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Measure and Interpretation of Effective Protection in the Presence of High Capital Costs

Evidence from India

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The traditional measure of effective protection based on gross value added does not fully reflect the incentives of the protection structure when the domestic price of capital goods differs substantially from the international price. In particular, reforming India's trade policies and reducing its protection rates would be meaningless — even damaging — if India does not first reduce its high protection on capital goods.

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This paper — a product of the Industry and Finance Operations Division, Country Department IV (India), Asia Regional Office — is derived from Policy Research Working Paper 433 (August 1990), which was part of a larger effort in the department to undertake a comprehensive review of India's trade regime and policies and to make recommendations for liberalization of its trade policies. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Francois Ettori, room H4-085, extension 32340 (March 1992, 24 pages).

A striking feature of India's protective structure has been high tariffs and protection on capital goods, which limit industrial competitiveness and export potential, and distort industrial incentives as indicated in "effective protection rates" (EPRs).

The distortions introduced by high capital and investment costs resulting from high levels of protection were corrected in India's analysis by introducing the notion of "corrected effective protection rates" (CEPRs). In theory, EPRs computed on the basis of value added *net* of depreciation could be made immune from capital cost distortions, provided that depreciation allowances are computed on economically meaningful grounds and that EPRs based on net value added are available. But in India as in many developing countries, available EPRs are based on gross value added. The need to account for the substantial capital cost distortions led to the use of a substitute tool, the CEPR.

The paper provides a brief refresher, and geometrical interpretations, on the definition of EPR and its limited interpretation as a measure of the scope for inefficiency or extra profit resulting from protection. It introduces the notions and formulae for the CEPR and the "net effective protection rate" (NEPR). The relevance of these notions and their magnitude are tested on a sample of 60 industrial projects in India.

The paper confirms the finding in a previous Bank review of India's industrial sector that effective protective rates averaged about 40 percent in the sector, with large variations between the industrial subsectors and within each subsector.

Using NEPRs, the paper shows that on *average* the amount of effective protection available from India's protective structure is just enough to compensate for the high cost of investment that results from heavy protection of capital goods. Most projects have, in effect, negative NEPRs, so they are at a disadvantage compared to foreign competitors.

Finally, the paper argues that reforming India's trade policies and reducing its protection rates would be meaningless — even damaging — if India does not first reduce protection on capital goods. When warranted, the nominal protection rate for capital goods should be slashed to the lowest possible level above the shadow premium for foreign exchange.

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MEASURE AND INTERPRETATION OF EFFECTIVE PROTECTION IN THE PRESENCE OF HIGH CAPITAL COSTS : THE EVIDENCE FROM INDIA

Introduction

1. This paper is derived from a previous Working Paper [6] prepared within a comprehensive review of India's trade regime and protection policies. One striking feature of India's protection structure has been the very high tariffs and protection on capital goods, thereby harming industrial competitiveness (and export potential) and distorting industrial incentives as they are indicated by Effective Protection Rates (EPRs).

2. The distortions introduced by the high capital and investment costs resulting from the protection levels on capital goods were corrected in India's analysis by introducing the notion of Corrected Effective Protection Rates (CEPRs). In theory, EPRs computed on the basis of Value Added (VA) net of depreciation could be made immune from capital cost distortions, provided that depreciation allowances are computed on economically meaningful grounds and that EPRs based on net VA are available. Because in India, as in many other LDCs, available EPRs are based on gross VA, the need to account for the substantial capital cost distortions led the analysis to use a substitute tool, the CEPR (defined in para. 14 below). Despite the formulae and equations developed herein, the CEPR is not a theoretical development or addition to the abundant litterature on Effective Protection. More specifically, the CEPR notion is a pragmatic one, and does not pretend to substitute to the equilibrium EPRs associated to a general- or partial-equilibrium model and to an equilibrium exchange rate. It is meant, more simply, to provide the practitioner with a correcting tool for interpreting, under static conditions in a country, EPR estimates as indicators of the relative incentives between industries in that country, and to interpret EPRs from an angle somewhat different from the traditional theoretical angle.

3. With these limitations and modest objectives in mind, the paper presents three main themes. First, it provides a brief refresher on the definition of EPR and its limited interpretation as a measure of the scope for inefficiency or extra-profit resulting from protection, with a simple geometrical representation. In the second part (and Annex 1), the paper introduces the notions and formulae of CEPR and Net Effective Protection (NEPR), also with a geometrical representation. Finally, the paper tests the relevance of these notions, and assesses their magnitude, in the case of India on the basis of a sample of some 60 industrial projects. Finally, a brief conclusion summarizes the major findings and draws some tentative conclusions.

Basic definitions and concepts

4. The concept and definitions of effective protection (cf. [2], [3] and [4]) were originally prompted by the desirability, when analyzing the amount of incentives provided to industry by a given structure and level of tariff nominal protection, to net out from the nominal protection granted to the output of an industrial transformation process the additional costs charged to inputs on account of the protection enjoyed by these inputs.

5. This net effect of protection on inputs and output is logically measured

on the difference between the value of output and that of inputs (including non-tradeables), i.e. the gross Value Added before depreciation. The Effective Protection Coefficient (EPC) is defined as:

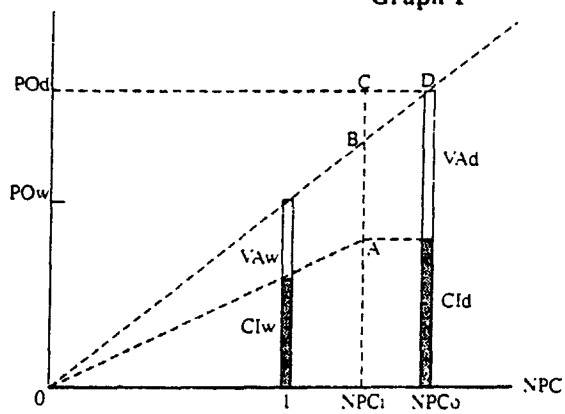
EPC = VAd/VAw , shown to be = NPCi + (NPCo - NPCi)/a (1), where:

- VAd and VAw are the Value Added measured respectively with domestic and international border prices (non-tradeable inputs are in both cases valued with domestic prices);
- "a" is the Value Added to output ratio in international prices (a = VAw/POw = 1 - (PIw * q)/POw, where POw and PIw are the respective international prices of output and input, and q is the fixed quantity of input per unit of output; a is by definition smaller than 1); and
- NPCo and NPCi are the respective Nominal Protection Coefficients of output and inputs.[1] NPCs in turn are defined to be the ratio between the domestic (ex-factory, before indirect taxes) price of a tradeable good and its international border price.[2]

The formula indicates clearly that any difference in nominal protection coefficients between inputs and output is amplified by the factor 1/a into an effective protection coefficient different from NPCi or NPCo.

6. This mechanism is illustrated by Graph 1. The horizontal axis is measured in terms of NPCs, and the vertical axis measures the international prices Pw and domestic prices Pd of input and output. For NPC = 1 (i.e. no protection), the vertical bar displays the composition of POw between its Value Added VAw and its input cost CIw = q * PIw at international prices. Point A indicates the input cost at domestic prices corresponding to NPCi, and point D the output domestic price POd corresponding to NPCo. The vertical bar for NPCo displays the components of POd, i.e. the Value Adde[d] [V]Ad and the input cost CId = q * PId a[t] [d]omestic prices.

Graph 1



[1] For the sake of simplification, only one input is considered in the definition of "a". The argument is easily generalized to the case of several inputs, including non-tradeables. In such case, NPCi would simply be an average of the NPCis of each input, weighted by the input values consumed per unit.

[2] In a protection regime without Quantitative Restrictions (QRs) which permits unconstrained competition from imports, domestic prices of tradeables align themselves with the import prices after tariff duty. Thus nominal protection coefficients are equal to 1 plus the tariff rate. Otherwise, domestic ex-factory prices (before indirect taxes) are the result of various effects of QRs and tariffs relative to the degree of domestic competition in the industry and of the supply/demand balance generated by the regulatory policies. In such cases, the realized nominal protection is best captured by the observed ratio of the domestic ex-factory price to the international border price (CIF). It is this latter definition of the NPC which is used throughout this note.

It is clear from the graph's geometry that:

EPC = VAd/VAw = AB/VAw + BC/VAw = NPCi/1 + CD * POw/1 * 1/VAw ,

hence the formula (1) above, since CD = NPCo - NPCi. [3]

7. Whenever EPC is greater than 1, i.e. a positive Effective Protection Rate EPR = EPC-1, the additional Value Added generated by the industry in excess of VAw can be used to remunerate/pay the production factors of labor and capital above the remunerations they receive in VAw at international prices. This reallocation of Value Added can take several forms, as follows:

- production factors are consumed or remunerated in excess of their consumption or remuneration under international prices (i.e., under a free-trade regime), due to policy or operational inefficiencies;

- if production factors are used and priced efficiently by international standards, the remuneration of capital above the fixed costs of capital, i.e. the accounting profit itself, is increased by the amount VAd - VAw which then represents a "rent" granted by the positive effective protection; and

- any combination of these two cases.

The causes for inefficiency in the first case above (excluding the extreme case of excessive input consumption, where VAd and EPC are artificially reduced) can be a combination of: (i) x-inefficiency in the use of labor (excess labor, low productivity, high regulated wages,...) or in the use of capital (uneconomic size of plant below MES, capacity under-utilization,...); and (ii) allocation distortions created by unappropriate policies (e.g., pricing policies).

8. To distinguish between the cases of inefficiency (operation or policy based) and those of extra-profit (protection rent), it is necessary to analyze one step further the breakdown of VAw and VAd between their different components and to compare their respective values in both cases. Value Added comprises three main components:

VA = L + FK + P ,

where: L is the total Labor cost;
FK is the fixed cost of capital (depreciation, and eventually interest on term debt if any); and
P is the profit (gross).[4]

An interpretation of the Effective Protection Rate

9. The first two cases evoked in para. 7 of reallocation of Value Added between its components are illustrated by Graphs 2-A and 2-B. In both cases,

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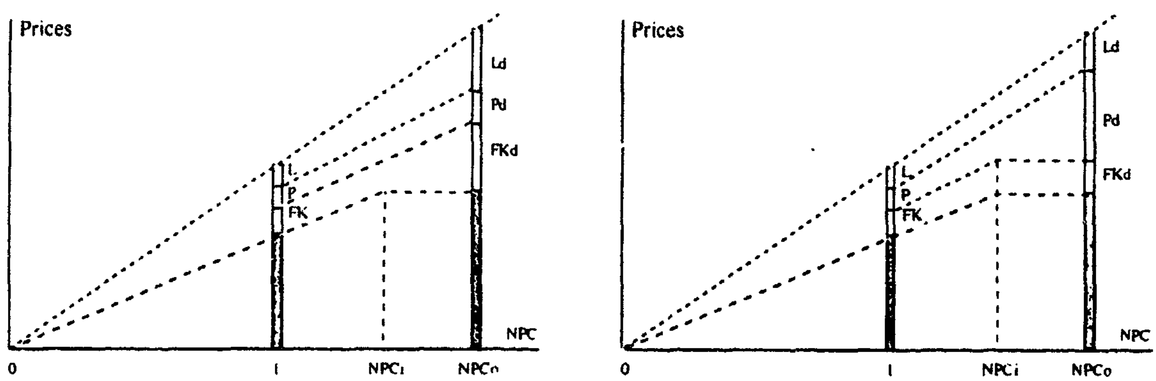
[3] By definition, EPC = VAd/VAw = (NPCo.POw - NPCi.PIw.q)/(POw - PIw.q). Algebraic manipulation gives EPC = [NPCo - NPCi.(1-a)]/a , hence formula (1).

[4] Gross profit P in turn can be split between income tax and net profit. In case of a rent extracted from positive effective protection, part of the rent can be appropriated by the government through a higher tax T. However, because the role of T is peripheral to the argument developed in this note, gross profit P will here be used in preference to net profit. Cf. Annex 1.

the situation with protection (i.e., with NPCs different from 1) is de facto compared to the situation where all NPCs are equal to 1, that is the free-trade regime. The reference comparator can be either a foreign competitor operating under international prices (e.g., in Hong-Kong) or the same industry in the same country after an hypothetical trade reform to a free-trade regime. In either case, international prices establish the reference basis and values for VA, the output and input prices and the profit-return on investment. Pd greater than Pw is generally interpreted to represent a case of extra-profit or protection rent (graph 2-B). When Ld is greater than Lw, x-inefficiency in the use of labor is probable. If FKd is greater than FKw, it can be due to x-inefficiency in the use of capital per unit of output (uneconomic plant size, under-utilization of capacity, i.e. quantity effect)[5], or to higher prices paid for fixed capital (price effect, cf. next section).

Graph 2



A - Case of inefficient use of production factors

B - Case of extra profit from protection

10. For these reasons, the Effective Protection Rate (EPR), the difference of EPC to 1, can be interpreted to be a measure of the scope for inefficiency or extra-profit granted by the difference VAw - VAd resulting from protection on input and output. For instance, an industry with an EPR of +30% can pay or remunerate its labor and capital 30% more than a competitor operating under international prices, or it could extract a profit (after paying the labor cost and the fixed cost of capital) substantially above that of the competitor, depending on the cost of capital and the resulting distribution of Value Added between its components.

11. The standard interpretation of EPRs as a measure of the scope for inefficiency or extra-profit assumes implicitely that behind the difference between FKd and FKw there is only a quantity effect but no price effect, and that the price of capital is approximately similar or constant under the two situations being compared (free-trade versus protection). This implicit assumption is largely correct in most cases and countries, where the industrial policies

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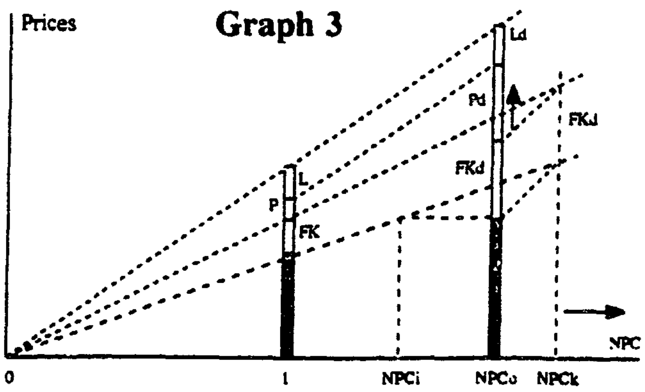
[5] In subsectors characterized by significant economies of scale (generally fluid-processing industries such as chemicals), the investment cost per unit of output increases by about 25% each time the capacity is reduced by half. If capacity is under-utilized, the unit capital cost is inversely related to the capacity utilization rate. In both cases, x-inefficiency in selection or operation of the production process generates a FKd greater than the FKw of the efficient international price-maker in the considered industry.

are designed to keep costs of investment and capital goods close to international prices, in order to avoid loading production costs with locked-in financial and fiscal charges over the life of industrial projects. In all developed countries and practically all developing countries, import tariffs and nominal protection applied to capital goods are quite low, much lower than tariffs and protection applied to other tradeables, and capital goods are often exempt from import duties and domestic taxes. For instance, in Brazil which has highly protected its domestic industry, tariff collection rates on machinery in the mid-80s were in the 11-17% range. In Korea, they were about 9% for domestic use, and negligible for export production. Even in Pakistan (which has the second highest overall tariff collection rate after India), tariff collection rates on machinery were 15% in 1987/88.

Corrected Protection under a distorted price of fixed capital[6]

12. By contrast, India is almost unique in levying high tariffs and taxes on capital goods. Its average tariff collection rate on machinery was about 70% in 1987/88, and this high protection in favor of its domestic capital goods industry (coupled with strict QRs) has led to NPCs averaging about 1.40 for domestic capital goods. As a result, investment costs of industrial projects in India are, ceteris paribus, about 50% higher on average than investment costs of comparable projects at international prices [6].

13. Under a structure of high protection and prices for capital goods, higher investment costs entail implicitely that: (i) Value Added generated by an industrial project normally include a larger amount of capital remuneration (depreciation, interest, and profit as return on equity); and (ii) thus domestic Value Added VAd exceed Value Added at international prices VAw, with a resulting positive EPR, even if the domestic firm is efficiently operated by international standards. A high price of capital goods and investment, characterized by an average NPC for capital goods (NPCk) substantially above 1, generates in the value added at domestic prices a fixed capital cost FKd which is approximately proportionate to NPCk (depreciation and interest charges are, ceteris paribus, a fixed proportion of the total investment cost). Assuming (for the sake of simplicity) that the labor cost L would not substantially decrease, at least in the short/medium term, if the project were to operate under free-trade, a high NPCk requires a high FKd which thus cuts down profit Pd, in particular when NPCk is higher than the output NPCo. This mechanism is illustrated by the graph 3 where FKd, the projection of FK on the vertical line NPCk, is proportionate to NPCk. When NPCk increases (horizontal arrow), FKd increases, as well as FKd's projection on the VAd vertical line. The portion of VAd other than Ld (fixed) and FKd shrinks (vertical arrow), up to a point where the residual room left for profit can vanish altogether.



[6] The issues associated with a distorted price of financial capital (e.g. interest subsidies) on EPRs have been extensively analyzed in the litterature. They are not the subject of this paper, and are not addressed herein.

14. It is generally desirable that the industrial and trade policies provide all investors with a minimum return on investment, for a number of reasons (attract foreign investment, encourage domestic investment, leave to the domestic industry enough profit to permit it to invest in modernization, innovation and R&D and thus keep abreast with its foreign competitors,...). Again, a good benchmark for the minimum return would be the the return on investment available from international prices under the free-trade regime. Intuitively, VAd should have a minimum level to cover, in addition to the labor cost L, a total remuneration of capital FKd + Pd equivalent to (FKw + Pw) multiplied by the inflating factor NPCk of the investment cost[7]. When the magnitude of distortion is significant, i.e. when NPCk is significantly above 1, it is shown in Annex 1 that, for various definitions of the return on investment, this minimum value of VAd corresponds to a unique value of the EPR, denoted CEPR, which is:

$$CEPR = (1 - s).(NPCk - 1) \qquad (2)$$

whenever "s" = L/VAw, the labor content of VAw, is moderate (say below 30%).

CEPR is called herein the Corrected Effective Protection Rate, because it is the level of EPR just sufficient to compensate for the higher price of capital and earn the return on investment achievable under the free-trade regime (if operating efficiently).[8] It measures the price effect of investment cost policies on effective protection. The difference EPR - CEPR = NEPR is called the Net Effective Protection Rate; it indicates the additional protection available above (resp. under) the CEPR, and thus the scope for x-inefficiency or extra-profit (resp. the obligation for extra x-efficiency or loss).

15. The VAd associated to CEPR corresponds to a level for the output price POd, corresponding in turn to the associated concept of Corrected Nominal Protection Rate for the output, denoted CNPRo, which is:

$$CNPRo = a.CEPR + (1 - a).NPRi \qquad (3) \qquad \text{(cf. Annex 1)}$$

The first term of the sum represents the impact of the investment cost on the output production cost, and the second term represents the impact of input costs. The difference NPRo - CNPRo = NNPRo between the actual nominal protection rate of the output and CNPRo is similarly called the Net Nominal Protection Rate for the output. A balanced and equitable structure of protection rates for output, inputs and capital goods (thus for NPCo, NPCi and NPCk) leaving no room for x-inefficiencies nor extra-profit would be characterized by low or null NEPRs, or equivalently NNPRs.

16. The concept of Corrected Protection (effective or nominal) is not rhetorical. The case of India, analyzed in the following section, illustrates

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[7] In all rigor, Value Added comprises also the financial costs of working capital, which is roughly proportionate to the average NPCi. But this is negligible when NPCk is significantly above 1.

[8] Using one unit of VAw as numeraire, formula (2) can be interpreted simply: the additional VAd over VAw (CEPR) is required for the remuneration of the additional investment cost (NPCk - 1) at the rate (1 - s). In [6] and an earlier version of this paper, CEPR was called Compensatory Effective Protection Rate, which carried an undesirable normative connotation.

the substantial impact of high investment costs policies on the level of protection required to ensure the profitability of industrial investments. Furthermore, in countries or cases where investment costs are not distorted upwards but where other policies (protection, competition) permit the financial viability of plants below Minimum Economic Scales (MES), the unit investment costs will be substantially higher than those of the internationally efficient reference comparator (cf. footnote 5). In such cases, a similar analysis with the price factor NPCk replaced by the quantity factor "x" (cf. Annex 1) would permit to separate the effect of uneconomic capacity choices and underutilization (CEPR) from that of other operational x-inefficiencies (NEPR). Also, distorted investment costs can erect barriers on new entry and competition against incumbents. In all these cases, the interpretations and policy conclusions to be derived from EPR analyses should establish first whether the concept of Corrected Protection is significantly relevant to the case, and if so separate CEPR protection from NEPR protection.

A case study: India

17. Some 60 industrial projects (mostly in the engineering and chemical industries) financed in 1988 and 1989 by India's Development Finance Institutions were analyzed in preparation for the World Bank's review of the trade regime of India ([1] and [6]). The available data were extracted from project appraisal reports prepared by Indian DFIs which reported systematically the international price equivalents of output, input and investment domestic prices for the standard computation of Economic Internal Rates of Return (ERRs). Notwithstanding the limitations of the available data, the analysis provided valuable indications of the incentives and disincentives resulting from the protection structure as they are perceived ex-ante by project promoters and financiers in India. The following section summarizes the quantitative results of the analysis and underlines the significance of corrected protection under the set of values taken in India by the principal parameters of the protection structure.

18. In India, the factor representing the ratio of investment costs (per unit of output) in domestic to world prices is substantially above 1 for several reasons. First, collected tariff duties on imported capital goods are high, averaging some 70% over the sample (cf. [6]). Only electronics industry machinery enjoys a lower tariff duty of 35%, while other industries in the sample pay an average tariff duty of 80% on their imported equipment. Secondly, locally procured capital goods, generally representing a large share of total equipment, carry purchase prices which average 40% above international prices. Thirdly, other goods and materials used in investment projects, cement especially, are charged substantial excise and other taxes which increase further the financial costs of investment above international costs.[9]

19. As per its objectives, the India review focussed exclusively on the effect of protection and pricing policies, especially for capital goods, on the competitiveness and the structure of production costs in industry. For this reason, the analysis considered only the price factor NPCk in the assessment and determination of effective protection and of the associated CEPRs, leaving aside the quantity factors due to x-inefficiencies in the selection and operations of project capacities. The estimate of NPCk is the

[9] Another reason, relevant essentially to the quantity factor "x", is that the overall level of protection has encouraged the entry of many projects with uneconomic plant sizes below MES and low utilization. Cf. para. 29.

ratio of the financial investment cost to the same adjusted for tariff duties on imported equipment and for the high prices of local equipment (the first two price factors described in the previous paragraph).[10]

20. As noted in para. 16 and Annex 1, the simple formula defining the CEPR is valid provided that the share "s" of labor costs in VAw is relatively small. Parameter "s" was estimated for each sample project by adding to the direct labor cost the "overheads" costs (which comprise not only non-direct labor but also certain services inputs such as telephone,...). The estimated values of "s" represent thus an upper limit of the labor content of Value Added VAw. It is clear that "s" is indeed small in these projects, as shown by the following table which summarizes the basic parameters of the sample:

TABLE 1: BASIC PARAMETERS OF THE PROJECT SAMPLE /a

Subsectors	Sample share (%) No.proj.	Sample share (%) VAw	ICOR	Factor s (%)	Factor NPCk
Heavy Chemicals	17	20	3.2	12	1.36
Synthetic Yarns	7	15	3.1	12	1.54
Basic Steel Goods	12	7	2.4	19	1.46
Heavy Miscellns	9	13	4.1	21	1.42
Average Intermdtes	45	55	3.3	15	1.43
Light Chemicals	5	3	1.6	19	1.33
Food Industries	7	6	1.9	16	1.36
Electronics	17	12	1.3	25	1.25
Other Engineering	26	24	1.5	17	1.45
Avge Final Goods	55	45	1.5	20	1.38
Overall Average	100	100	2.5	17	1.42

/a All parameters in this table are weighted averages.

Source: Annex 2

21. The sample data confirm that: (i) investment costs in India are substantially higher than international costs, by about 42% on account of the price of capital goods; and (ii) selected processes and technologies are capital-intensive with a low share "s" of labor costs in the value added VAw (17% on average, with a maximum of 25% in electronics). The data reveal also the presence in the sample of two distinct groups of industries: (i) the first group consists of heavy industries producing intermediates and inputs, with ICORs generally above 3 and a low "s" averaging 15%; and (ii) the second group comprises less capital-intensive industries producing final goods, with ICORs around 1.5 and a slightly higher "s" averaging 20%.

[10] A second estimate NPCk2 is the ratio between the financial investment cost to the "economic" investment cost (used for ERR computation), which captures not only the effect of capital goods prices but also the price distortions of other goods and factors (e.g., cement). This second estimate represents an upper limit of the cumulative effects of all forms of investment taxation in India. Results corresponding to NPCk2 are given in the Annexes.

22. The relative magnitudes of NPCk and "s" justify the application of the CEPR formula of para.14. Table 2 below presents both the resulting CEPRs and the actual Effective Protection Rates (EPR), as well as the NEPRs. These results indicate large inter-sectoral variations in EPRs and NEPRs. Sub-sectoral CEPRs (adequately weighted by VAw) range between 15% for electronics to 30-40% for most other subsectors and up to 45% in synthetic yarns. Furthermore, though the overall average NEPR is null (within an error margin of ± 10%), the large inter-sectoral variations of NEPRs indicate unequal incentives from one subsector to the other. The only subsector where the actual EPR is close to CEPR is Heavy Chemicals. Positive NEPRs are significant (25%) in Basic Steel Products and Synthetic Yarns, and substantial (47%) in Heavy Miscellaneous industries (paper, tyres). Negative NEPRs are modest in electronics (7%), significant in food industries (22%), substantial in light chemicals (34%) and large in engineering industries (52%).

TABLE 2: CORRECTED AND ACTUAL EFFECTIVE PROTECTION BY SUBSECTOR/a

Subsector	CEPR (%)	Actual EPR (%)	NEPR(%)	Distributn(%) of Projects with +/- NEPR
Heavy Chemicals	28	37	9	60/40
Light Chemicals	28	-6	-34	0/100
Synthetic Yarns	44	70	26	50/50
Basic Steel Products	37	60	23	57/43
Electronics	14	7	-7	60/40
Other Engineering	40	-12	-52	0/100
Food Industries	30	8	-22	50/50
Heavy Miscellaneous	30	77	47	80/20
Overall	30	30	0	42/58

/a CEPRs, NEPRs and Actual EPRs in this table are averages weighted by VAw.

Source: Annex 3

23. Indian policy-makers have traditionally tried to adjust nominal protection levels to their perceived need of each industry, or product-group, through a multiplicity of ad-hoc tariffs and exemptions. The large inter-sectoral variations in NEPR reflect the ad-hocism and inadequacy of such protection policies. This is further illustrated by the intra-sectoral discrepancies within each subsector. Only in light chemicals and engineering are all the projects subject to the same incentive (negative NEPR), as indicated by the last column of Table 2. In practically every other subsector, the projects are distributed in approximately equal shares between those benefitting from a positive NEPR and those subject to a negative NEPR, which can be construed to be the result of a quasi-random process. The structure of Effective Protection in India provides thus very heterogeneous incentives.

24. The use of the Corrected Nominal Protection rates (CNPRs, cf. para.15) permits to estimate the respective impacts of capital costs and input costs on

the production costs and competitiveness of Indian industries. The results are summarized in Table 3 below which presents the subsectoral CNPRs along with the actual Nominal Protection Rates (NPRs) and the Net nominal protection rates (NNPRs). An important conclusion emerges from the table. Surcharges on capital and investment costs related to the CEPR (first column of the table) increase domestic prices on average by 12% of output's international prices. Extra price and cost of inputs increase domestic prices on average by 31%. The overall impact is that the sample projects require normally a Corrected Nominal Protection rate (CNPR) of 43% on average, say about 45%, two-thirds of which to offset the impact of high input costs and one-third to offset the impact of high capital and investment costs.

TABLE 3: CORRECTED AND ACTUAL NOMINAL PROTECTION BY SUBSECTOR/a
(In % of Output Value at International Prices)

Subsector	VA/CEPR Impact	Input Cost Impact	CNPR	Actual NPR	NNPR	Distributn(%) of Projects with +/- NNPR
Heavy Chemicals	10	46	56	59	3	60/40
Light Chemicals	15	19	34	16	-18	0/100
Synthetic Yarns	17	46	63	65	3	50/50
Basic Steel Goods	10	50	60	62	2	57/43
Electronics	3	31	34	32	-2	60/40
Other Engineering	19	24	44	19	-25	0/100
Food Industries	1	23	24	26	2	50/50
Miscellaneous	6	31	37	46	9	80/20
Overall	12	31	43	36	-7	42/58

/a CNPRs, NNPRs and Actual NPRs in this table are averages weighted by Output in world prices.

Source: Annex 4

25. The concordance between actual and compensatory NPRs is higher than for effective protection. The actual NPR is close to CNPR for Heavy Chemicals, Synthetic Yarns, Basic steel products, Electronics and Food industries. Positive NNPR is negligible (about 9%) in the Miscellaneous industries (dominated in the sample by Tyres). On the other hand, negative NNPRs are significant in engineering industries (25%) and in Light Chemicals (18%). Finally, the intra-sectoral discrepancies observed within each subsector for effective protection (cf. para. 23) are equally applicable to the nominal protection, as summarized in the last column of the table above. Except for light chemicals and engineering industries where all projects are subject to negative NNPR, the projects in each other subsector are distributed in approximately equal shares between positive and negative NNPRs. On a product-wise basis (cf. Annex 4), it is important to remark that subsectors producing intermediates and inputs for other subsectors (heavy chemicals, synthetic yarns, basic steel products) show quite higher NPRs and CNPRs (averaging about

62%) than the other subsectors producing final goods which have NPRs and CNPRs averaging about 32%.

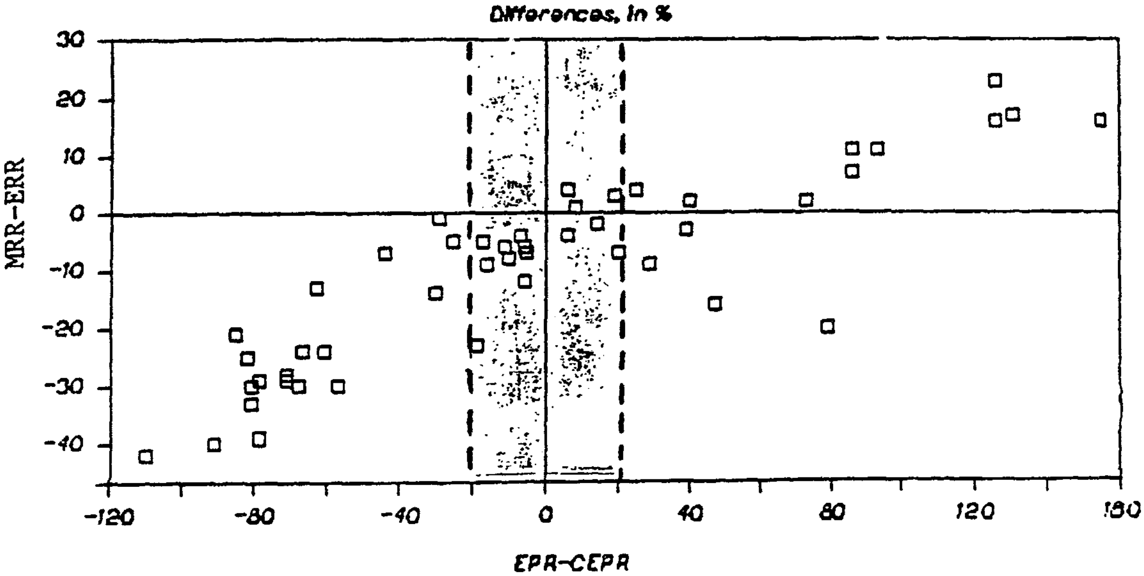
26. It should be noted that the average actual NPRs and CNPRs, of 35% and 45% respectively, are substantially lower than the average tariff collection rates of 60-70% for 1987/88, which in turn are much lower than the average official customs tariffs of 130-140% (cf. [1]). The levels of customs tariffs and collection rates have been often exceeding those required by protection purposes only; the substantial amount of "water" in tariffs may result from the ad-hocism of protection policies (cf. para. 23) or possibly from the objective of generating public revenue. The benefits eventually derived from such public revenue are more than offset by the adverse effects of this non-protection objective on the structure and levels of manufacturing production costs, and have largely contributed to building-up the "high-cost economy" which India and its consumers have to live with.

27. The significant levels of Net protection (both nominal and effective) are reflected by the differences between the financial (pre-tax) and economic rates of return of the projects (MRR and ERR respectively). Some three-fourths of projects have financial rates of return lower than ERRs. The sign identity of MRR-ERR and NEPR according to the CEPR model (cf. para. 7 of Annex 1) is verified in 84% of the cases, which confirms the relevance of the CEPR model to the analysis (the sign equivalence is statistically significant). The actual relationships between MRR-ERR and NEPR are displayed on Graph 4 where most observations are in the lower left quadrant. Furthermore, most observations are outside the shaded area of NEPRs within the ± 20% range which, as observed in para. 15, denotes a balanced and equitable structure of protection rates for output, inputs and capital goods leaving practically no room for extra-profit nor x-inefficiencies.

GRAPH 4

RELATIONSHIP BETWEEN EPRs AND IRRs

Differences, in %



<u>Illustration of the quantity effects of x-inefficiencies</u>

28. In view of the significant levels of NEPR available to some of the synthetic fibers and heavy chemicals industries in India (cf. para. 22), the question arises whether Indian planners may have tried to estimate product-specific protection rates to cover not only the price effects of NPCk but <u>also</u> the quantity effects of x-inefficiencies (the choice of uneconomic capacity sizes below the MES required for international competitiveness in subsectors /product groups characterized by significant economies of scale; and/or the unability, for market or technical reasons, to reach a satisfactory rate of capacity utilization) stemming from India's self-sufficiency and licensing policies. The primacy of self-sufficiency in Indian industrial policy has generated protection policies which permitted the financial viability of markedly undersized plants satisfying small, or very small, domestic markets. In addition, the traditional regulations for licensing of entry and domestic competition have limited in each product group the output of each plant to a prescribed share of the market, and thus constrained the capacity utilization of new entrants. As mentioned in para. 16, these factors can distort upwards the unit investment costs. It is shown in Annex 1 that, similarly to the price effects of the factor NPCk, the quantity effects of x-inefficiencies on financial profitability correspond to an effective protection rate providing international level returns, denominated XEPR and computed as follows:

$XEPR = (1 - s).(x - 1)$, where the factor x is inversely related to the capacity utilization rate k and the ratio of capacity size to MES.

Moreover, Annex 1 shows that, for the actual EPR to cover both the price and quantity effects, then NEPR should be greater than XEPR.

29. Typical industries characterized by significant economies of scale are those producing synthetic fibers and chemicals, particularly petro-chemicals. Project-specific data on some of these products from the sample, as shown in Table 4, indicate the presence of uneconomic capacities, sometimes coupled with low capacity rates. The table shows that NEPR is higher than XEPR in 4 cases, and lower in 5 cases. This tends to invalidate the assumption, raised in para. 28, that the levels of actual protection granted to such products could have been estimated to cover both the price and quantity effects of policies for capital goods protection, self-sufficiency and licensing.

TABLE 4: <u>X-INEFFICIENCY EFFECTS ON EFFECTIVE PROTECTION</u>

Product	MES/Capacity Ratio	Capacity Utiln(%)	Factor x	CEPR	NEPR	XEPR
				------(in %)-----		
EPM Rubber	2.000	90	1.320	32	89	26
ABS	5.000	75	2.284	12	74	35
SBR	2.414	90	1.423	41	102	35
PFY	1.667	81	1.364	35	54	28
MA	1.429	70	1.483	33	28	41
NBR	4.167	85	1.874	43	25	75
NTY	1.456	87	1.201	58	-5	18
POY	5.556	90	1.986	70	20	86
Alpha Olefins	2.000	85	1.397	37	-12	36

Conclusions

30. Another Bank review of India's industrial sector had also found effective protection rates to average about 40% over the sector, with substantial inter-sectoral variations. This is confirmed (within the error margin of ± 10%) by the analysis presented herein. Moreover, the use of Corrected Effective Protection (CEPR) shows that, on average, the amount of effective protection available from the structure of protection in India is just sufficient to compensate for the high costs of investment resulting from the high protection granted to the capital goods subsector. The real incentive granted by the protection structure (taking into account the price of capital goods) does not appear to be the traditional EPR but the Net Effective Protection rate (NEPR), the difference between EPR and CEPR. Inter-sectoral variations of NEPR are revealed to be larger than those of the EPR itself, and a majority of projects are in fact subject to negative CEPRs and thus in a disadvantaged position compared to foreign competitors.

31. The more general finding is that the traditional measure of effective protection based on gross Value Added, by focussing only on the price ratios of output and current inputs and thus neglecting the price ratio of fixed capital, does not fully reflect the incentives provided by the structure of protection. In those cases where misguided policies distort the domestic price of capital goods substantially away from international prices (either above as in India, or possibly below in the case of investment subsidies), a more meaningful indicator of the incentives to industry would be the Net Effective Protection as defined herein. In such cases, a reform of the trade and protection policies towards lower protection rates would be meaningless, or even damaging, without first lowering the protection on capital goods. When warranted, the nominal protection rate for capital goods should be slashed down to the lowest possible level above the shadow premium for foreign exchange.

32. Finally, a word of caution. Corrected Effective Protection should not be viewed as a normative tool by industrial/trade policy makers to compute how much additional effective protection could be granted on a case-by-case basis to adjust for the effects of x-inefficiencies or high investment cost policies. This paper and the notions of CEPR and NEPR were developed for industrial/trade analysts and practitioners, and were not meant to address normative issues nor the welfare implications of general- or partial-equilibrium EPRs (e.g., welfare-raising effects of compensation for specific industries in a second-best sense, the structure of an optimal distribution of NEPRs as compared to the case of free trade, ...). Corrected Effective Protection should be viewed only as a pragmatic tool (which requires for computation only standard information readily available in ERR and FRR estimates) to assess the damage caused by policies leading to high investment costs and high protection of the capital goods industry, and should be used to assess only the level of taxation and protection of capital goods beyond which the associated damage becomes counter-productive or intolerable for international competitiveness. Similarly, the notion of XEPR, measuring the quantity effects of x-inefficiencies, is another practical tool to assess the damages of protection policies permitting inefficient choice or operation of capacity.

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FINANCIAL AND ECONOMIC RETURNS UNDER PROTECTION
DEFINITION AND COMPUTATION OF CORRECTED PROTECTION

1. Consider as the reference comparator an industrial project operating under a free-trade regime to produce a tradeable and consume tradeables and non-tradeables during a period of N years. Per unit of output, the project would require an investment Iw and generate under permanent operating conditions an annual gross value added VAw (both Iw and VAw being expressed at international prices). The project's annual cash flow would be CFw = VAw - Lw , where Lw is the total cost of the Labor factor.

2. Consider the same project implemented and operating under a protection structure different from free-trade. The project would then require an investment Id and would generate an annual Value Added VAd (both Id and VAd being expressed in the domestic prices resulting from the protection structure). The project's annual cash flow would be: CFd = VAd - Ld - T , where:
- . Ld, the annual cost of Labor, is assumed to be marginally different from Lw (which is reasonable at least in the short term), and thus to be expressed in the form Ld = (1+m).Lw , with m small; and
- . T, the tax (on profit) paid by the project under protection, is the additional tax above that it would pay under the free-trade regime.

3. Introducing the following notations:

y = Id/Iw (ratio of unit investment costs in domestic/world prices);

s = Lw/VAw (share of Labor in VAw under free-trade regime);

t = T/VAw (share of the additional profit tax in VAw);

EPR = (VAd - VAw)/VAw , the Effective Protection Rate; and

AR = CF/I - 1/N , the annual return (after depreciation) to investment;

then simple algebraic manipulation establishes the following relationship between the simple annual returns to investment under both situations:

$$ARd / ARw = 1/y \,.\, [1 + (EPR - m.s - t)/(1-s)] \qquad (1)$$

4. It should be noted that factor "y" represents the ratio of investment costs per unit (of output). It can be expressed thus as the product of two factors: y = x.z , where factor z captures the price effects of pricing policies for investment and capital goods under the considered protection regime, and factor x captures the quantity effects of x-inefficiencies in selecting and operating the project's production capacity (capacity utilisation rate, plant size relative to MES,...). If the reference comparator for the project is a foreign competitor operating under international prices and standards of efficiency, both factors should be preferably taken into account. If the reference comparator is the same project in the same country after an hypothetical reform to free-trade, then the effects of price factor z can be analyzed separately from those of factor x.

5. The above relationship between simple returns to investment leads to a similar relationship involving the profit returns to equity. Under the assumptions adopted for comparison, the project in both situations is financed with a constant debt/equity ratio. The debt generates thus an interest charge FK which is in a fixed proportion to the investment cost, i.e. FK/I is constant in both price systems (domestic and international). Given that the Profit P is by definition equal to AR - FK , it follows that:

$$Pd - Pw = ARd - ARw = ARw/y \,.\, [1 - y + (EPR - m.s - t)/(1-s)] \qquad (2)$$

6. Equations (1) and (2) can also be used to derived a relationship between the project's Internal Rates of Return (IRR) achieved under the two alternative trade regimes. To permit algebraic manipulations, each IRR is computed for an elementary model of project cash flow: the investment I is implemented in one year, and reaches in its first year of operation its full capacity, thus generating the constant annual cash flow CF during the N years of project life. When the ratio CF/I is relatively small (below 0.3, which is the case of most industrial projects), IRR is well approximated by the following formula:

$$IRR = CF/I - 1/[N.(1 + (N-1).CF/2\,I)]$$

Applying twice this formula to the project yields the following relationship between IRRd under protection and IRRw under free-trade for the project:

$$IRRd - IRRw = C \,.\, 1/y \,.\, [1 - y + (EPR - m.s - t)/(1-s)] \qquad (3)$$

where C is a constant specific of the project's parameters under free-trade.[1]

7. The three formulas above are similar in nature. For each of them, the requirement that the return under protection be at least equal to the return under free-trade is translated, by simple algebra, into the condition[2]:

$$EPR >= (y - 1).(1 - s) + m.s + t = CEPR \qquad (4)$$

The right part of the above equation is called the Corrected Effective Protection Rate. It is the minimum amount of effective protection just sufficient to compensate for the higher amount of investment (y > 1) and earn the return on investment achievable under free-trade if operating efficiently. The difference EPR - CEPR = NEPR is called the Net Effective Protection rate; it measures the additional effective protection available above CEPR, and thus the room for extra-profit or operating inefficiency.

8. The level of nominal protection of output required for yielding an effective protection at least equal to CEPR is derived from the definition of EPR = NPRi + (NPRo - NPRi)/a , where "a" is the VA/Output ratio in international prices, and NPRs are nominal protection rates for output/inputs. The requirement EPR >= CEPR translates readily into:

---

[1] 2

Specifically, $C = (CFw/Iw) \,.\, [1 + (N-1)/[2N.(1+(CFw/Iw).(N-1)/2)]]$.

[2] The same algebra applied to formula (3) shows also that EPR > CEPR (resp. <) is equivalent to IRRd > IRRw (resp. <).

NPRo >= a.CEPR + (1 - a).NPRi = CNPRo ,

where the right part of the equation is called the Corrected Nominal Protection Rate for output.

9. Two remarks about equation (4) are warranted. First, the terms "m" and "t" are small parameters of the first order of magnitude. In fact, taxation practices and levels are generally similar across countries in order to attract or retain investments. It is reasonable to expect that T of para. 2 above will be small in most cases where the actual level of EPR above CEPR does not provide room for extra-profit which Government could appropriate partly through extra-taxation T. Thus, whenever EPR-CEPR is small, it is legitimate to discard parameter "t". Also, "m" the percentage of variation from Lw to Ld in the simulated shift from protection to free-trade is generally expected in most cases to be relatively limited, at least in the short/medium-term. Moreover, the quantity m.s is of the second order of magnitude for "s" small. For these reasons, formula (4) can be reduced to its first term, at least in those cases when the parameter "s" is small (say below 25%). Consequently, the formula defining the CEPR will be simplified in first approximation to:

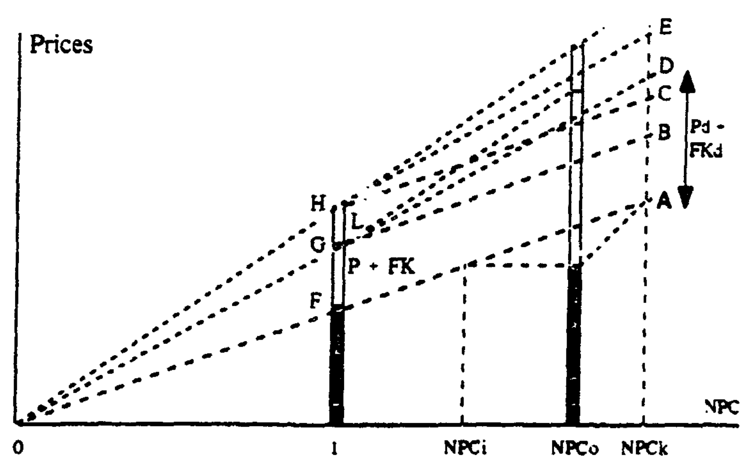
CEPR = (1 - s).(y - 1) (5), whenever "s" is small.

10. As noted in para.4, the parameter "y" is the product of two factors, one capturing the quantity effects of x-inefficiency and the other capturing the price effects of pricing and protection policies for investment and capital goods (cf. para.12 below). When the effects of such pricing policies on a project's effective protection are analyzed, the project under protection is to be compared to the same project under free-trade regime, and the factor "y" reduced to the price factor. In particular, under protection structures characterized by a nominal protection coefficient NPCk for capital goods which is significantly above 1, the CEPR formula can be rewritten:

CEPR = (1 - s).(NPCk - 1) (6),

which is the formula used in the main text.

11. This formula can be demonstrated geometrically in the case of the simple model of para.3. In the adjacent graph, the capital remuneration Pd+FKd for CEPR is proportionate to the investment cost and thus to NPCk, and labor cost L is assumed constant. By projection of segment FG into segment AB, and segment GH into segments BC and DE, on the vertical line NPCk, VAd = (Pd+FKd)+L = AD+DE = AE (where DE=HG=CB= L). Hence: CEPR = (AE-FH)/FH = (AE-AC)/FH (where AC=FH) = [(AE-ED)-(AC-CB)]/FH = (AD-AB)/FH = (AD-AB)/FG. FG/FH = (NPCk-1).FG/FG.(1-s) = (NPCk-1).(1-s).



12. By definition, "y" is the ratio of investment costs Id and Iw per unit of output. These unit investment costs are thus expressed by:

Id = TId/Qd , and Iw = TIw/Qw , where TId and TIw are the total investment costs in domestic and international prices respectively, and Qd and Qw are the corresponding levels of output production.

The total investment costs are such that: TId = NPCk.TIw , by definition of the average coefficient of nominal protection NPCk which captures the price effect of pricing and protection policies for investment and capital goods.

Output production Q is also expressed by: Q = K.k , where K is the production capacity and k is the capacity utilization rate. For the sake of simplicity, it is assumed that the utilization rate kw of the reference comparator operating efficiently under a free-trade regime is 90%, and the utilization rate kd of the project under protection is defined relatively to the above level. The ratio kd/kw = kd/0.9 is herein denominated "k".

Most chemical industries, and generally the fluid-processing industries, are characterized by a pragmatic law which, ceteris paribus, relates in first approximation the total investment cost of a project to its capacity:

$$TI = \text{Constante} . K^{0.6}$$, where K is to the power 0.6.

By simple algebraic manipulation, it follows that:

$$y = Id/Iw = NPCk \,.\, (1/k) \,.\, (Kw/Kd)^{0.4} = NPCk.x$$, where:

- Kw the capacity of the reference comparator is normally equal or greater than the relevant Minimum Economic Scale (MES); and
- factor $x = (1/k).(MES/Kd)^{0.4}$ captures the quantity effects of the x-inefficiencies generated or tolerated by the protection policies.

13. Three specific thresholds of effective protection can be derived from the above developments. First, CEPR = (1 - s).(NPCk - 1) is the level of EPR required to compensate for the taxation of the investment cost due to NPCk (the price effect). Second, the threshold (1 - s).(x - 1) associated to the x factor estimates the level of EPR associated implicitely to the x-inefficiencies generated or tolerated by the protection and licensing policies; by reference to the x-inefficiencies, it is denominated XEPR = (1 - s).(x - 1). Finally, the threshold of EPR associated to the combined price and quantity effects, through factor y = NPCk.x , is denominated TEPR = (1 - s).(y - 1).

These three concepts are not independant, and are linked by a relation of quasi-additivity:

$$TEPR = CEPR + XEPR + CEPR.XEPR/(1 - s)$$

An actual EPR meant to cover both the price and quantity effects would be at least equal to TEPR; hence, NEPR would be at least equal to the sum of the last two terms in the formula above, and strictly greater than XEPR.

ANNEX 2

BASIC PARAMETERS OF SAMPLE PROJECTS

Subsector(Product)	Investmt Cost(Wp)	ICOR	VAw	Labor Cost	Factor "s"	Factor NPCk1	Factor NPCk2
	Rs crores		Rs crores	Rs crores			
Heavy Chemicals:							
Phenols(60/61)	2.12	2.33	0.91	0.09	0.099	1.38	1.4
Buta Rubber(67)	17.85	3.49	5.11	0.72	0.141	1.5	1.
EPM Rubber(67)	32.03	5.33	6.01	1.21	0.201	1.4	1.4
ABS(67)	10.74	4.08	2.63	0.87	0.331	1.42	1.4
Alpha Olephins(67)	61.92	2.64	23.46	2.21	0.094	1.41	1.7
SBR(67)	46.69	5.29	8.82	1.52	0.172	1.5	1.6
Nitric Acid(60/61)	4.2	1.74	2.42	0.32	0.132	1.53	1.6
PA(61/67)	52.31	2.53	20.67	1.5	0.073	1.04	1.16
MA(61/67)	15.48	2.09	7.39	0.65	0.088	1.435	1.59
MA(61/67)	15.26	3.70	4.12	0.63	0.153	1.39	1.62
AVERAGE (weighted)	258.6	3.17	81.54	9.72	0.119	1.36	1.53
Average (plain)		3.32	19.7%		0.15		
	10	10		10	10		
Synthetic Textiles:							
PFY(45)	109.08	3.23	33.78	3.53	0.104	1.45	1.65
POY(45)	15.62	2.94	5.31	0.65	0.122	1.79	1.81
NTY(45)	64.86	3.18	20.41	2.62	0.128	1.66	1.66
Synthetic Yarn(45)	8.11	1.82	4.45	0.85	0.191	1.33	1.53
AVERAGE (weighted)	197.67	3.09	63.95	7.65	0.120	1.54	1.66
Average (plain)		2.79	15.4%		0.14		
	4	4		4	4		
Basic Steel Products:							
Spec.Steel Castgs(73/74)	5.37	1.20	4.48	0.53	0.118	0	1.63
Forgings(73/74)	5.05	1.87	2.7	0.54	0.200	0	1.505
ColdRoll Coils(73/74)	20.12	4.73	4.25	0.58	0.136	0	1.55
Steel Tubes(73/74)	9.23	2.94	3.14	0.47	0.150	0	1.65
Iron Pipes(73/74)	4.96	0.86	5.8	0.8	0.138	1.51	1.71
Coated SteelSheets(73/74)	20.74	3.32	6.25	1.4	0.224	1.44	1.59
Forgings(73/74)	3.03	2.15	1.41	0.9	0.638	1.53	1.575
AVERAGE (weighted)	68.5	2.44	28.03	5.22	0.186	1.46	1.59
Average (plain)		2.44	6.8%		0.23		
	7	7		7	7		
Electronics:							
TV Loudspeakers(90)	2.11	4.80	0.44	0.11	0.250	1.2	1.4
Audio Systems(90)	2.36	1.77	1.33	0.3	0.226	1.42	1.51
Single-sided PCBS(90)	2.23	3.19	0.7	0.2	0.286	1.24	1.48
Step Motors(90)	5.08	2.45	2.07	0.6	0.290	1.33	1.38
B&W and Color TVs(90)	4.32	0.83	5.21	1.49	0.286	1.38	1.55
Electronic Tuners(90)	3.73	6.78	0.55	0.2	0.364	1.26	1.39
EPABXs(88)	9.04	1.75	5.16	1.55	0.300	1.22	1.33
Computer Terminals(90)	3.93	1.81	2.17	0.68	0.313	1.39	1.53
PCs(90)	21	1.62	12.97	2.09	0.161	1.23	0
Mainframes&Software(90)	11.24	0.57	19.59	5.31	0.271	1.18	1.29
Floppies(100%EOU)(90)	2.29	1.64	1.4	0.44	0.314	1.04	1.09
AVERAGE (weighted)	67.33	1.31	51.59	12.97	0.251	1.25	1.38
Average (plain)		2.47	12.4%		0.28		
	11	11		11	11		

Food Industries:							
oybean Oil(36)	14.26	3.33	4.28	1.11	0.259	0	1.49
Glucose(38)	14.41	1.51	8.97	1.55	0.173	0	1.52
Glucose(38)	13.38	1.33	10.03	0.91	0.091	1.32	1.49
Vanillin(38)	4.08	4.86	0.84	0.21	0.250	1.5	0
------------------			------				
AVERAGE (weighted)	46.13	1.91	24.12	3.78	0.157	1.36	1.50
Average (plain)		2.78	5.8%		0.19		
	4	4		4	4		
Miscellaneous Industries:							
Paper(52)	9.93	3.45	2.88	0.6	0.208	0	1.58
res(56)	197.78	4.49	44.03	8.8	0.200	1.415	0
PP Film(57)	5.07	3.25	1.56	0.51	0.327	1.49	1.58
PVC Tiles(57)	4.35	1.04	4.18	1.06	0.254	0	1.5
Plastic Profiles(57)	3.27	2.92	1.12	0.29	0.259	1.4	1.42
------------------			------				
AVERAGE (weighted)	220.4	4.10	53.77	11.26	0.209	1.42	1.54
Average (plain)		3.03	13.0%		0.25		
	5	5		5	5		
Light Chemicals							
Pesticides(63)	6.46	0.99	6.52	1.43	0.219	1.39	1.5
Na Ampicillin(Drug)(65)	0.58	0.73	0.8	0.05	0.063	1.3	1.71
Magnetic Oxides(68)	12.32	2.52	4.88	0.81	0.166	1.3	1.5
------------------			------				
AVERAGE (weighted)	19.36	1.59	12.2	2.29	0.188	1.33	1.51
verage (plain)		1.41	2.9%		0.15		
	3	3		3	3		
ther Engineering Industries:							
luminum Extrusions(75)	2.7	0.52	5.23	0.68	0.130	0	1.6
luminum Foil(75)	2.57	1.08	2.37	0.48	0.203	1.43	1.58
earings(77)	27.16	2.42	11.22	0.4	0.036	1.51	1.51
Machine-Tools(81)	7.76	1.72	4.52	0.69	0.153	1.4	1.54
ower Handtools(84)	11.39	1.21	9.42	1.9	0.202	1.39	1.85
XLPE Cables(85)	4.94	0.45	10.86	1.24	0.114	1.85	1.9
Jelly Filled Cables(85)	12.63	1.73	7.29	2.32	0.318	1.4	1.66
Batteries(86)	12.58	1.48	8.51	1.85	0.217	0	1.84
Fluoresc. Lamps(87)	27.1	2.52	10.74	0.81	0.075	1.45	1.6
Washing Machines(87)	14.53	1.53	9.48	2.2	0.232	1.31	1.46
Auto Electricals(93)	7	2.29	3.06	0.77	0.252	1.52	1.55
Carburettors(93)	7.47	0.95	7.84	1.85	0.236	1.48	1.61
Bus Bodies(93)	12.26	1.70	7.2	1.18	0.164	1.43	0
2-W Shock Absorbers(94)	3.4	1.86	1.83	0.88	0.481	1.25	1.45
------------------			------				
AVERAGE (weighted)	153.49	1.54	99.57	17.25	0.173	1.45	1.62
Average (plain)		1.53	24.0%		0.20		
	14	14		14	14		
OVERALL AVERAGE(weightd)	1031.48	2.49	414.77	70.14	0.169	1.42	1.57
OVERALL AVERAGE(plain)	100.0%	2.43	100.0%		0.21		
Sample size	58	58			58		
Intermediates/Inputs							
AVERAGE(weightd)	745.17	3.28	227.29	33.85	0.149	1.43	1.59
AVERAGE(plain)	72.2%	2.95	54.8%		0.19		
Sample size	26	26			26		
Final Goods							
AVERAGE(weightd)	286.31	1.53	187.48	36.29	0.194	1.38	1.54
AVERAGE(plain)	27.8%	2.00	45.2%		0.22		
Sample size	32	32			32		

ANNEX 3

IMPACT OF INVESTMENT COSTS ON VALUE ADDED AND EPRs, BY SUBSECTOR

Subsector(Product)		VDuties(%) (On Imprtd KalGoods	Factor NPCk1	Factor NPCk2	CEPR1	CEPR2	Actual EPR	NEPR2	NEPR1
Heavy Chemicals:									
Phenols(60/61)	*		1.38	1.42	25	27	153	126	128
Buta Rubber(67)	*	134	1.5	1.5	43	43	68	25	25
EPM Rubber(67)	*	136	1.4	1.44	32	35	121	86	89
ABS(67)	*	82	1.42	1.47	11	13	86	73	75
Alpha Olephi:ns(67)	*	90	1.41	1.76	37	69	25	-44	-12
SbR(67)	*	84	1.5	1.69	41	57	143	86	102
Nitric Acid(60/61)	*	91	1.53	1.62	46	54	-28	-82	-74
PA(61/67)	*	0	1.04	1.16	3	15	-10	-25	-13
MA(61/67)	*	94	1.435	1.59	40	53	-32	-85	-72
MA(61/67)	*	98	1.39	1.62	33	53	61	8	28
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AVERAGE (weighted)	*				28.19	44.90	37.14	-7.76	8.95
Average (plain)		89.89	1.40	1.53	31.10	41.90	58.70	16.80	27.60
		9	10	10	10	10	10	10	10
Synthetic Textiles:									
PFY(45)	*	89	1.45	1.65	35	50	89	39	54
POY(45)	*	90	1.79	1.81	69	71	90	19	21
NTY(45)	*	84	1.66	1.66	58	58	53	-5	-5
Synthetic Yarn(45)	*		1.33	1.53	23	37	-20	-57	-43
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AVERAGE (weighted)	*				44.33	53.39	70.01	16.62	25.68
Average (plain)		87.67	1.56	1.66	46.25	54.00	53.00	-1.00	6.75
		3	4	4	4	4	4	4	4
Basic Steel Products:									
Spec.Steel Castgs(	*	86		1.63		55	-26	-81	
Forgings(73/74)	*	38		1.505		37	26	-11	
ColdRoll Coils(73/	*			1.55		48	174	126	
Steel Tubes(73/74)	*	86		1.65		56	70	14	
Iron Pipes(73/74)	*	110	1.51	1.71	44	61	-10	-71	-54
Coated SteelSheets	*	90	1.44	1.59	34	46	93	47	59
Forgings(73/74)	*	63	1.53	1.575	19	21	176	155	157
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AVERAGE (weighted)	*				36.74	49.84	60.09	10.25	20.57
Average (plain)		78.83	1.49	1.60	32.33	46.29	71.86	25.57	54.00
		6	3	7	3	7	7	7	3
Electronics:									
TV Loudspeakers(90	*	36	1.2	1.4	14	27	120	93	106
Audio Systems(90)	*	42	1.42	1.51	32	39	45	6	13
Single-sided PCBS(	*	42	1.24	1.48	14	28	159	131	145
Step Motors(90)	*	47	1.33	1.38	22	25	31	6	9
B&W and Color TVs(	*	44	1.38	1.55	14	20	82	62	68
Electronic Tuners(	*	44	1.26	1.39	-3	-5	287	292	290
EPABXs(88)	*	31	1.22	1.33	15	23	13	-10	-2
omputer Terminals	*	45	1.39	1.53	27	35	19	-16	-8
Cs(90)	*	39	1.23		12		6		-6
Mainframes&Softwar	*	30	1.18	1.29	13	21	-35	-56	-48
Floppies(100%EOU)(	*	0	1.04	1.09	3	6	0	-6	-3
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AVERAGE (weighted)	*				14.07	22.03	7.24	-14.37	-6.83
Average (plain)		36.36	1.26	1.40	14.82	21.90	66.09	50.20	51.27
		11	11	10	11	10	11	10	11

Food Industries:								
Soybean Oil(36) *	60		1.49		36	115	79	
Glucose(38) *	90		1.52		43	-18	-61	
Glucose(38) *	93	1.32	1.49	29	45	-26	-71	-55
Vanillin(38) *		1.5		38		137		99
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AVERAGE (weighted)*				29.70	42.57	7.67	-39.57	-43.10
Average (plain)	81.00	1.41	1.50	33.50	41.33	52.00	-17.67	22.00
	3	2	3	2	3	4	3	2
Miscellaneous Industries:								
Paper(52) *	86		1.58		46	75	29	
Tyres(56) *	88	1.415		33		83		50
BOPP Film(57) *	89	1.49	1.58	33	39	79	40	46
PVC Tiles(57) *	71		1.5		38	19	-19	
Plastic Profiles(5*	40	1.4	1.42	29	31	51	20	22
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AVERAGE (weighted)*				32.90	39.72	76.81	9.13	49.20
Average (plain)	74.80	1.44	1.52	31.67	38.50	61.40	17.50	39.33
	5	3	4	3	4	5	4	3
Light Chemicals								
Pesticides(63) *		1.39	1.5	31	39	-29	-68	-60
Na Ampicillin(Drug*		1.3	1.71	28	66	-13	-79	-41
Magnetic Oxides(68*	59	1.3	1.5	25	42	25	-17	0
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AVERAGE (weighted)*				28.40	41.97	-6.35	-48.32	-34.75
Average (plain)	59.00	1.33	1.57	28.00	49.00	-5.67	-54.67	-33.67
	1	3	3	3	3	3	3	3
Other Engineering Industries:								
Aluminum Extrus[illegible]*	37		1.6		52	-58	-110	
Aluminum Foil(7[illegible] *	81	1.43	1.58	34	46	-33	-79	-67
Bearings(77) *	54	1.51	1.51	49	49	-14	-63	-63
Machine-Tools(81) *	95	1.4	1.54	34	46	-21	-67	-55
Power Handtools(84*	90	1.39	1.85	31	68	-23	-91	-54
XLPE Cables(85) *	95	1.85	1.9	76	80	-34	-114	-110
Jelly Filled Cable*	86	1.4	1.66	27	45	15	-30	-12
Batteries(86) *	90		1.84		66	-15	-81	
Fluoresc. Lamps(87*	80	1.45	1.6	42	56	27	-29	-15
Washing Machines(8*	47	1.31	1.46	24	35	-9	-44	-33
Auto Electricals(9*	92	1.52	1.55	39	41	34	-7	-5
Carburettors(93) *	68	1.48	1.61	37	46	-23	-69	-60
Bus Bodies(93) *		1.43		36		-23		-59
2-W Shock Absorber*	61	1.25	1.45	13	23	17	-6	4
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AVERAGE (weighted)*				40.42	54.12	-12.49	-65.79	-49.89
Average (plain)	75.08	1.45	1.63	36.83	50.23	-11.43	-60.77	-44.08
	13	12	13	12	13	14	13	12
OVERALL AVERAGE(we*				32.85	46.36	30.28	-20.98	-1.58
OVERALL AVERAGE(pla	70.53	1.40	1.55	30.08	41.78	40.81	-1.70	11.69
Sample size	51	48	54	48	54	58	54	48

ANNE

IMPACT OF INPUT AND INVESTMENT COSTS ON COMPETITIVENESS AND NPRs,BY SUBSECTOR

(--------------- in % of Output Value at International Prices ------------

Product		OInput Cost (Impact	VA Impact From CEPR1	CEPR2	CNPR1	CNPR2	Actual NPR	NNPR2	NN
Heavy Chemicals:									
Phenols(60/61)	*	41	3	4	44	45	64	19	
Buta Rubber(67)	*	52	16	16	68	68	77	9	
EPM Rubber(67)	*	34	9	10	43	44	67	23	
ABS(67)	*	51	3	4	54	55	77	22	
Alpha Olephins(67)	*	68	14	27	82	95	77	-18	
SBR(67)	*	52	8	11	60	63	77	14	
Nitric Acid(60/61)	*	34	32	38	66	72	14	-58	
PA(61/67)	*	30	2	7	32	37	25	-12	
MA(61/67)	*	15	17	23	32	38	0	-38	
MA(61/67)	*	32	15	25	47	57	61	4	
AVERAGE (weighted)	*	46.35	10.03	16.08	56.38	62.42	58.80	-3.63	2.4
Average (plain)		40.90	11.90	16.50	52.80	57.40	53.90	-3.50	1
		10	10	10	10	10	10	10	
Synthetic Textiles:									
PFY(45)	*	45	16	23	61	68	67	-1	
POY(45)	*	50	18	18	68	68	76	8	
NTY(45)	*	50	20	20	70	70	68	-2	
Synthetic Yarn(45)	*	27	8	12	34	39	20	-19	
AVERAGE (weighted)	*	46.03	17.07	20.44	63.02	66.48	64.87	-1.61	1
Average (plain)		43.00	15.50	18.25	58.25	61.25	57.75	-3.50	-0
		4	4	4	4	4	4	4	
Basic Steel Products:									
Spec.Steel Castgs(	*	57		17		75	49	-26	
Forgings(73/74)	*	43		15		58	54	-4	
ColdRoll Coils(73/	*	43		8		51	72	21	
Steel Tubes(73/74)	*	22		22		44	49	5	
Iron Pipes(73/74)	*	29	20	28	49	57	25	-32	
Coated SteelSheets	*	59	4	5	63	64	68	4	
Forgings(73/74)	*	52	4	4	56	56	83	27	
AVERAGE (weighted)	*	49.65	6.48	10.38	60.16	60.14	61.82	1.69	2.
Average (plain)		43.57	9.33	14.14	56.00	57.86	57.14	-0.71	2.
		7	3	7	3	7	7	7	
Electronics:									
TV Loudspeakers(90	*	2	3	6	5	8	30	22	
Audio Systems(90)	*	43	7	9	50	52	54	2	
Single-sided PCBS(	*	36	3	6	39	42	71	29	
Step Motors(90)	*	45	8	9	53	54	56	2	
B&W and Color TVs(	*	60	2	2	62	62	68	6	
Electronic Tuners(	*	54	-1	0	53	54	95	41	
EPABXs(88)	*	14	7	10	21	24	20	-4	
Computer Terminals	*	51	7	9	58	60	56	-4	
PCs(90)	*	18	2		20		19		
Mainframes&Softwar	*	12	8	13	20	25	-8	-33	-28
Floppies(100%EOU)(	*	0	1	2	1	2	0	-2	
AVERAGE (weighted)	*	30.48	3.24	5.57	33.72	43.26	32.23	-3.39	-1.49
Average (plain)		30.45	4.27	6.60	34.73	38.30	41.91	5.90	7.18
		11	11	10	11	10	11	10	11

Food Industries:								
Soybean Oil(36) *	37		4		41	49	8	
Glucose(38) *	11		23		34	2	-32	
Glucose(38) *	6	15	24	21	30	-8	-38	-29
Vanillin(38) *	28	10		38		64		26
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AVERAGE (weighted)*	23.60	14.28	13.27	23.45	36.69	25.80	-12.48	-21.06
Average (plain)	20.50	12.50	17.00	29.50	35.00	26.75	-20.67	-1.50
	4	2	3	2	3	4	3	2
Miscellaneous Industries:								
Paper(52) *	6		13		20	28	8	
Tyres(56) *	32	6		38		47		9
BOPP Film(57) *	21	9	11	30	32	43	11	13
PVC Tiles(57) *	40		16		56	48	-8	
Plastic Profiles(5*	33	6	7	39	40	44	4	5
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AVERAGE (weighted)*	31.10	6.07	12.60	37.84	37.20	46.18	2.71	9.01
Average (plain)	26.40	7.00	11.75	35.67	37.00	42.00	3.75	9.00
	5	3	4	3	4	5	4	3
Light Chemicals								
Pesticides(63) *	18	20	26	38	44	-1	-45	-39
Na Ampicillin(Drug*	37	5	12	42	49	34	-15	-8
Magnetic Oxides(68*	12	13	22	25	34	25	-9	0
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AVERAGE (weighted)*	19.18	14.43	21.80	33.60	40.98	15.83	-25.15	-17.77
Average (plain)	22.33	12.67	20.00	35.00	42.33	19.33	-23.00	-15.67
	3	3	3	3	3	3	3	3
Other Engineering Industries:								
Aluminum Extrusion*	-3		14		11	-19	-30	
Aluminum Foil(75) *	16	8	11	24	27	8	-19	-16
Bearings(77) *	15	37	37	52	52	4	-48	-48
Machine-Tools(81) *	12	14	19	26	31	3	-28	-23
Power Handtools(84*	17	18	40	35	56	3	-53	-32
XLPE Cables(85) *	22	49	51	71	73	-4	-77	-75
Jelly Filled Cable*	38	11	17	49	55	43	-12	-6
Batteries(86) *	32		28		60	26	-34	
Fluoresc. Lamps(87*	11	23	31	34	42	26	-16	-8
Washing Machines(8*	31	5	7	36	38	30	-8	-6
Auto Electricals(9*	53	16	17	69	70	67	-3	-2
Carburettors(93) *	18	24	30	42	48	3	-45	-39
Bus Bodies(93) *	49	13		62		41		-21
2-W Shock Absorber*	25	5	8	30	33	31	-2	1
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AVERAGE (weighted)*	24.63	17.64	23.00	44.21	45.33	19.19	-28.14	-22.00
Average (plain)	24.00	18.58	23.85	44.17	45.85	18.71	-28.85	-22.92
	14	12	13	12	13	14	13	12
OVERALL AVERAGE(we*	35.52	11.85	19.71	52.55	66.23	43.52	-8.99	-3.43
OVERALL AVERAGE(pla	31.69	11.73	16.13	44.00	47.83	39.10	-9.00	-4.21
Sample size	58	48	54	48	54	58	54	48

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