Import Substitution in Pakistan—Some Comments

by

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As the resort to import substitution as a tool of economic development has spread, it has generated an increasing volume of critical literature. Of the numerous articles that have appeared, one in *The Pakistan Development Review*, by Ronald Soligo and Joseph J. Stern is among the more suggestive and venturesome [1, pp. 249-270]. The authors undertake to examine the effects of past protection in Pakistan on the efficiency of investment allocation and so to determine whether or not protection has saddled the country with highly uneconomic industries. Both their methodology and their results are interesting. With respect to the latter, however, and especially with respect to their interpretation, I have some doubts which it is the purpose of this paper to explore.

I

Soligo and Stern use a simplified input-output model, through which they compute value added in some forty-eight industries at domestic prices and at world prices. Their basic equations are those expressing value added in these terms, and are as follows:

$$W_i = X_i - \sum_{j=1}^{n} X_{ji} \quad \dots\dots\dots\dots\dots\dots\dots\dots (1)$$

and

$$V_i = Y_i - \sum_{j=1}^{n} Y_{ji} \quad \dots\dots\dots\dots\dots\dots\dots\dots (2)$$

where W_i is value added in industry i, X_i is the gross value of output for that industry, and ΣX_{ji} represents total deliveries of industry j to industry i, all these values being at domestic prices. The symbols in the second equation correspond to those in the first equation, but are at world prices. The first equation reflects what domestic factors receive in an industry with a given tariff structure, while the second shows what they *could* be paid if output were sold and inputs brought at world prices.

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The subsidy provided by the tariff (U_i) is measured by $W_i - V_i$, or the difference between value added at domestic prices and value added at world prices (converted at the effective rate of exchange). To permit interindustry comparisons, the equation for the subsidy must be expressed in percentage form:

$$U_i = \frac{W_i - V_i}{W_i} \quad \dots\dots (3)$$

An alternative to equation (2) is introduced, to permit computation of world prices, where such data are unavailable, by correcting domestic prices for the effect of the tariff:

$$V_i = \frac{X_i}{(1+t_i)} - \sum_{j=1}^{n} \frac{X_{ji}}{(1+t_j)} \quad \dots\dots (4)$$

where t_i and t_j are the tariff rates on commodities i and j. This version rests on the following two explicit assumptions:

"*i*) that the official exchange rate reflects the scarcity price of foreign exchange; and

ii) that the domestic price of any commodity is equal to the world price of a competing import plus domestic taxes on imports" [1, p. 254].

In actual computations, a substitute equation was used that explicitly introduced imported inputs at c.i.f. prices. For this reason, in a passage apparently relating to the use of their equation (5) ((4) above) in place of one (5″) that allows for varying scarcity margins on intermediate inputs (S_j), the authors state:

> We feel that there is some justification for making the jump from Equation (5) to Equation (5″) because *a*) the data we use give imported inputs at c.i.f. prices. This means that for these intermediate inputs we do not need to know either t_j or S_j to compute their value at world prices (at the official rate of exchange); and *b*) domestic intermediate deliveries are predominantly either commodities which are also exported, such as raw cotton and jute, and for which the scarcity margin is zero, or services which cannot be traded in the international markets and, hence, for which 'world' prices are irrelevant [1, p. 257].

The results of this study are striking. Of the forty-eight industries studied, twenty-three proved to have $U_i > 1$. That is, V_i, or value added (at world prices for outputs and inputs) was negative, which means that the value of interindustry inputs at world prices exceeded the total value of output at those prices (Equation (2) above). As Soligo and Stern point out, this result indicates either inefficiency in these industries in the use of imported inputs, or domestic inputs that are higher priced than similar inputs abroad.

These results are surprising. But we shall attempt to show that the method used makes such an outcome highly probable and highly suspect. Moreover, the interpretation of the results is also very questionable. Let us consider the interpretation first.

II

Although Soligo and Stern at one point suggest that negative value added (at world prices) may reflect inefficiency in the use of imported inputs, they discard this highly plausible interpretation in explaining their results. Perhaps this is because a negative value added implies a degree of inefficiency that is almost unbelievable. Raw materials and intermediate inputs would have to be chewed up at a phenomenally wasteful rate to yield a total value of final output that is less (at world prices) than the cost of the inputs alone. Whatever the reason, in explaining their results, the authors resort to the use of a

> conventional diagram of average and marginal revenue product curves for a given industry measured in terms of world market prices. The curves represent long-run curves with capital as well as labour a variable factor. On the horizontal axes we plot the composite of capital and labour which is the optimum, given the wage and interest rates, for the corresponding scale of output [1, p. 262][1].

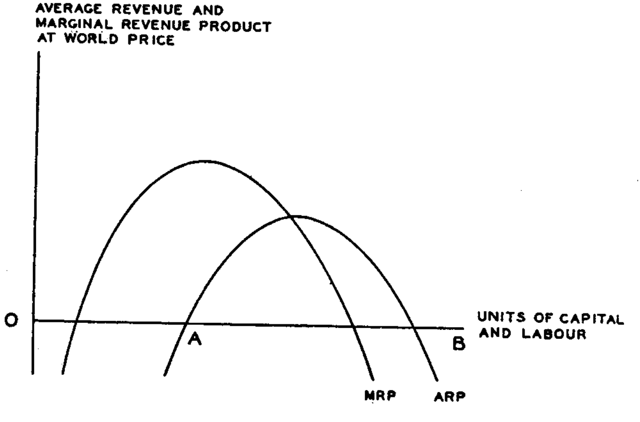

FIGURE I

Negative value added can occur either to the left of point A or to the right of point B. The former represents, according to Soligo and Stern, industries "in the decreasing portion of their cost curves"; they are "premature" in the sense that the market is not yet "sufficiently large to permit an efficient scale of operation" [1, p. 262]. To the right of point B, the industry has been "overexpanded".

[1] This figure is reproduced as Figure 1 in the text.

These curves raise serious conceptual difficulties. They purport to represent the variation in average and marginal revenue product of an *industry* for plants of various sizes. Size of plant is indicated on the horizontal axis by various "composites" of capital and labour. Yet in discussing the implications of the diagram, the authors refer to *output* as "less than OA", which suggests that they intended the horizontal axis to represent not inputs of capital and labour, but outputs for various optimal combinations of these factors[2]. This interpretation makes the diagram more comprehensible, for so interpreted their average revenue product curve is only the converse of the long-run cost curve ("envelope" curve).

Let us undertake the systematic construction of such a curve. Instead of curves of average and marginal cost for firms of various sizes, which are the bases for the usual "envelope" curve of long-run cost, we could start with curves of average and marginal physical product, then convert to average and marginal revenue product by multiplying by the world price[3].

This gives a series of curves such as in Figure 2. To these we could fit an "envelope" curve showing average revenue product in the long run. But note

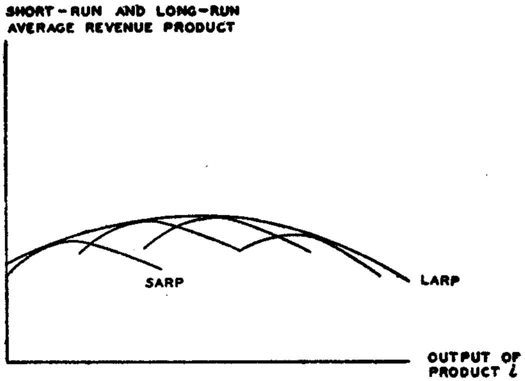

FIGURE 2

[2] This confusing interchange of inputs and outputs suggests the need for a clarification of the relationships involved. Starting with a firm's average and marginal revenue product curves under perfect competition, the axes are revenue product and number of units of factors employed. Equilibrium is represented by the intersection of the marginal with the average revenue curve, which determines the number of units of the factors employed. This defines a volume of output, which could be represented on a total product curve with axes reflecting total product and number of units employed. This output, in turn, can be taken to be a point on the horizontal axis of the firm's average and marginal cost diagram. (For a diagrammatic representation, see Stonier and Hague [2, p. 243]).

[3] World prices are taken as a given datum. Since none of the industries in question are assumed to export any of their output, they could not influence the world price directly.

Either outcome can plausibly result when *a*) material inputs (X_{ji}) comprise a large proportion of the value of final output (X_i), enjoy no protection ($t_j = 0$), and are used in excessive amounts; and/or when *b*) the processing industry is granted heavy protection (t_i is large). Then, although the value of final output at *domestic* prices is certain to be at least slightly greater than the domestic value of material inputs, it may be smaller at world prices—that is, when corrected for the tariff. This possible case we have already considered. It implies, even when inputs are a large proportion of the value of total output, such a high degree of inefficiency as to warrant an alarmed investigation of production methods in the industry concerned. Such a situation would appear most likely to arise (given very unfavourable conditions for industrial production) in assembly industries, where value added is a small proportion of total value and where ample opportunities for wasteful operations can exist.

A second and more likely basis for a negative value added resides in the possibility, even probability, that at least some domestic prices do not exceed the c.i.f. price of competing imports by the amount of the tariff. Where this is the case, it is not at all unlikely that the first term in our equation (4) will be no larger than or even smaller than the second term. Thus suppose that the c.i.f. price of some competing import *i* is 100, that the duty on *i* is 100 per cent, and that a domestic firm produces this commodity under competitive market conditions, at a cost of 100. Then if material inputs are half of the value of final output and are duty-free, equation (4) becomes:

$$V_i = \frac{100}{1+1} - \frac{50}{1+0} = 0$$

Value added is zero because of the failure of the assumption with regard to the relation between prices of domestic goods and competing imports to hold.

Although Soligo and Stern recognize such a possibility, they rule it out. Where a very high duty (or an embargo) on imports of a commodity prevents its entry, they admit that "the domestic price could well be below the c.i.f. price plus import tariffs". Despite the lack of information, this is regarded as improbable.

> We are, however, inclined to believe that there is likely to be excess demand in all commodity markets and, that as a *minimum*, domestic price does equal c.i.f. price and import taxes. That is to say that *at best* the scarcity margin is zero. This assumption is maintained throughout what follows [1, p. 255][5].

[5] Italics in original.

But the relative scarcity of protected commodities is almost certain to vary considerably. If the domestic production of any such commodity has become relatively efficient, and its supply from a number of suppliers relatively abundant, the domestic price can then be well below the c.i.f. import price plus the tariff. This increased relative efficiency and abundance of supply is just what we should expect as an economy develops. Yet as this occurs, Soligo and Stern's measures become worse. It would seem highly likely that a number of the twenty-three industries for which they obtain a tariff subsidy (U_i) greater than one, and therefore a negative value added, would fall into the category of having a selling price that exceeds the price of a competing import by less than the amount of the duty.

Indeed, at least three of the industries listed among the twenty-three fall into this category. These are jute textiles, cotton textiles and footwear, with a U_i of 1.52, 1.52, and 1.04 respectively. Fabrics of jute (SITC code no. 653 04) were *exported* in 1961 and 1962 to the value of 121.6 and 122.8 million rupees; there were no imports. And while cotton yarn and thread (SITC no. 651 04) were imported in small amounts (11.0 and 7.2 million rupees in these years), exports of various cotton fabrics (651 03, 04; 652 01, 02) were substantial, amounting to 68.0 million rupees in 1961 and 51.4 million rupees in 1962. Exports of footwear (851) amounted to 3.0 and 2.5 million rupees in these years. Certainly industries which are able to export cannot possibly have a domestic price that equals the c.i.f. import price plus the duty (barring discriminating monopoly) [3].

There may be others among the twenty-three industries that are on a net export basis. Data in the United Nations publication consulted are not sufficiently detailed to permit a judgement. And still others, while not efficient enough to export, may be sufficiently productive to sell their output at a price substantially below the protected level. Detailed inquiry into the facts probably would eliminate many, if not all, of the twenty-three industries where the computations yielded a negative value added.

IV

As a matter of logic, however, all industries with a U_i of 1 or more, and hence with value added zero or negative, should be discarded. For, logically all such results are absurd.

In order to establish this point, let us go back to the equation for effective rate of protection:

$$U_i = \frac{W_i - V_i}{W_i}$$

Using W_i as the denominator results in expressing the tariff subsidy as a percentage of value added in domestic prices. It can equally well be expressed in terms of value added in world prices by substituting V_i for W_i in the denominator. Since this change of denominator makes my argument stand out more clearly, while in no way affecting its foundations, I shall adopt it[6]. Thus, the equation for effective protection, or the tariff subsidy, becomes:

$$U'_i = \frac{W_i - V_i}{V_i} = \frac{W_i}{V_i} - 1 \quad \ldots\ldots\ldots\ldots\ldots (5)$$

Substituting equation (4) for V_i in the denominator, we get:

$$U'_i = \frac{W_i}{\dfrac{X_i}{(1+t_i)} - \sum_{j=1}^{n} \dfrac{X_{ji}}{(1+t_j)}} - 1 \quad \ldots\ldots\ldots (6)$$

One would naturally expect that, as the rate of duty on a given final output increases, the rate of duty on inputs remaining constant, the effective rate of protection will steadily rise. When measured according to this formula, however, this is not true. If the second term in the denominator is held fixed while the value of t_i in the first term (the duty on final output) is increased, the value of the first term as a whole steadily diminishes. Assuming it was initially larger than the second term, as t_i, is steadily increased, it approaches the value of the second term. As it does so, the value of the difference between the two terms approaches zero and the value of U'_i approaches infinity, which is absurd. Moreover, if the value of t_i continues to be increased, the value of the denominator (V_i) passes the zero point and becomes negative (*see* Figure 3). This causes U'_i to become negative. Such an outcome is not economically absurd, since it is clear that when the weighted average rate of duty on inputs is greater than the duty on final output, protection is negative. Instead of being subsidized, the processing industry is taxed. But a negative value for U'_i obtained as above, through a *rise* in the rate of duty on the final product, is spurious. This is because it is assumed that domestic prices must rise along with the rate of duty, which is simply not so.

When one uses, as do Soligo and Stern, the equation for V_i that expresses the subsidy as a percentage of value added in domestic prices,

$$U_i = \frac{W_i - V_i}{W_i} = 1 - \frac{V_i}{W_i}$$

[6] I am here following the procedure used by Giorgio Basevi [4].

the same critical point, where V_i approaches zero, is reached when U_i approaches 1. When V_i becomes negative, U_i becomes greater than unity. Inasmuch as the essentials of the argument are the same whether one expresses the subsidy as a percentage of value added in domestic or in world prices, a value of 1 for U_i computed *a la* Soligo and Stern corresponds to a value of infinity computed *a la* Basevi, and like the latter, is absurd. Since Basevi appropriately discards all his results for which U_i approaches infinity, Soligo and Stern should likewise discard all results for which U_i approaches unity. If this were done, all 23 industries for which "the net subsidy received through tariff protection exceeds the total value added" [1, p. 259] would have to be excluded from consideration, and probably matches and metal products (with U_i's of 0.92 and 0.98) as well.

V

In discussing the issues underlying the calculation of effective rates of protection through the use of formula (6), Basevi says:

> This formula's main weakness lies in the fact that it is based on the assumption of fixed physical proportions between material inputs and output. This assumption is probably not too restrictive when effective rates of protection given by the formula are not too high, but the error increases with their height. A conspicuous consequence of this approximation is that effective rates of protection as given by (the) formula are not, as they should be, a continuously rising function of the tariff rate on output; on the contrary, at a critical point, when the denominator becomes zero, the function vanishes asymptotically and switches to negative values. This is clearly an absurd result...[4, p. 7][7].

It should be clear from the discussion in Section III above that "the main weakness of the formula" does not reside in its "assumption of fixed physical proportions between material inputs and output", but rather in the assumption that the domestic price of a good will always exceed that of a competing import by the amount of the tariff. Effective protection—the real tariff subsidy (U_i)—would only rise continuously as the tariff on output rose if the price and thus the domestic value of final output rose *pari passu* with the rate of duty. But it does not, and normally (in the absence of monopoly) will not. Costs are what they are, and even if the coefficients of production were not fixed by the character of the model, it is improbable that costs would rise with every change in the rate of duty on final output.

[7] Basevi uses a formula that differs from the one presented here in notation only.

All we are concerned with here is an arithmetical operation. In order to transform value added at domestic prices to value added at world prices, we divide certain domestic values (X_i and X_{ji}) by $(1+t_i)$ and $(1+t_j)$, which simply reduces both sets of values by the tariff factor. The whole purpose of the computation is not to discover what the factors in the processing industry *would* be paid in the absence of tariffs, but what they *could* be paid. And this the procedure of division tells us, by converting domestic values *with* protection into what those values would be *without* protection.

Were we interested in pursuing the subject of what the factors *would* be paid in the absence of general protection (unless we were willing to wait and see), we should have to go through a prolonged theoretical inquiry about the effect of general free-trading conditions upon the demand for and hence the price of factors. And this introduces the need for extensive knowledge of (or assumptions about) elasticities of demand and supply. In following through this kind of reasoning, the assumption of fixed coefficients could lead to results that differ considerably from those obtained if coefficients are free to vary. But this kind of problem is not involved here; all the computation tells us is that *if* a particular set of duties on a single finished product and its inputs is removed, the sum available to remunerate the factors in the processing industry that accounts for the value added will be such and such an amount. In contrast, the problem of what the factors *would* be paid under free-trade conditions presupposes complete free trade—that is, the abolition of barriers to trade on all commodities, not just a single one.

VI

As already noted, the results obtained by Soligo and Stern indicated, for 23 industries, a tariff subsidy in excess of value added (at world prices); $U_i > 1$. These industries, it happens, are consumer-goods industries. In contrast, for some 9 "investment goods" industries, the authors obtain values of $U_i < 1$, ranging from a high of 0.98 to a low of 0.11. They conclude that:

> Our data also indicate that the most productive use of capital in the future lies in the investment and related goods industries. These industries have been able to survive, and indeed grow rapidly, with only relatively modest tariff protection. It is clearly in these industries in which Pakistan has a comparative advantage, which she should now go on to exploit. Our study, of course, has only compared the tariff protection given to different manufacturing industries. We have not compared the manufacturing sector as a whole with other sectors such as agriculture or mining. Our conclusions refer only to the relative profitability of different industries within the manufacturing sector. It may well be that investment in manufacturing as a whole is less productive than in other sectors. [1, pp. 263-264].

Further:

> Our results lend strong support to the point of view expressed in the *Third Five Year Plan* that the time has come to give priority to investment in intermediate goods and capital and related goods industries [1, p. 266.].

A serious semantic danger lies concealed here. One naturally tends to think of "investment goods" as consisting of such products as heavy electrical equipment (motors, generators, transformers), machine tools, structural steel, bulldozers and tractors, and the like. I suggest that while this is what the concept means when applied to industrialized countries, it would be a serious mistake to think of investment goods as meaning such goods when applying the concept to Pakistan. Although no mention is made of the specific commodities that make up the investment goods categories in that country, I strongly suspect that they bear no resemblance to those just mentioned, but rather are typically light industrial goods. Thus "electrical machinery", one of the categories in Soligo and Stern table, could well be predominantly small motors, "electrical appliances" could consist of fans, small heating units, *etc.*, and "other transportation" of bicycles and prams, and so on. It is noteworthy that all of these commodities tend to be of a labour-intensive type, whereas the "investment goods" typical of advanced countries are highly capital-intensive.

The view just presented is reinforced by the fact that the highest value for U_i in Soligo and Stern's entire table, 3.96, is for motor vehicles, which in many respects resemble what are generally thought of as investment goods.

Even more firmly supporting this view, that what Soligo and Stern term "investment goods" are not the heavy industrial goods we normally think of, is the fact that imports of the latter type are large, while exports of goods under the same broad classification are very small by comparison. The following table gives some idea of the magnitudes involved.

PAKISTAN'S TRADE IN SELECTED INVESTMENT-TYPE GOODS : 1961-1962

(*in millions of rupees*)

(SITC (code)		1961	1962
	Imports		
681	Iron and steel	383.2	374.9
711	Power-generating machinery, *n.e.s.*	43.8	61.9
713 01	Tractors	44.9	53.5
716	Machinery, *n.e.s.*	289.6	642.3
721	Electrical machinery and appliances	163.9	207.8
81	Prefabricated buildings, fixtures, fittings, *etc.*	9.4	22.3
	Exports		
711	Machinery other than electrical	8.6	7.5
716	Machinery, *n.e.s.*	3.9	4.4

Source: [3, pp. 533 and 535]

Certainly before the Planning Commission of Pakistan launches a programme to promote "investment goods" industries, it should determine precisely what industries fall in these categories in Pakistan, to make sure they are of a type suited to conditions there.

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