must be estimated by making assumptions about the magnitude of capital flows, price elasticities, and possible changes in trade restrictions external to the country.[3]

The third term in Equation 4 reflects the cost raising effects or the protection on inputs. The component $\frac{\sum_i a_{ij}t_i}{\sum_i a_{ij}}$ measures the level of protection

[3] One commonly used procedure is that detailed in Edmar Bacha and Lance Taylor. "Foreign Exchange Shadow Prices: A Critical Review of Current Theories," Quarterly Journal of Economics (June 1971). An alternative, not involving free trading assumptions, is the so-called UNIDO procedure.

on inputs used. Since the sum of the inputs only represents a part of the value of the final product, the cost raising effect of input protection on the price of the final product j only applies to the portion of the final product accounted for by inputs.

The protection t_i on inputs, as noted, is nominal protection at the existing exchange rate. To the extent that that protection can be reduced under industrial promotion schemes such as a drawback by allowing the importation of inputs at less than full tariffs (or other inport restrictions)[4] the producer is provided a cost advantage offsetting, at least in part, the extent to which he is discriminated against by the protection on intermediate inputs. This cost advantage is due to (1) the reduced level of input protection, and therefore input costs, and (2) the ability to import at an overvalued exchange rate (presuming that $\frac{r^*}{r} > 1$). The last term in Equation (4) and (4a) represents this cost reducing effect. If a full tariff exemption is granted, i.e., $t_i' = 0$, production costs per unit are lowered by the magnitude of the exchange rate overvaluation times the sum of the imported intermediate inputs.

III. A COMPARISION BETWEEN THE NET EFFECTIVE PROTECTION AND NET PROTECTION MEASURES

A major similarity between the net effective protection and net protection measures is that they possess many of the same weaknesses and shortcomings. Both embody a partial equilibrium approach and are essentially descriptive measurement devices. A major limitation of both is the assumption that

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[4] If protection is administered by a quota system, the provision of an import quota for intermediate inputs to a producer is tantamount to a full tariff exemption under a tariff protective system. Thus our realized tariff t_i' on inputs is a realized implicit tariff.

both make of fixed input proportions. Changes in relative input prices are in fact likely to induce some substitution. The non-substitutibility assumption presents a special problem for the net protection measure which incorporates imported inputs as a separable component from the total inputs from industry i. As is the case with the a_{ij}'s , the m_{ij}'s are assumed to be fixed. In practice they may vary (increase) in the presence of tariff exemption schemes for imported components.

The primary difference between the net effective protection and the net protection measures deals with the base on which they are levied and viewed. The former, of course, deals with value added, while the latter is computed on a value of production basis ex factory. Our measure avoids the fiction that there is such a thing as "international value added" and concentrates instead on direct price raising or reducing effects brought about by different economic policies.

Table 1 presents some numerical comparisons between the net effective protection and net protection measures under different assumptions. As indicated, in all instances the measure of net effective protection exceeds that for net protection. This is so because of the difference in base, as can be demonstrated algebraically comparing the two measures.

In each overall example three cases are differentiated depending upon imported components. Case 1 presents the estimates based upon the assumption of no imported inputs, i.e., $\sum_i m_{ij} = 0$, while Case 3 depicts the case with full tariff exemptions for existing imported inputs, i.e., all $t'_i = 0$. For the net effective protection measure this distinction is irrelevant, and the estimates of protection for all cases are the same. This is not so with the net protection measure, however. As seen, net protection varies

Table 1

COMPARISONS OF NET EFFECTIVE PROTECTION AND NET PROTECTION MEASURES UNDER DIFFERENT ASSUMPTIONS

	EXAMPLE A			EXAMPLE B			EXAMPLE C			EXAMPLE D		
	1	2	3	1	2	3	1	2	3	1	2	3
Assumptions												
τ_j	1.40	1.40	1.40	1.40	1.40	1.40	1.375	1.375	1.375	1.455	1.455	1.455
$1 - \sum_i a_{ij}$	.50	.50	.50	.50	.50	.50	.50	.50	.50	.50	.50	.50
$\sum_i a_{ij} t_i$	.08	.08	.08	.25	.25	.25	.25	.25	.25	.25	.25	.25
$\frac{r^*}{r}$	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
$\sum_i m_{ij}$	0	.20	.20	0	.20	.20	0	.20	.20	0	.20	.20
All t_i	0	.10	0	0	.10	0	0	.10	0	0	.10	0
Protection Estimates												
g_j	.640	.640	.640	.300	.300	.300	.250	.25	.25	.409	.409	.409
$g'_j + 1$	1.312	1.312	1.312	1.040	1.040	1.040	1.000	1.000	1.000	1.127	1.127	1.127
p_j	1.053	1.090	1.094	.933	.963	.966	.917	.947	.948	.970	1.000	1.003

depending upon the situation regarding imported inputs. The magnitude of such differences depends upon the relative importance of imported inputs, the protection afforded them, and exchange rate disequilibrium.

In Example A both measures of protection display discrimination in favor of the industry producing the product in question. Such is not uniformly the case with all the other examples provided in Table 1. With the net protection measure p_j in Example B the industry appears to be discriminated against by economic policy, even in the case of full tariff exemptions on imported inputs, (Example B.3), even though the rate of net effective protection (g'_j) is postive. Example C is one where the rate of net effective protection is zero; yet according to our measure the industry is discriminated against. Finally, in Example D.2 the τ_j is calculated such as would be necessary to exactly offset the deleterious discrimatory effects coming from other economic policies and circumstances. It is this level of nominal protection (or subsidy), in this instance of 45.5 percent, that provides a net protection measure of 1.0, indicating overall neutrality in incentive effects.

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PUBLISHING DEPARTMENT

Coordination
Cláudio Passos de Oliveira

Supervision
Everson da Silva Moura
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