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On Tariffs and Optimal Taxation Policy in Developing Countries

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Taxes on the foreign-trade sector are substantial sources of government revenue in almost all developing countries. Thus in a number of countries – including Pakistan, Indonesia, Burma, Ceylon, Malaysia, Thailand, Nigeria, Ghana and Colombia – such taxes account for more than 40 percent of the government revenue.[1] The main type of trade tax has been tariffs, but in addition there have been export taxes and profits from export marketing boards, the latter being really forms of export taxes.

For developed countries, by contrast, taxes on trade are generally not now significant sources of revenue, and usually account for less than 5 percent of government revenue, and frequently much less. However, this has not always been so. In the early history of the now-developed countries, trade taxes have usually been quite important, and the principal purpose of tariffs has been to raise revenue. In the United States, customs duties accounted for over 25 percent of revenues at all levels of governments in 1880, though for only 0.8 percent in 1960. In Germany they accounted for 16 percent of revenue in 1914, though for only 4 percent in 1960 [4, pp. 138-39] and [1, pp. 58-59].

A well-known conclusion in the theory of international trade is that having tariffs is not an optimal policy for a small country unable to influence terms of trade if collection costs of taxes can be disregarded and lump-sum taxes or indirect taxes

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[1] See [3]. (Indonesia and Pakistan have been added to the list here.) There is no reason to believe that trade taxes have become significantly less important in the two last decades.

on all commodities are possible.[2] Perhaps inspired by this kind of conclusions, international organizations argue in favour of free trade in developing countries. Thus *The Development Report 1983* by the World Bank clearly says that.

> Although gains in price and efficiency from freer international trade are still widely appreciated, developing countries are often victims of short-sighted government action. The political challenge is first to halt and then to reverse the drift towards protectionism. The ministerial meeting of GATT held in November 1982 set the stage for liberalization. Greater participation by developing countries in GATT would help strengthen its role as the most appropriate forum for continued negotiations to reduce trade barriers. [7, p. 3].

Thus one may get the impression that in the view of both economic science and international economic organizations, the developing countries may not be pursuing an optimal foreign-trade policy. It is the purpose of this paper to show that if sufficient government revenue can not be raised through lump-sum taxation and if indirect taxes can not be imposed on all commodities, tariffs may be part of an optimal taxation policy. Many economists have in general questioned the possibility of having all government revenue raised through lump-sum taxation – see, e.g., Sandmo [6] – and having indirect taxation on all commodities in developing countries would require that such taxes be acceptable to the policy-maker and that all firms have an accounting system reporting their sales and expenditures, hardly a very realistic assumption in many developing countries. We therefore start here with the extreme alternative assumption that lump-sum taxation and indirect taxes on commodities are not possible and that the government, therefore, will have to raise revenue through tariffs. These extreme assumptions will then be modified to see how sensitive our conclusions are to less restrictive assumptions, including that of imposability of indirect taxes on some, but not all, commodities.

I

Following Sandmo [5], I shall adopt the simplifying assumptions that preferences can be represented by a social utility function, and that the public sector is concerned to raise a given amount of tax revenue. Since the country is assumed to be small and unable to influence terms of trade, consumer and producer prices (including tariffs) are supposed to be determined in the international market. The public sector is assumed to maximize the utility of consumers, subject to the tax

[2] See, e.g., [2, pp. 165–75].

revenue constraint. This very simple model has, of course, the shortcoming that distributive effects of alternative tax schemes are ignored.

The social utility function is

$$U = U(C_o, C_1, \ldots, C_m) \qquad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (1)$$

which is taken to have the usual concavity properties. Consumers and producers face prices $P_i = p_i + t_i$ where p_i are international prices and t_i are tariffs. Factors of production are treated as negative consumption goods. In the following, it is assumed that commodity 0 is not taxes and is used as a numeraire which means that $P_o = p_o = 1$ and $t_o = 0$. One possible interpretation of this is that commodity 0 is labour and that other commodities are consumer goods which make the model similar to that of Sandmo [5].

The budget constraint of the consumers is

$$\sum_{i=0}^{m} P_i C_i = 0 \qquad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (2)$$

Given this budget constraint, the first-order conditions for utility maximization by consumers are

$$U_i - \lambda P_i = 0 \qquad i = 0, 1, \ldots . m \qquad \ldots \quad \ldots \quad (3)$$

where λ is the Lagrange multiplier which can be interpreted as the marginal utility of income. The demand functions become

$$C_i = C_i(P) \qquad i = 0, 1, \ldots, m \qquad \ldots \quad \ldots \quad (4)$$

where P is the price vector $(P_1, \ldots, P_m)$.

We define the indirect utility function as

$$V(P) = U(C(P)) \qquad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (5)$$

Differentiating equation 5 with respect to P_K gives

$$\frac{\partial V}{\partial P_K} = \sum_{i=0}^{m} U_i \frac{\partial C_i}{\partial P_K} = \lambda \sum_{i=0}^{m} P_i \frac{\partial C_i}{\partial P_K}$$

Differentiating the budget constraint gives

$\sum_{i=0}^{m} P_i \frac{\partial C_i}{\partial P_K} = -C_K$. Then it follows that

$$\frac{\partial V}{\partial P_K} = -\lambda C_K \qquad K = 1, \ldots, m. \qquad \ldots \quad \ldots \qquad (6)$$

Note that, since international prices are given, we must have $\partial V/\partial P_K = \partial V/\partial t_K$.

Suppose that the government wants to raise a fixed amount of revenue, T, by import duties. The maximization problem of the public sector in terms of the Lagrangian then becomes

$$L = V(P) + \mu(\sum_{i=n}^{m} t_i M_i - T) \qquad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \qquad (7)$$

where imports $M_i = C_i - X_i \cdot X_i$ = domestic production.

Maximizing the above function with respect to t_K gives

$$\frac{\partial V}{\partial P_K} + \mu(\sum_{i=n}^{m} t_i \frac{\partial M_i}{\partial P_K} + M_K) = 0 \quad K = n, \ldots, m \qquad \ldots \quad \ldots \qquad (8)$$

Inserting equation (6) into equation (8) gives

$$\lambda C_K = \mu(\sum_{i=n}^{m} t_i \frac{\partial M_i}{\partial P_K} + M_K) \qquad K = n, \ldots, m \qquad \ldots \quad \ldots \qquad (9)$$

$$\sum_{i=n}^{m} t_i \frac{\partial M_i}{\partial P_K} = -M_K + \frac{\lambda}{\mu} C_K \qquad K = n, \ldots, m \qquad \ldots \quad \ldots \qquad (10)$$

From (10) the structure of optimal trade taxes can be estimated.

If we, instead of tariffs, have indirect taxes on all import commodities (i.e. $X_i = 0$ and t_i = indirect taxes), equation (10) becomes

$$\sum_{i=n}^{m} t_i \frac{\partial C_i}{\partial P_K} = \frac{\lambda - \mu}{\mu} C_K, \qquad K = n, \ldots, m \qquad \ldots \quad \ldots \qquad (11)$$

which is similar to Sandmo equation 7 [6].

If indirect taxes can be imposed on commodities $n, \ldots, z$ in equation (10), then $n < z < m$ and equation (10) can be written as

$$\sum_{i=n}^{z} t_i \frac{\partial C_i}{\partial P_K} + \sum_{i=z+1}^{m} t_i \frac{\partial M_i}{\partial P_K} = \frac{\lambda - \mu}{\mu} C_K \qquad K = n, \ldots, z \qquad \ldots \quad (12a)$$

$$\sum_{i=n}^{z} t_i \frac{\partial C_i}{\partial P_K} + \sum_{i=z+1}^{m} t_i \frac{\partial M_i}{\partial P_K} = -M_K + \frac{\lambda}{\mu} C_K \qquad K = z+1, \ldots, m \qquad \ldots \quad (12b)$$

In general, we can not, from equations (12a) and (12b) conclude that optimal tariffs will be zero for a small country unable to influence terms of trade. Only in very special cases can it be shown that optimal tariffs will be zero. One such special case will be when all cross derivatives are zero and the demand for imports is infinitely elastic.

II

We now turn to the empirical aspects of the problem. Since the import demand functions in the previous analysis should be interpreted as those existing within a general-equilibrium framework, they are hardly very relevant for a more practical approach to dealing with taxation problems. In order to show how the optimal taxation problems can be dealt with within an empirical framework, I therefore rely on a partial-equilibrium approach. The problem can be illustrated in the Figure 1. It refers to an importable commodity. *DD'* is the domestic demand curve, *SS'* the import-competing supply curve and *HH'* the foreign import supply curve.

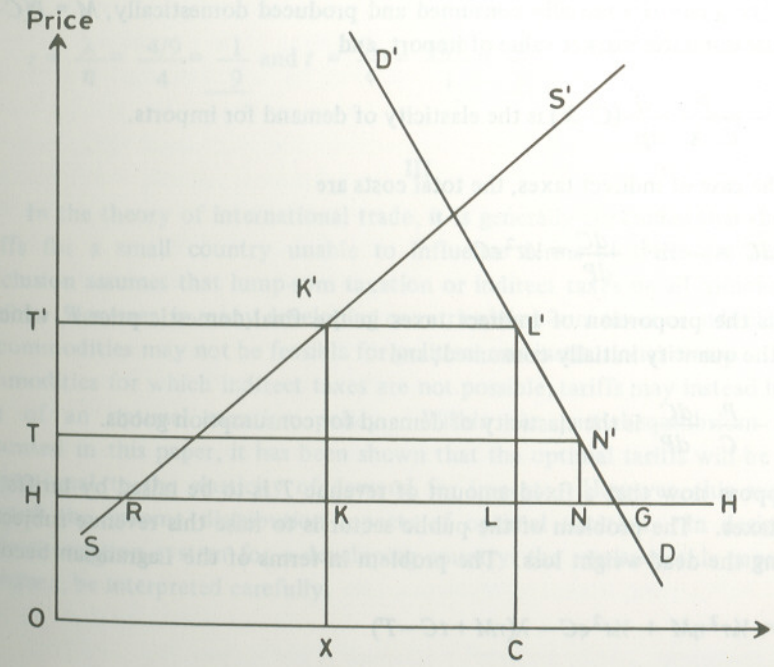

Figure 1. Quantity of the Importable

An indirect tax HT would raise revenue $HTN'N$ and cause a consumption distortion cost $NN'G$. A tariff to raise the same revenue, however, would have to be HT' raising revenue $KK'L'L$ ($=HTN'N$). It would cause a production distortion cost RKK' and a consumption distortion cost $L'LG$. Thus, not only would a tariff add a production distortion cost, but the consumption distortion cost would be greater than in the case of indirect taxes. Therefore, it would only be in the case in which indirect taxes can not be imposed on all commodities that tariffs can be part of an optimal taxation policy.

In the following we will show how optimal tariffs and indirect taxes can be estimated in the case of two commodities where for institutional or political reasons indirect taxes can only be imposed on one of the commodities. It can easily be shown that the results would also apply to a more general case. Units of quantities are chosen so that the domestic market price including the tariffs or indirect taxes is unity. In the case of imports the total costs are

$$\tfrac{1}{2}\tau\,(dX + dC) = \tfrac{1}{2}\tau^2 \frac{d}{dp}(X-C) = \tfrac{1}{2}\tau^2\eta M$$

where τ is the proportion of the tariff in the final domestic price P, which is unity, C and X are quantities initially consumed and produced domestically, $M = P(C-X)$ is the initial domestic market value of import, and

$$\eta = -\frac{P}{C-X}\frac{d}{dp}(C-X)$$ is the elasticity of demand for imports.

In the case of indirect taxes, the total costs are

$$\tfrac{1}{2}\,tdC = -\tfrac{1}{2}t^2\frac{dC}{dP} = \tfrac{1}{2}t^2\epsilon C$$

where t is the proportion of indirect taxes in the final domestic price P, which is unity, C the quantity initially consumed, and

$$\epsilon = -\frac{P}{C}\frac{dC}{dP}$$ is the elasticity of demand for consumption goods.

Suppose now that a fixed amount of revenue T is to be raised by tariffs and indirect taxes. The problem of the public sector is to raise this revenue subject to minimizing the dead-weight loss. The problem in terms of the Lagrangian becomes

$$L = \tfrac{1}{2}\tau^2\eta M + \tfrac{1}{2}t^2\epsilon C - \lambda(\tau M + tC - T)$$

Minimizing the above function with respect to τ and t gives

$$\tau\eta M - \lambda M = 0$$

$$t\epsilon C - \lambda C = 0$$

$$\tau = \frac{\lambda}{\eta} \text{ and } t = \frac{\lambda}{\epsilon}$$

These formulas of optimal tariffs and optimal indirect taxation are similar to the formulas of inverse elasticities in the theory of optimal taxation.

To give an example of how the optimal indirect taxes and tariffs can be estimated, suppose , $\eta = 4, \epsilon = 1, M = 100, C = 200$, and $T = 100$. Then

$$\tau M + tC = T$$

$$\frac{\lambda}{4}\cdot 100 + \frac{\lambda}{1}\cdot 200 = 100$$

$$\lambda = \frac{400}{900} = \frac{4}{9}$$

$$\tau = \frac{\lambda}{\eta} = \frac{4/9}{4} = \frac{1}{9} \text{ and } t = \frac{\lambda}{\epsilon} = \frac{4/9}{1} = \frac{4}{9}$$

III

In the theory of international trade, it is generally concluded that the optimal tariffs for a small country unable to influence terms of trade are zero. This conclusion assumes that lump-sum taxation or indirect taxes on all commodities are feasible. However, in many developing countries lump-sum taxes or indirect taxes on all commodities may not be feasible for political and institutional reasons. For those commodities for which indirect taxes are not possible, tariffs may instead be used as part of an optimal taxation policy. Within the partial-equilibrium approach presented in this paper, it has been shown that the optimal tariffs will be inversely proportional to the elasticity of demand for imports. However, this analysis has ignored the income distribution aspects of optimal taxation. In designing any optimal taxation system for a developing country, the results in this paper should, therefore, be interpreted carefully.

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Comments on "On Tariffs and Optimal Taxation Policy in Developing Countries"

At a time when international economists are extolling the many virtues of free flow of foreign trade, Flϕystad's paper argues that imposing tariffs may in fact be an "optimal" policy for certain developing countries. This is clearly a counter-intuitive conclusion, but Flϕystad arrives at it by focusing solely on the fiscal aspects of tariffs and liberalization. If governments cannot raise revenues through either lump-sum or indirect taxation, then tariffs may be an optimal taxation policy. At the same time, however, tariffs are not necessarily an optimal *trade* policy, and this distinction must be kept in mind when reading this paper.

The arguments of international organizations pushing for removal of tariffs and other distortions in foreign trade do not typically relate to the narrow revenue-related aspects. In fact, the policy advice of such organizations is based on the wider issues of gains from trade and improvements of efficiency that result from tariff liberalization. Briefly, according to the standard theory, international trade is believed to contribute to development in the following ways: trade allows a country to follow the route indicated by the theory of comparative advantage; it offers greater opportunities to exploit economies of scale; it increases the supply capacity of the economy through imports of capital goods, raw materials, and other inputs in production; and, finally, by providing competition for tradable goods, it is a source of stimulus and pressure for domestic production. These theoretical arguments are supported by a number of case studies that have shown that, at the broadest level, the countries adopting outward-looking development strategies have fared better in terms of growth, employment, economic efficiency, and adjustment to external shocks than those that have engaged in more inward-looking strategies. The outward-oriented policies have been typically characterized, *inter alia,* by the provision of incentives for exports, and the encouragement of import competition for domestically produced goods.

All this is well known, but is ignored by Flϕystad. As a consequence, the paper is much too narrowly focused and I am not sure what message it has for the policy-maker in a developing country. Clearly, it cannot be interpreted as a rationale for

increases in tariffs. What really has to be done is to combine the resource allocation and efficiency arguments with the revenue-based issues, and then calculate the optimum tariff. I recognize that this would make the analysis much more complex, but without such an attempt the paper remains an exercise devoid of any policy significance. Perhaps this paper should be viewed as a first step in the direction of incorporating revenue aspects into a comprehensive analysis of tariffs.

Aside from the above general issues, there are a few specific points in the paper that deserve comment. Firstly, since it is assumed that all goods are homogeneous I am not sure what the terms of trade (defined as the relative price of exports to imports) mean in this context. There is only one price in the model. Presumably all that Flϕystad wants to say is that in a small open economy the foreign price level is given, and the law of one price holds. If one shifts to a situation of non-homogeneous goods, and certainly one can make a case that imports are imperfect substitutes for domestic goods in developing countries, then the analysis would have to be altered. For example, one could easily get a case in which the cross-price derivatives between imports and domestic goods were zero.

Secondly, while the partial-equilibrium model is useful as a pedagogical device, it tends to be somewhat restrictive. Employing the concept of "Harberger triangles" to measure welfare gains and losses is a standard procedure when one is concerned with small changes. However, this approach becomes increasingly unrealistic when large tariff changes are considered, and this has to be acknowledged in judging the numerical example.

Finally, while the numerical simulations are interesting, I would have preferred to see some type of table that gave the results for different values of the relevant parameters. In other words, some type of sensitivity analysis would have been very useful. For example, if one reverses the values for the price elasticity of the demand for imports (η) and the price elasticity of the demand for domestic goods (ϵ), one gets quite different conclusions. Suppose $\eta = 1$ and $\epsilon = 4$, then we find that $\tau = 2/3$ and $t = 1/6$. One could also consider other intermediate values, and perhaps even $\eta = 0$. As $\eta \to 0$, we would get $\tau \to \infty$. Since we know of a number of imported commodities that have a zero (or close-to-zero) price elasticity, would this mean that one would recommend an infinite tariff?

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