Effective Protection Rates — A Guide to Tariff Making

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I. INTRODUCTION

Import restrictions, both tariff and non-tariff, have been the main policy instrument in implementing the import substitution industrial strategy which has been pursued by almost all the developing countries. The strategy was visualised as a means of realising higher growth of output and foreign exchange earnings, conservation of foreign exchange and stability of the economy. Efficiency in resource use and income distribution considerations did not assume much significance in the development strategy.

The industrial sector of Pakistan, protected from imports through severe quantitative restrictions and even bans, suffered from inefficiencies and rigidities. However, this was realized only by the mid-Sixties when Soligo and Stern (1985), on the basis of effective protection rates reached a very startling, though not entirely correct, conclusion that in most of the industries in Pakistan, value added at world market prices was negative[1]. The study aroused interest in the examination of efficiency levels, both inside and outside Pakistan, through the computation of effective protection rates. These studies include among others, Balassa (1971); Little, Scitovsky and Scott (1970) and the NBER series on the import regime in many countries. Studies relating to effective protection in Pakistan include Soligo and Stern (1985); Lewis and Guisinger (1968); Kemal (1978); Khan (1978) and Naqvi, Kemal and Heston (1983).

The studies on effective protection rates (EPRs) generally relate to a single year. On the assumption that EPRs are stable over time, at least in the short run, very strong conclusions have been drawn regarding levels of efficiency and the structure of incentives. Besides, whatever the level and dispersion in effective protection

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[1] Lewis and Guisinger (1968) found only three and Kemal (1978) only one such industry where value added was negative.

rates across various industries a common policy prescription of a uniform (preferably zero) protection rate is suggested. This ignores the basic fact that industries at different levels of fabrication and complexity of technology require different levels of protection.

While effective protection studies do present the protection structure often characterised by high and dispersed EPRs, no attempt is made to examine the adequacy of the protection structure in realizing the objectives of industrialization. Moreover, besides uniformity of EPRs, no effort is made to design a structure of optimal EPRs. In addition, how the nominal protection structure will be determined, once target EPRs have been ascertained, has hardly found a place in the literature.

This paper sets out to highlight the interrelationship between EPRs and the structure of tariffs with a view to determining the nominal protection rates, given the target EPRs. This is done in section II. Section III analyses the stability of EPRs by controlling for the nominal protection structure. Effective protection as a measure to assess the efficiency level and structure of incentives is discussed in Section IV. Major conclusions are summarized in Section V.

II.   EFFECTIVE PROTECTION RATES AND TARIFF RATES

The effective protection rate, which is defined as the difference between value added at domestic prices and value added at world market prices as a percentage of value added at world market prices, is functionally related to the custom duty and sales tax on imports, excise duty and sales tax on domestic production and the structure of inputs along with the value added component in gross production. Therefore, effective protection rates for J activities, denoted by vector E, may be written as

$$E = F(A,T,D) \qquad \ldots \qquad \ldots \qquad \ldots \qquad (1)$$

where

A is the matrix of input-output coefficients for j activities;

T is the vector of tax rates on imports; and

D is the vector of tax rates on domestic production.

Matrix A, not necessarily square, provides not only input coefficients but also the value-added coefficient for each of the j activities through $1 - \sum_i a_{ij}$.

Effective Protection Rates (E) are uniquely determined given A, T and D through Equation (1).

$+ \infty > E_j > -1$ if $[1 - \sum_i aij] > 0$; and

$Ej < -1$ if $[1 - \sum_i aij] < 0$.

The structure of effective protection estimated through Equation 1 provides the net impact of protection provided through tariffs, other taxes and other import restrictions on both inputs and outputs. Given these EPRs, it is possible to assess the efficacy of incentives implied by the tax structure for realising the goals of public policy. However, if EPRs are at variance with the objectives of public policy, an optimal structure of effective protection would have to be indicated corresponding to which nominal protection rates (NPRs) will be determined as well.

In the determination of NPRs corresponding to EPRs, it needs to be noted that uniform EPRs to manufacturing industries would imply uniform nominal protection rates to all the activities. However, if raw materials or primary goods are allowed at zero or low duty rates, the uniform EPRs would require a cascading in the tariff structure. However, this cascading would have to be mild.

Since the target EPRs would differ for realising the objective of industrialization, nominal tariff rates corresponding to EPRs will have to be computed to effect policy changes, i.e. a new vector T has to be found which corresponds to target vector E.

$$T = G (E, D. A) \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad (2)$$

While E is unique, given T, D and A, the vector T is not unique given E, D and A. As a matter of fact, an infinite number of vectors would correspond to a given E, D and A.

Non-reversibility of the function as shown in (1) implies that (2) does not automatically yield a unique vector of tariffs. However, it does provide flexibility in the choice of tariff rates and thus allows the government to realise other objectives, including administrative convenience, consumption restraint, revenue maximisation etc. along with protection to domestic industries. For example, if revenue considerations are important, then the high tariffs accompanied with excise and sales taxes on domestic production would be preferable to lowering of tariffs for effecting a reduction in EPRs. On the other hand, for administrative convenience, low rates of tariffs may be preferred.

Effective protection rates are typically estimated for each activity. As long as the mapping of activity to the product is one-to-one, both the effective protection and the nominal protection functions are well-behaved. However, if the same product corresponds to different activities (input-output coefficients change across the firms), uniform protection for an industry implies different tariffs rates for the same

product — an absurdity. On the other hand, effective protection rates would vary significantly across firms in the same industry, if the input-output coefficients change across firms due to a number of factors including efficiency levels, scale economies, differences in technologies etc.[2] Very high intra - industry variations were found in a number of industries in Pakistan [Naqvi, Kemal and Heston (1983)].

Differences in EPRs across firms create serious problems in tariff formulation. Tariffs will have to be set by considering either the most efficient, the least efficient or the average firm for protection. The choice of firm has significant implications for protection and industrial efficiency. If the tariff rates are set in correspondence with the most efficient firm, an efficient industrial structure would evolve but in the process would lead to closure of sub-optimal firms. If, on the other hand, the least efficient firm is taken as the criterion, an inefficient industrial structure with abnormal profits would emerge. The selection of the average firm would have elements of both inefficiencies as well as abnormal profits.

The preceding discussion leads us to the conclusion that if the computed EPRs do not correspond to policy objectives, then an alternative tariff structure will have to be formulated to attain the target EPRs for realising objectives of public policy. Moreover, in the presence of differences in EPRs across firms in an industry, a policy choice will have to be made regarding closure and efficiency in an industry.

III.   STABILITY OF EFFECTIVE PROTECTION RATES

The fixation of new target EPRs, if the existing structure of EPRs does not conform to the policy objectives, presupposes that EPRs are stable as long as nominal protection rates do not change. Whether EPRs are, in fact, stable or not, has not been tested. An attempt is being made in this section to test the stability of EPRs based on data from the Census of Manufacturing Industries. Ten industries relating to Punjab for 1973-74, 1975-76 and 1976-77 have been selected.[3] It was necessary to restrict the sample to industries and years when nominal protection rates remained the same to test the stability of EPRs. Therefore, these years have been chosen because the nominal protection structure showed minimum changes across the three years. Similarly, the ten industries included in the analysis are those wherein tariffs are not redundant, and the tariff rates have not undergone changes during this period. Since major industries such as Sugar, Textiles, Leather, Footwear and Cigarettes could not meet the criterion, they were excluded from the analysis.

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[2] The A matrix should correspond to input-output coefficients in a free-trade situation. However, they are typically not available. Therefore, it involves an assumption that protection does not affect choice of technology. To the extent protection does affect the choice, effective protection rates are over-stated.

[3] Census of Manufacturing Industries data for 1974-75 were not available.

Effective Protection Rates corresponding to both Corden and Balassa definitions have been reported in Table 1. Since in 1976-77, a general import surcharge of 10 percent was imposed, estimates for the year are presented by alternately excluding and including the surcharges in the computation.

The instability of effective protection rates reported in Table 1 is indeed very disturbing. It follows that the choice of a year has a very strong bearing on the conclusions regarding the level of protection to the manufacturing industries of Pakistan. It raises doubts as to whether EPRs on the basis of single-year data can be a reliable basis for outlining policy. This obviously calls for more care in the

Table 1

Effective Protection Rates

	Corden				Balassa			
	1973-74	1975-76	1976-77 *I	**II	1973-74	1975-76	1976-77 *I	**II
Vegetable Ghee	−52	−81	−72	−75	−55	−91	−81	−82
Plywood	−129	−174	−241	−244	−	−121	143 -	−146
Paper & Board	14	−7	34	21	18	−24	50	32
Chemicals	108	100	50	38	158	123	38	22
Paints & Varnishes	275	−384	154	144	−169	−	−455	−424
Tyres and Tubes	−188	−283	−400	−400	−142	−131	−142	−142
Glass and Glass Products	79	700	133	113	329	−104	423	300
Cement	73	15	−22	−12	106	37	−25	−15
Engines and Turbines	129	39	9	−3	183	58	12	−4
Sewing Machines	500	−450	614	614	1000	00	−307	−307

*I Refers to EPRs when the effect of the surcharge is included; and
**I Refers to EPRs when the effect of surcharge is excluded.

choice of a year and for serious consideration of using average input coefficients over a few years.

While Table 1 shows beyond any doubt instability in EPRs across years, they do not seem to have affected the ranking of industries as may be seen from Table 2.

Table 2 shows remarkable stability in the ranks. Therefore, while the EPRs for a single year may not be a reliable guide for level of incentives, the changes in relative profitability of various industries corresponding to different years is remarkably stable. Rank correlation in case of the Corden method has been 0.94, 0.95 and 0.89 between 1973-74 and 1975-76, and 1976-77 and 1973-74 and 1976-77 respectively. Rank correlation in case of the Balassa method has been 0.85, 0.72 and 0.90 for the respective periods.

Table 2

Ranking of Industries by Effective Protection

	Corden			Balassa		
	1973-74	1975-76	1976-77	1973-74	1975-76	1976-77
Vegetable Ghee	10	10	10	10	10	10
Plywood	1	1	1	2	2	2
Paper & Board	9	9	7	9	9	6
Chemicals	6	6	6	7	6	7
Paints & Varnishes	4	3	4	3	4	4
Tyres and Tubes	2	2	2	1	3	1
Glass and Glass Products	7	5	5	5	1	5
Cement	8	8	9	8	8	9
Engines and Turbines	5	7	8	6	7	7
Sewing Machines	3	4	3	4	5	3

IV. EFFECTIVE PROTECTION AS A MEASURE OF INEFFICIENCIES AND INCENTIVES

It has been quite common to draw inferences regarding levels of efficiency on the basis of levels of EPRs, notwithstanding the fact that high EPRs may reflect excessive profits due to monopolistic practices in the product market and distortions in the factor markets. It is important to underscore the point that only if the product markets are competitive, there are no distortions in factor markets and the prices of non-traded products do not rise after protection is granted to traded goods, the EPRs would reflect inefficiencies. However, such an environment hardly exists in the developing countries. Most of the industries are highly concentrated where four major firms account for more than eighty percent of output. Financial markets are distorted because of credit ceilings and restrictions on interest rates. High protection rates also raise prices of non-traded inputs. Therefore, EPRs need to be decomposed into its four constituent parts, viz. inefficiencies, excess profits, higher than equilibrium wage costs and increase in prices of non-traded inputs induced by protection levels.

The results of such an exercise for 1968-69 show that 62.4 percent of the effective protection could be attributed to high profits while only 20 percent to inefficiencies. Distortions in the labour market accounted for 10.4 percent and higher prices of non-traded inputs accounted for 7.2 percent of EPRs in Pakistan [for details see Kemal (1984)]. It is, therefore, obvious that unless EPRs are corrected for distortions, conclusions drawn regarding inefficiencies on the basis of EPRs would be rather misleading.

While EPRs may not measure inefficiencies, do they reflect the structure of incentives to various activities in the sense that they measure the increase in value added arising from protection? Similarly, in a market-oriented economy, do the EPRs necessarily provide guidance to resource allocation? In order to answer these questions, it needs to be noted that the private producers respond to profits rather than value added and the share of wages in value added varies significantly across the industries. The increase in value added due to protection would amount to an increase in profits by the same magnitude as long as wages remain the same. However, the ranking of industries on the basis of the ratio of increase in profits to value added (EPR) would be very different from the ratio of increase in profits to equity or capital stock. It is the latter, rather than the former, which guides resource allocation. Therefore, EPRs which measure protection to a process must be complemented with increase in the private rate of return arising from protection.

V. CONCLUSIONS

The major findings of the paper are summarized below:

(i)   While effective protection is uniquely determined for given tax rates and input structures, an infinite number of tariff structures would correspond to the given effective protection, taxes on domestic production and input coefficients;

(ii)   Non-reversibility of the effective protection function provides flexibility to the policy-makers to realise other objectives of public policy along with protection;

(iii) Effective protection rates are very unstable over time even when nominal protection structure remains the same and as such EPRs corresponding to input coefficients of one year may be misleading;

(iv)   In order to make EPRs more meaningful, input coefficients for a 'normal' year or average for a few years may be used;

(v)   It is significant that while EPRs are unstable, the ranking of industries by EPRs is quite stable. This probably reflects that overall business environment affects the industries in the same direction; and

(vi)   EPRs do not necessarily measure inefficiency. While EPRs do measure incentives provided by the government to an activity, they need to be supplemented with the estimates of an increase in the rate of return due to protection for analysing the effect of protection on resource allocation.

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Comments on
"Effective Protection Rates — A Guide to Tariff Making"

It is my privilege to be a discussant on this important paper on Effective Protection Rates. As pointed out in the paper the single-year based EPRs are unstable as they vary across different years. This is a serious limitation of the EPRs for evaluating the incentive structure of industries. However, despite the instability of EPRs the author looks for the optimal or target EPRs to determine the nominal protection structure or the tariff rates.

The paper also points to several difficulties in determining tariff rates on the basis of given EPRs. Such difficulties are:

(i)   EPRs relate to a single year.

(ii)   The E function is non-reversible.

(iii)   Due to non-reversibility of the E function, the T function does not automatically yield a unique vector of tariffs.

(iv)   If input-out coefficients change across firms, the uniform protection rate for an industry would imply different tariff rates for the same product. Thus, differences across firms create problems in tariff formulation.

(v)   In the presence of differences in EPRs, a line needs to be drawn between the acceptance and rejection levels of protection. How such a line can be drawn in practice is difficult to recommend especially in view of non-reversibility of the E function.

In view of the above difficulties, the task of determining tariff rates from given EPRs is formidable. It has been shown that while EPRs are unstable, the ranking of industries based on their EPRs is quite stable. But the relationship between EPRs and the tariff rates and not the relationship based on stable rankings or high rank correlation coefficients is relevant to the determination of tariff rates. The stability of ranking is, therefore, not quite relevant to the theme of the present paper.

The paper suggests that for the purpose of tariff making, the EPRs may be decomposed into inefficiencies, excess profits, higher than equilibrium wage costs and increase in prices of non-traded inputs induced by protection levels. How all this can be done in practice needs to be worked out by the author for inclusion in the present paper.

The paper recommends that instead of single-year EPRs, the average for a few years may be used while making a policy choice. The choice of period for computing such an average would be arbitrary and may be manipulated to suit different economic agents.

The data for which EPRs have been shown in Table 1 relate to the Census of Manufacturing Industries, Punjab for selected years. The reliability of such data being doubtful, we should be careful in employing such data and drawing conclusions from the results obtained.

In view of the foregoing limitations, I believe there is a very distant possibility of success in using EPRs for tariff making in practice. To my mind, the notion of an optimum tariff is more sound in theory as well as in practice rather than the structure of optimum EPRs.

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