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SOME REMARKS ON THE THEORY OF EFFECTIVE PROTECTION

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Some Remarks on the Theory of Effective Protection

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A number of recent articles have made a distinction between
nominal and effective tariff rates, and have held the latter to be relevant
for an analysis of the protective implications of tariffs. A particularly
lucid exposition of the theory of effective protection is contained in a
paper by W. M. Corden $/\ 4\ 7$ . In Corden's words,[1]

> Ordinary nominal tariffs apply to commodities,
> but resources move as between economic activities.
> Therefore, to discover the resource-allocation
> effects of a tariff structure one must calculate
> the protective rate for each activity, that is,
> the effective protective rate.

The present paper examines some aspects of the theory of effective protection.

EP RATES AND RESOURCE ALLOCATION

The theory of effective protection is based on two points. First,
in considering the EP rate for an industry, it is relevant to take into
account not only the tariff rate of the industry's output but also taxes
cum subsidies on inputs used in producing this output. Second, the level of
protection is related not to the industry's gross output but to its value-added.

This can be demonstrated in a simple model. Consider an economy with
a single primary factor (capital), and a single tradable input (materials).[2]
Further assume that the foreign demand for and supply of all traded goods
is infinitely elastic; that the production of all goods is characterized by
fixed production coefficients, and that all tariffs are nonprohibitive, so
that the local price of any protected good equals the world market price plus
the tariff.

Then, the effective protective rate, $g_j$, on the production of
industry j's output, is given by

$$g_j = \frac{t_j - t_j' a_j}{1 - a_j} \tag{1}$$

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[1] Corden $/\ 4\ 7$ , page 222.

[2] The argument is readily extendable to the n factor and m input case.

where $t_j$ = the nominal tariff rate on industry $j$'s output, $t_j'$ = the nominal tariff rate on materials, and $a_j$ = the share of materials in the cost of $j$ in the absence of a tariff.

Consider next the rate of return on capital in industry $j$. This is given by

$$r_j = v_j \left[ 1 + t_j - a_j ( 1 + t_j') \right] \qquad (2)$$

where $r_j$ = the post-tariff rate of return, and $v_j$ = the output-capital ratio. Now it can be seen that an alternative expression for $g_j$ is

$$g_j = \frac{r_j - r_j'}{r_j'} \qquad (3)$$

where $r_j'$ = the pre-tariff rate of return. In other words, the EP rate is simply the relative increase in the rate of return to capital resulting from the tariff.[1]

Corden is correct, that it is relevant to consider taxes cum subsidies on inputs. An appropriate measure of protection must consider, in the example above, a tax levied on materials. If an import duty is levied on materials used to produce industry $j$'s output, the protection accorded to the production of this output is decreased accordingly.

However, there is some question whether EP rates measure the resource-allocation effects of a tariff. What Corden appears to be saying is that the percentage rate of increase in the return on capital will determine the interindustry flow of capital. For example,[2]

> If we have calculated that tradable industry X has 10 per cent effective protection and tradable industry Y has 20 percent, we should be able to conclude that resources will be drawn from X to Y and into both from non-protected industries and from those non-traded industries where prices stayed constant.

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[1] In a more general model, $g_j$ is the rate of increase in value-added, as a result of the tariff.

[2] Corden /4/ , page 227.

Surely this is an oversimplification. Capital will only flow from industry X to industry Y if the post-tariff rate of return is higher in Y than in X. And this will not necessarily be the case in Corden's example unless the pre-tariff rates of return are identical in the two industries. A sufficient (but not necessary) condition for the two pre-tariff rates of return to be equal is (1) there is competitive factor pricing, and (2) both industries are economic in the pre-tariff situation. Although the first assumption is in the spirit of EP theory, the second is not, for it requires that tariffs are imposed only on industries that are economic anyhow -- a somewhat stringent requirement.

In the more general case, $r_j'$ will not be the same in all industries. Consider the following example. The pre-tariff return on capital is 2 percent in industry Y and 4 percent in industry X. The going rate on capital is 6 percent. Thus neither industry produces. Now assume a tariff is levied, so as to provide an EP rate of 100 percent in industry Y and 50 percent in industry X. Then, contrary to what the EP theory would predict, capital will flow into industry X but not into industry Y.[1]

There are two points relevant here. First, capital will be influenced by the absolute and not the relative increase in the rate of return.[2] Thus a better measure of the resource allocation effects of a tariff would be given by

$$h_j = g_j r_j' \qquad (4)$$

But even this is not enough, for the value of $r_j'$ is relevant as well as the value of $h_j$. In our example above, h must be 2 percent to make industry X economic, but 4 percent to make Y economic.

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[1] Because the post-tariff rates of return will be 6 percent in industry X and only 4 percent in Y.

[2] If $r_j'$ is zero then $g_j$ is infinite for any value of $t_j$, certainly an absurd result. And if $r_j'$ is negative, the results are equally absurd. Soligo and Stern /_ 6 _/ obtain such results.

## VALUE-ADDED

Corden's definition of value-added also deserves some attention. He begins by distinguishing between primary factors and tradable inputs. He then considers nontradable inputs, noting that if these are available to the industry in question in infinitely elastic supply, they should be treated like tradable inputs, and otherwise should be grouped together with primary factors. Finally, he argues that any primary factor available in infinitely elastic supply should also be grouped with the tradable inputs. In particular, capital might be in some cases internationally mobile, and available at the going rate. And labor in an LDC might be available according to W. A. Lewis assumptions. a horizontal supply curve at the prevailing wage rate. Basevi, in his study of protection in the U. S. /‾2‾7, does in fact treat capital as a tradable input, and calculates the effective protective rate on labor alone. [1]

According to Corden, then, the denominator in equation (1) consists of value-added by finitely-supplied, nontradable, primary factors. Corden's distinction between infinitely and finitely elastically supplied factors (inputs) raises some questions. First, if one groups together selected primary factors and selected nontradable inputs,[2] then effective protection is being related to a congeries of factors, and it is not entirely clear what the measure means. Second, and more disturbing, Corden is attributing a great deal of significance to the difference between (1) infinite and (2) finite (although possibly large) elasticities. As infinite means "arbitrarily large," then how large in practice must an elasticity be to be regarded as infinite? Surely the limiting case is not sufficiently dissimilar to form the basis of a qualitative distinction between groups of factors.

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[1] This incidentally gives some nonsense results, in that the labor-intensity of an industry is inversely correlated with the effective protective rate, for each of two years, and is significant at the 1 percent level for one of these years. That is, industries with a lower rate of effective protection on labor tend to have a higher labor-output ratio.

[2] Selected on the basis of supply elasticity.

Another problems is that, in a LDC, labor and capital may both be infinitely elastically available, or nearly so. Many LDCs depend heavily on foreign capital, and industries are frequently protected primarily to attract capital from abroad. Surely the capital supply curve must look nearly horizontal to economic planners. Similarly, labor is in many cases Lewis-available. But if both factors are horizontally supplied, then both must be treated like tradable inputs. Then what is in the denominator? It may be zero, in which case the theory of effective protection breaks down. Or perhaps there is some finitely elastically supplied factor: entrepreneurship? electricity? An EP rate calculated on some such factor is likely to be of little interest.

From the point of view of a sufficiently small industry, all inputs are available at the going rate, unless there is some factor specific to the industry. If protection is provided for producing paper clips, the paper clip industry's demand for factors will not have a noticeable effect on the return to any factor, except possibly some type of skilled labor or of experienced management. In principle, then, the EP rate should be calculated on the basis of value-added by these few specific factors: and this would produce some odd results.

## CONCLUSION

This paper has examined the contention that EP rates indicate the resource-allocative effects of a tariff. It was found that EP rates do not in themselves indicate into which industries resources will flow: it is necessary also to have information on the pre-tariff profitability of the different industries.

The EP rate relates the nominal tariff to value-added by primary factors, defined as domestic, nontradable inputs whose supply is less than perfectly elastic. Our argument above suggests that this concept of primary factor -- and therefore the corresponding concept of value-added -- is ambiguous. Accordingly, the concept of effective protection may be mis-leading.

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