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The Cost and Composition of Indian Exports

by

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ABSTRACT

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India has a long history of export promotion policies amounting to a drive for export maximization. These policies have been applied without regard to comparative advantage and this study indicates the high cost of India's disregard for economic efficiency. Using the domestic resource cost concept as the criterion for measuring relative export efficiency, the present structure of Indian exports is examined on both the sectoral and product level. The results show not only an unacceptably wide divergence in the DRC of exports on the margin--indicating a misallocation of resources in the export sector--but also an export incentive system which fails to select India's most efficient exports.

The Cost and Composition of Indian Exports[1]

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Just as it is now common knowledge that development through import substitution can be an ineffective and costly path to development, so is there a growing realization that export promotion can also lead to many of the same problems. Export promotion has been considered by many governments and economists as the opposite of import substitution, and therefore a return to rational commercial policies. Yet although export promotion is indeed the opposite of import substitution, it too can be mishandled.

This study attempts to demonstrate such a case with respect to India. It is not argued that export promotion is unjustified in the Indian context, but rather that export incentives have been handled as poorly and inefficiently as have India's import substitution policies.[2] For although the results presented here are tentative, they nevertheless indicate a glaring absence of export rationality.

This study also demonstrates the feasibility of using the domestic resource cost (DRC) concept (also known as the domestic cost of foreign exchange concept) as a practical broad-scale planning tool in a truly less developed country, where linear programming models (à la Bruno [1967a], [1967b]) are impossible. Isolated industry studies such as those of Krueger [1966], [1970] serve an important role. But, if the DRC measure is to be an effective planning tool, it must also be capable of broader analysis such as is attempted here.

In Section I the DRC concept is briefly defined and defended as the proper tool to use in studies of this type. In addition, the limitations of the measure are discussed. Sections II and III present the empirical results of two methods of DRC measurement, the input-output approach and the "survey" approach. Finally, Section IV summarizes and comments briefly upon the results.

I

When using the domestic resource cost criterion for project evaluation, one must be very careful to define it precisely. It would seem that a great deal of the recent controversy (Balassa and Schydlowsky [1968], [1972], Krueger [1972], Bruno [1972]) between proponents of the DRC versus the effective rate of protection (ERP) measure could be cleared away through the use of clear and consistent definitions.[3] DRC measures the <u>cost</u>, in terms of domestic resource cost, of earning (or saving) one net unit of foreign exchange through the export (or import substitution) of a particular good. If one assumes: 1) the absence of nontraded goods, 2) perfect competition in goods and factor markets, 3) Leontief-type production functions, and 4) infinite elasticities of import supply and export demand, DRC is given by

$$DRC_i = \frac{P_{Hi} - \sum_j A_{ji}(P_{Hj}/P_{Wj})}{P_{Wi} - \sum_j A_{ji}} . \qquad (1)$$

P_{Hi} is the price of the i^{th} good on the domestic market, P_{Wi} is the price of the i^{th} good on the world market (C.I.F. for imports and F.O.B. for exports), and A_{ji} is the value at world prices of good j which goes directly into the production of a physical unit of good i. The numerator of equation 1 is the domestic value added in the production of one unit of good i. The denominator is the <u>net</u> foreign exchange earned (or saved) by exporting (or import substituting) one unit of the i^{th} good, i.e., the gross foreign exchange earned (or saved) less the C.I.F. cost of imported inputs.

Much of the discussion in the literature has revolved about the apparent equivalence of DRC and ERP under the above assumptions. However, there is a very important conceptual distinction between the two measures (which has been blurred by loose terminology), as well as an important difference in their common usage.

The conceptual distinction reflects the different goals of the DRC and ERP measures.[4] The domestic resource cost concept measures the social resource cost of a unit of export or import substitute relative to its foreign exchange earnings or savings. The effective rate of protection on the other hand was originally designed to measure the increase in private factor incomes paid per unit of production relative to a given base, normally taken as the free trade situation. The different foci of DRC and ERP, the former on social costs and the latter on private incomes, is the major conceptual distinction between the two measures. And it is not surprising that this should be so in that the two tools were designed to different ends. DRC was designed to look at the normative question of where resources should be allocated while ERP was designed to look at the positive question of where resources will flow. Once this conceptual distinction is made, much of the discussion in the literature becomes a mere exercise in semantics. The measures should not be defined by their commonly used expressions as is normally done (e.g., by Balassa and Schydlowsky [1968] in equations 1 and 2, by Krueger [1972] in equations 1 and 3), but by the purposes for which they are designed.

Balassa and Schydlowsky would of course like to make the measurement of costs one of the purposes of the ERP concept, because they feel (rightly or wrongly as is discussed below) that the normal measurement of ERP is also the way in which resource costs should be measured. However, the clarity of the controversy would be enhanced, and the substance decreased, if all would agree that the essential question is the proper measurement of the DRC concept rather than a choice between ERP and DRC.

The difference in the usage of the ERP and DRC measures involves the assumptions commonly employed with respect to marginality.

Effective protection has always been used in a total sense, i.e., to measure the total effective protection, the total increase in factor incomes, deriving from a given tariff structure. It is this total nature of ERP that has brought on its most telling criticisms, for under all but a very marginal tariff system the commonly used assumptions of infinite import-supply and/or export-demand elasticities, Leontief production functions, and the absence of nontraded goods pre- and post-tariff are severely taxed. One could relax one or more of these assumptions, but one would quickly become enmeshed in a complete general equilibrium system which would destroy the simplicity and the empirical relevance, of the present partial equilibrium measure.[5] The relevance of these strictures in any given situation is an empirical question, but serious doubts have been raised with respect to the large industrial countries for which ERP is usually applied. And if these assumptions are not fulfilled, the ERP concept as a total measure has no meaning.

The DRC concept has also been used in a total sense,[6] and used in this way it suffers from the same drawbacks as ERP. However, the DRC concept is equally useful in measuring the marginal domestic cost of foreign exchange. So used, it involves only marginal changes in a given, observable economic situation, and is thus much less taxing with respect to the assumptions on which it is based. The assumptions become quantitatively less constricting when there is no reference to a distant and vague free trade economy. A corresponding marginal use of the ERP concept is possible but has apparently never been used.[7]

The marginality of the DRC concept as used here gives rise to another facet of the DRC-ERP controversy: the assumed "givens" to the analysis. As pointed out explicitly by this author [1971] and by Balassa and Schydlowsky [1972], it is crucial to the method for measuring DRC whether one assumes a first-best or a second-best environment. Under the former assumption one need only look at costs in the final stage of production as all inputs into production will be supplied from the most efficient source (domestic or foreign) at world prices;[8] under the latter assumption one must look at all stages of production as inputs coming from domestic production may be more costly than imports, and the excess cost of these inputs becomes inseparable from the costs of the final good, just as the inputs themselves are inseparable from the final good.

There seem two good reasons for using the DRC concept assuming a second-best environment. First, the idea of ever attaining a first-best flexibility of policies is certainly the exception rather than the rule in LDC's, and to evaluate projects under first-best assumptions is generally irrelevant.[9] In the terms of Balassa and Schydlowsky's argument, the political pressures for maintaining inefficient intermediate goods industries are not likely to be overcome easily. Second, and more important, estimating DRC under first-best conditions using data derived from a second-best world certainly void any semblance of marginality. And, without marginality, all the attacks to which ERP has been subject (with respect to elasticities of substitution for instance) are equally applicable to DRC. The DRC concept is, basically, a partial equilibrium measure and it seems to stretch it too far to contemplate wholesale changes in the structure which the measure is attempting to describe.

One may of course dispute the usefulness of any partial equilibrium measure in analyzing LDC economies, but as long as one is using partial equilibrium tools, they should be used correctly.

This study then uses the DRC concept assuming that the present structure of the Indian export economy is given. Only one small change is allowed: alternative assumptions as to the source of steel are considered. The result is the measurement of the DRC of exports at present export and production levels and under current policies. The goal is of course to change those policies, and therefore the measures will have to be repeated as policies are altered in order to insure that movement is always in the proper direction. This iterative procedure seems more dependable than the alternative of constructing general equilibrium models for LDC's — the DRC concept is certainly not one — and iteration may be the best practical and political method for altering policies as well.

Two methods of measuring the DRC of Indian exports are discussed and applied in the next two sections.

II

The first method used for evaluating the DRC of Indian exports makes use of input-output analysis. The DRC of each sector is computed as the quotient of the respective elements of the vectors MRC and MXE:

$$MRC = (p_K K_H + p_L L + p_W W_H + p_N N_H)(I - A)^{-1} \qquad (2)$$

$$MXE = S_X - (S_M M + K_M + W_M)(I - A)^{-1} . \qquad (3)$$

MRC is a vector of the shadow-priced direct-plus-indirect marginal resource cost per rupee of output (measured at domestic prices) for each sector and MXE is a vector of the marginal net foreign exchange earnings per rupee of export (again measured at domestic prices) for each sector. The p_j are scalers of the ratios of market to shadow wages of capital (K), labor (L), other value added (W), and nonfactor value added (N).[10] The vectors K, L, W and N are factor input coefficients measuring the value of factor input per unit value of output, all at domestic prices, and the subscripts M and H refer respectively to the imported and domestic components of each source of value added. M is a matrix of the direct import contents (measured at domestic prices and including imported nonfactor value added) of each sector. S_X and S_M are vectors respectively of the F.O.B./domestic-price ratios of export sectors and the C.I.F./import-price ratios of import sectors. Finally, A is an input-output coefficients matrix at domestic producers' prices. Export supply and demand elasticities are assumed infinite.

The input-output table employed was one compiled by the Indian Statistical Institute (ISI) [1965] for the years 1964/5, and published by the Indian Planning Commission.[11] The table is a 77-sector input-output flow table at producers' prices. Although a 77-sector table might normally be considered as quite disaggregated, the ISI table is disaggregated primarily in the traditional and agricultural sectors, while the engineering goods sectors in particular remain fairly aggregated. There are only six engineering goods sectors, electrical equipment, non-electrical equipment, transportation equipment, metal products, iron and steel, and non-ferrous metals.

The value added portion of the ISI table distinguishes only two primary factors, capital and other value added. Since in shadow pricing value added the composition of factors is as important as the total, an attempt was made to divide the row "other value added" into two rows, labor and other (than capital and labor) value added, the latter being primarily profits. With labor coefficients derived from data in the Government of India's Annual

Survey of Industries for 1963 and 1965, the payments to labor in each ISI sector were calculated as a proportion of the gross input into that sector, and were then subtracted from the original ISI vector of other value added. There are then three primary factor vectors: capital, labor, and other value added. Because some materials and services used as direct inputs into the ISI sectors were not themselves included in the ISI table and could not be broken into the primary factors labor, capital and other value added, it was necessary to add another "factor" to the model, nonfactor value added. Finally, the incidence of indirect taxes on inputs, which was buried in the ISI table, was removed since indirect taxes are clearly not resource costs but a transfer of income.

Once the input-output data had been adopted to the needs of the model, the application of the model itself was quite straightforward. The ISI sectors were first divided into import and domestic sectors. Import sectors were those presently at full capacity and from which inputs for additional exports would have to come through imports.[12] The rows and columns of the import sectors were struck from the ISI matrix, the remaining rows and columns yielding the domestic input-output matrix A. The input coefficients of the import sectors into the domestic sectors formed the import matrix M. A few sectors were allocated both to the import and domestic matrices as a significant portion of additional supplies come from both imported and domestic sources.[13]

The iron and steel sector is a crucial sector in the analysis of the nontraditional export sectors. At present steel production in India is entirely inadequate to supply inputs for any additional exports and thus for most of the analysis iron and steel is considered an import sector. Yet India does expect to once again become self-sufficient in steel, and, to test the impact of this eventuality, much of the analysis was repeated treating steel as a domestic sector.

Finally, it was necessary to divide value added into domestic and imported components. It was assumed that half of capital was imported, that all of labor was domestic, that all of other value added was domestic, and that eighty-two per cent of nonfactor value added was imported and the remainder domestic. This last figure was arrived at by calculating the weighted average of the direct plus indirect import content of all ISI intermediate goods sectors. The weights were the total value of each sector as an intermediate input, as indicated in the ISI table itself.

The S_X and S_M vectors were constructed by determining where possible the actual F.O.B./domestic purchasers' price ratios for exports, and the actual C.I.F./domestic purchasers' price ratios for imports. Where the necessary price data was not available on the import side, nominal tariffs were used instead of actual price differentials. The S_X and S_M vectors are given in Table 1.[14]

The model was finally solved for various shadow prices of cpaital, labor, other value added, and nonfactor value added.[15] The results are summarized in Table 2.

First, all shadow-price ratios (except that for nonfactor value added) were set equal to unity and the resulting rankings are given in column 3. The most striking, although not unexpected result is the relatively high domestic resource cost of India's nontraditional export sectors. While the median DRC for the forty-two sectors studied is a respectable Rs.7.82 per U.S. dollar, the median for the eighteen nontraditional sectors[16] is Rs.11.80 per dollar, ranging from a low of Rs.6.15 for rayon fabrics to Rs.26.69 for man-made fibers.[17] The engineering goods sectors, electrical equipment, non-electrical equipment, transportation equipment and metal products, have an even higher median DRC of Rs.21.42 per dollar.

It is not, however, the absolute median domestic resource cost which should be of concern here. Everyone agrees that the official exchange rate is overvalued and that therefore exports should cost more than the official exchange rate. Rather, it is the wide range of DRC which is alarming. The ratio of the highest to the lowest DRC is 5.6; the median DRC of the non-traditional sectors is 1.6 times the median DRC of the traditional sectors. Obviously the composition of Indian exports needs some attention unless the wide differences among exports can be explained on other grounds.

The individual rankings are of some interest. At the top of the list are the silk textiles and rayon fabrics sectors, well-established textile industries operating under heavy tax incidence. They are followed closely by the tobacco products and leather sectors, which are again traditional Indian industries and exports. Jute textiles and plantations (tea and coffee), for long two of the mainstays of Indian exports, occupy positions nine and twelve respectively, while the third mainstay, cotton textiles, ranks seventeenth. The only nontraditional exports in the top half of the rankings are rayon fabrics, other rubber products, perfumes and cosmetics, paper and paper products, and paints and varnishes. The bottom of the list is monopolized by the engineering goods sectors as well as the sectors tires and tubes, plastics, sugar (sugar is "dumped" by India as it is by many countries) and, at the very bottom, man-made fibers. Plastics and man-made fibers are heavily protected industries in India and are widely renowned to be inefficient by world standards. The implications for Indian export policy of these and subsequent rankings is discussed in Section IV.

One common criterion used by the Government of India (GOI) in ranking export industries is the proportion of domestic value added in manufacture. The GOI wishes to maximize domestic value added — to minimize import contents — in order to maximize per unit per export earnings. This is not necessarily a rational policy as the maximization of earnings per unit of resources expended, and not per unit of output, is the proper goal. The two criteria can yield quite different results; as shown in column 2 of Table 2, rankings by the two methods differ widely. Goods such as processed cashewnuts, jute and silk textiles and woolen yarn, have large import contents yet are still relatively efficient exports. On the other hand, inefficient exports such as wood products, ceramics and sugar, have relatively low import contents. The Spearman's rank correlation coefficient (S^2) between the two rankings is only 0.28.

An alternative criterion for the ranking of industries is their relative export and domestic prices, i.e., their F.O.B./domestic price ratios. Rankings by F.O.B./domestic price ratios and by DRC were also compared. Here the correspondence is a good deal closer than it was with import contents with the S^2 for the two rankings being 0.85. Still, the correspondence is far from perfect. For instance, the rayon fabrics sector ranks second in DRC but only sixteenth in F.O.B./domestic price ratios. In the next section, where the goods studied are more homogeneous, the correspondence between DRC and F.O.B./ domestic price ratios deteriorates.

The high private opportunity costs of exports over domestic sales is often laid to the high profit rates which manufacturers reap on sales in the highly protected domestic market. The social cost implications of this possibility are explored in column 5 of Table 2 in which the factor other value added (predominantly profits) is shadow priced at fifty per cent of its nominal value.[18]

Shadow pricing profits does indeed lower the domestic resource cost of

Indian exports; the median DRC falls from Rs.7.82 to Rs.6.17 per dollar for all exports, and from Rs.11.80 to Rs.8.68 per dollar for the eighteen non-traditional sectors. However, the range of DRC and the rankings of industries are not greatly affected. Before shadow pricing, the ratio of the highest to the lowest DRC sector is 5.6, while after shadow pricing profits, the ratio falls only to 4.4, still indicating a wide divergence. The individual rankings do change to some extent, but not a great deal and the S^2 between the two rankings is 0.98. The ranking of nontraditional industries is also changed only marginally — the S^2 between the two rankings is 0.94 — yet it is in this set of industries that excess profits are supposed to be important. In sum therefore, the large divergence between sectors in their social cost of export is not explained by excess profits.

It is often argued that the low shadow price of labor in many LDC's — versus its high market price — justifies the introduction and protection of high-cost manufacturing industries in LDC economies. By extension, the argument has been used to justify the heavy subsidization of high-cost manufactured exports. On the surface, the argument seems plausible. Yet although it may well be that the absolute market cost of LDC manufacturers is above, even far above, their actual resource cost, it is comparative advantage that should govern trade between countries. Unless the shadow pricing of labor brings the resource cost of manufactured exports below the cost of existing exports, they should still be considered as relatively inefficient.

Such a switch in the relative position of manufactured and existing exports is unlikely when existing exports are the usual labor-intensive, traditional exports of most LDC's. For India, this is demonstrated in Column 7 of Table 2. In addition to employing a shadow-price ratio of 0.5 for labor, capital is given a shadow-price ratio of 1.5 and other value added a shadow-price ratio of 0.5 (as before). The domestic resource cost of all Indian exports does indeed fall markedly, from a median of Rs.6.17 per dollar in the previous case, to a median of Rs.4.32 per dollar, a drop of thirty per cent. Measured from the original position with no shadow pricing, the drop in DRC is forty-five per cent. Yet for nontraditional exports the median falls to only Rs.6.89 per dollar from a median of Rs.8.68, a fall of only twenty-one per cent from the case in which other value added alone was shadow priced.

The ranking of industries is virtually unchanged from the original ranking in column 3. The rank correlation between the original and the "fully" shadow-priced rankings is 0.96 and most of the change in rankings is explained by shifts in only three sectors, iron ore, plantations, and rayon fabrics. After removing these sectors from the sample, the two rankings have an S^2 of 0.98. Virtually no change in rankings takes place among nontraditional exports and the ratio between the median traditional export and the median nontraditional export is still large at 1.8, indeed higher than it was before shadow pricing. Therefore, although shadow pricing does lower the absolute cost of Indian exports, it does not change substantially their relative costs or even the range of costs between the better and the worse.

Finally, it might be argued that the above analysis unduly penalizes the nontraditional sectors since wages are more inflated in the industrial sector — due to union pressures and political receptivity — than in the traditional sectors.[19] There are several reasons for believing this not to be the case. Some studies have indicated that marginal products are well below wages (average products) in Indian agriculture and claims have even been made of a zero marginal product (and thus a zero shadow price ratio) for agricultural labor.[20] Also, industrial employment does demand special skills and although unskilled and semi-skilled labor may be overpaid, it is not clear that this is also true of skilled and managerial labor which does form a significant portion of industrial employment. Finally, there is some question as to the ability of unions to force higher wages in an economy where rationalization is a constant threat.

In spite of these doubts, the model was solved for this case by setting the shadow-price ratio of labor in the agricultural, rural and service sectors equal to unity and that for labor in the manufacturing and mining sectors equal to 0.5. The results are found in column 9 of Table 2.

The ratio of the median DRC for nontraditional versus traditional exports does indeed fall from 1.8 in the previous case to 1.5. However, the change in sectoral rankings is only moderate — the S^2 between these and the previous rankings is 0.64 — and, more importantly, the change in rankings occurs predominantly in the middle tertile of the rank. Thus, of the eleven nontraditional sectors originally in the bottom tertile, ten remain there, and no new nontraditional sectors move into the top tertile. The new shadow-price parameters then indicate no major change in the choice among sectors.

Up to this point, the analysis has assumed that steel is imported at a relatively high foreign-exchange cost.[21] The effect is to penalize all steel consuming sectors, especially the four engineering goods sectors which ranked numbers thirty-one, thirty-nine, forty and forty-one in the original rankings. Yet India does plan on expanding future steel output through the expansion and better utilization of existing plants and the construction of at least two new steel plants. It is therefore interesting to see what effect this is likely to have on the domestic resource cost of India's exports.

The ranking of industries when steel is considered a domestic industry is given in Table 2, column 11. The relative ranking of the engineering goods sectors, in particular non-electrical equipment and metal products, is improved, but they still remain in the lowest third of the list. The median DRC for the four engineering goods sectors falls from Rs.11.68 per U.S. dollar (in column 7) to Rs.7.08 per dollar, a fall of thirty-nine per cent, yet the median DRC of nontraditional exports as a whole is still high at Rs.6.06 per dollar versus Rs.6.89 per dollar with imported steel. For the sample as a whole, the median DRC is virtually unchanged. The engineering goods sectors are then the only sectors affected by the source of steel; the rank correlation between rankings with imported steel and those with domestic steel is 0.98.

III

The previous section has demonstrated the large divergence in the domestic resource costs among India's export sectors. This section analyzes in some detail forty-two exported products produced within a limited number of sectors, the engineering goods sectors. The analysis shows that the variation in costs among these goods is as large as the variation in costs among all of India's export sectors.

The model employed in the survey analysis is that of equation 5. For convenience, all variables were put in terms of the domestic price as a numeraire.

$$DRC_i = \frac{1 - \sum_m r'_{mi}/s_m}{s_{xi} - \sum_m r'_{mi}} , \qquad (5)$$

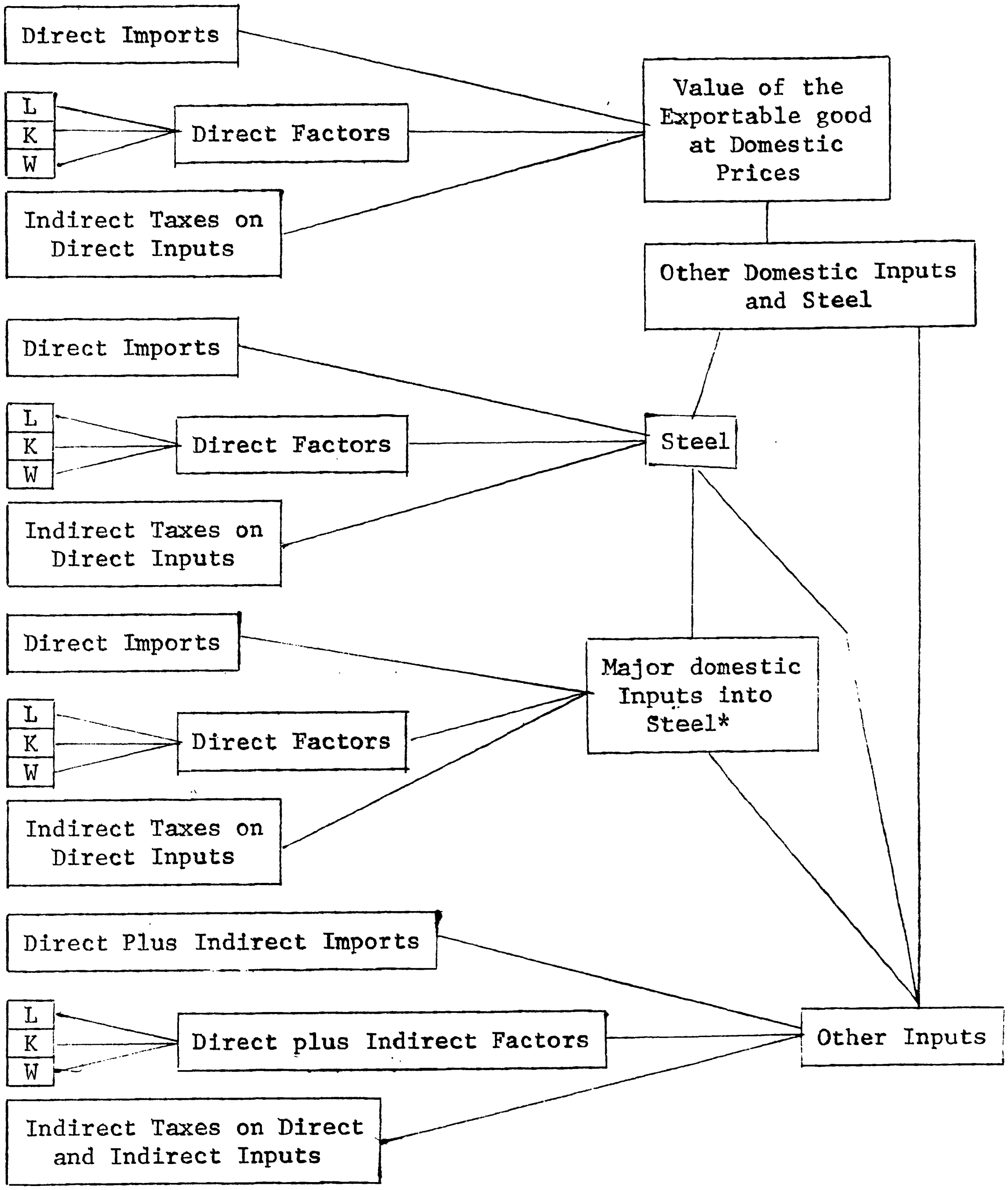
where r'_{mi} is the direct plus indirect input of import m (measured at domestic prices) per unit value of i, $s_m = P_{Wm}/P_{Hm}$, $s_{xi} = P_{Wi}/P_{Hi}$ and P_W and P_H are world (C.I.F. for imports and F.O.B. for exports) and domestic price respectively. Direct-plus-indirect resource cost, the numerator of equation 5, was divided into its component factors, direct-plus-indirect labor (L_i), capital (K_i), other value added (W_i) and indirect tax incidence (T_i), and each factor was awarded a shadow-price ratio (p). (The shadow-price ratio for indirect taxes, p_T, is invariably set equal to zero.) The final expression for the domestic resource cost is then:

$$DRC_i = \frac{p_L r'_{Li} + p_K r'_{Ki} + p_W r'_{Wi} + p_T r'_{Ti}}{s_{xi} - \sum_m r'_{mi}} , \tag{3}$$

where r'_{Li}, r'_{Ki}, r'_{Wi}, and r'_{Ti} are the values of the direct-plus-indirect input of labor, capital, other value added and indirect taxes, respectively, into a unit value of good i measured at domestic prices.

The sample consisted of forty-two different engineering exports, with various different types and models of some products bringing the total number of items to fifty-eight. These goods were chosen because data on their F.O.B./domestic price ratios (s_{xi}), total indirect tax incidence and, in some cases, their direct import content, could be gathered in a consistent fashion. Therefore, any biases in the data are likely to be consistent among products.[22]

The direct-plus-indirect factor content of each export was calculated as follows (reference to Figure 1 may help in understanding the procedure). The total value of each export at domestic prices was divided into (1) direct factor content using factor input coefficients derived from the Government of India, Annual Survey of Industries for 1965, (2) direct import content using in general the import replenishment figures given in the Government of India, Import Trade Control Policy for the Year April 1969-March 1970, but in some cases figures from industry sources, (3) indirect tax incidence on direct inputs using drawback figures supplied by industry sources, and (4) domestic intermediate inputs as a residual. Domestic intermediate inputs were then subdivided into steel[23] (using steel contents from the Annual Survey of



Note: *There are several such inputs.

Figure 1 - The method of resolving the value of exported goods into factor and import contents

Industries) and other inputs. The factor content of steel was calculated by (1) taking direct factor contents from the Annual Survey of Industries, (2) determining the direct factor contents of the major domestic inputs into steel from the Annual Survey of Industries, (3) calculating the indirect taxes on these inputs,[24] (4) identifying imported inputs into steel and into steel's domestic inputs, and (5) allocating the residual to other inputs. At this point, direct factor contents, import contents and tax contents were known for the export, the steel in the export, and the major inputs into the steel. It remained to determine the factor and other contents of the residual, other inputs.

From the input-output analysis of the previous section, a weighted average of the direct-plus-indirect factor contents, tax contents and import contents of all intermediate goods sectors was calculated.[25] The weights were the value of the output of each sector used as an intermediate input as given in the ISI input-output table. The value of "other inputs" in each export was then divided in the same proportions as this "average" intermediate input.

An additional resource cost is also evaluated, the extra costs of exports over and above the costs of domestic sales. These extra costs include such factors as extra transport and port charges, extra packing charges, inspection charges, and credit and insurance charges, and were gathered from industry sources. The extra costs of export were added to domestic value added and given a shadow-price ratio, p_E.[26]

The domestic resource cost of each export was calculated; the s_{xi}'s used and the results are given in Table 3. The median of the domestic resource costs for the fifty-eight items (column 5) is Rs.14.37 per U.S. dollar, which is below the general level of DRC for the engineering goods sector as calculated in the previous section. Yet there is no lack of expensive exports in the sample. Twenty-one per cent of the exports have a DRC in excess of Rs.22.5 per dollar, while forty-five per cent have DRC of over Rs.15.0 per dollar. One export, gas mantles, has a negative domestic resource cost. To export Rs.1.00 worth of gas mantles it costs Rs.0.82 in domestic resources plus Rs.1.09 in imported inputs. Thus, for every $1.00 of domestic resources engaged in the export of gas mantles, India loses $0.10 of foreign exchange.[27]

As before, however, the absolute levels of the domestic resource cost are not of as much concern as the wide variation in DRC among products. If the sample is ranked by DRC and divided into tertiles, the median DRC for the top tertile is Rs.11.03 while that for the bottom tertile is Rs.29.25, a ratio of 2.7 to 1.0. The ratio of the highest non-negative DRC to that of the lowest is 14.8 to 1.0.

It is interesting to note that the lowest DRC product, stainless steel dissecting sets, has a high total import content. Import content is a poor guide to resource cost as shown in column 3 of Table 3; the rank correlation between rankings based on direct-plus-indirect import content and DRC is only 0.47. The F.O.B./domestic price ratio (column 1) is only a slightly better proxy for the domestic resource cost on the micro level; the rank correlation between rankings by the two measures is 0.65.

Shadow pricing the domestic resource cost of earning foreign exchange lowers the absolute cost of foreign exchange, but it does little else. Shadow-price ratios of 0.5 were assigned to labor and other value added, 1.5 to capital and 0.54 to the extra costs of export,[28] and the results are shown in Table 3, column 7. The median DRC falls to Rs.8.82 per dollar, a drop of thirty-nine per cent as compared to the median without shadow prices. However, the variation in DRC is not significantly reduced; the ratio of the medians of the highest and lowest tertiles is 2.6, only slightly lower than that before shadow pricing. In addition, the ranking of products is changed only slightly. The rank correlation between rankings before and after shadow pricing is 0.95, with only a few products, spring steel flats, refrigerators, steel tube furniture, steel wool and bibcocks, changing rank significantly.

As before, the significance of the domestic industry once again supplying all the steel consumed in exports was tested. All factor coefficients were once again calculated assuming that all steel previously imported as a direct input was now taken from domestic sources, and also changing the factor content of the "average" intermediate input to reflect steel as a domestic sector. The new domestic costs of foreign exchange are given in Table 4, column 9. The median DRC is Rs.13.43 per dollar, only seven per cent less than it was when high-import-cost imported steel was used.[29] However, although the overall median falls only slightly, there is a more significant reduction in the DRC of the higher cost items. Only eleven per cent of the sample have DRC of over Rs.22.50 per dollar (versus a proportion of twenty-one per cent when steel was imported), and only thirty-five per cent of the items have DRC of over Rs.15.00 per dollar (versus forty-five per cent when steel was imported). Not surprisingly, then, the variation in DRC among items in the sample also falls. The tertile ratio used previously is 2.0, still high but below its value of 2.7 when steel was imported.

The use of domestic steel would change the rankings of the sample, but only by a small amount. The rank correlation (S^2) between the rankings using domestic and imported steel is 0.91. A large portion of the small divergence in rankings is due to the changed rankings of two very steel-intensive products which presently use large amounts of imported steel, steel tube furniture and taps. Excluding these two items yields a rank correlation of 0.96.

Finally, shadow prices were applied to the DRC measures with domestic steel and the results given in column 11. Rankings are quite insensitive to shadow pricing; the S^2 between columns 9 and 11 is 0.96.

IV

Results are only as good as the data which yield them, and the results obtained in Sections II and III must be interpreted with some care. The data used was the best that was available, however, the available data was none too well adapted to the present purposes. Still, the DRC measures in both sections vary so greatly among sectors and among individual products, that fine interpretation seems unnecessary; the wide divergences in costs among exports must seem to be based in fact. It remains to gather, consistently, the kind of data which can make future results more reliable.

The input-output model results of Section II send a clear message. The GOI, in pushing for the export of nontraditional products, is paying a high price for foreign exchange. The median cost of the foreign exchange earned through the export of nontraditional products is 1.6 times that of foreign exchange earned through the export of traditional products. The cost is higher still when the shadow prices of factors are taken into account.

The immediate retort might be that the low elasticities of export demand for India's traditional exports have been ignored, and this is indeed so. In most traditional exports, India is a small enough producer that the elasticity of export demand for Indian exports cannot be low.[30] Efficient traditional exports such as coffee, tobacco, iron ore, cigarettes, silk textiles, oil cakes and timber must surely have rather high elasticities of export demand. Of all the traditional exports studied, only tea, jute textiles, and sugar could be said to have really stagnant and inelastic world market demand. And in these and other traditional Indian exports, the falling shares of India in the world markets are testimony to the existence of supply bottlenecks as well as demand shortages.

If for development and other reasons, the Government of India wishes to promote the growth of nontraditional exports, there are at least some which are relatively efficient. Rayon fabrics, other rubber products, perfumes and cosmetics, paints and varnishes, paper, drugs and glasswares all earn foreign exchange at a reasonable cost. Yet, just as nontraditional exports are subsidized while the more efficient traditional exports are not, so also are the less efficient nontraditional exports subsidized more, and the more efficient nontraditional exports subsidized less. The highest subsidies go to engineering goods, chemicals and plastics, yet these are also the relatively inefficient nontraditional export sectors. Even within the engineering goods sectors, the higher subsidies go generally to the less-processed products such as are in the metal products sector, and the lower subsidies to machinery and equipment such as are in the more efficient non-electrical equipment sector. The observation of Bhagwati and Desai [1970] of the perversity of the Third Plan system of subsidies seems just as true today as it was then.

However, the results in Section III of the survey of goods within the engineering goods sectors suggest that one approach the input-output results with some care. In these sectors at least, where output is heterogeneous, the diversity in the domestic costs of foreign exchange is very great. Although the engineering goods sectors rated poorly overall, they do contain some efficient exports and this implies that working on the sectoral level is not enough; the problem of choosing exports is more complex.

The survey results again bear out the lack of direction of the Indian export-incentive system. When the levels of Cash Assistance (admittedly only a very partial measure of the total subsidy given to exports in India) are plotted against the rankings of the goods surveyed, there is only a barely discernible positive relationship between the rate of subsidy and the efficiency of the export, as seen in Tables 4 and 5.

The implications of this study for export policy and export research are clear: the cost to the economy of foreign exchange earned through different exports varies widely and policy makers must pay far more attention to the composition of exports if exports are to serve their foremost role of saving resources for growth and development. Policy makers must discriminate among exports in promoting them; policies of export maximization can only lead to a waste of resources.

It should not be implied that the DRC criterion is the only criterion for discriminating among exports. The DRC concept as developed here is strictly a medium term measure and is only one of many other inputs into any decision about very short-run or very long-run export policy.

In the long run, comparative advantage can be expected to shift. World demand patterns change, domestic industry and technology change, and no measure which looks primarily at present resource costs and present export prices can be more than one of many tools for predicting future long-term comparative advantage. The engineering goods export sectors which were shown to be so inefficient at present, may become more efficient as time goes on. Certainly this is the expectation of the GOI. However, there seems to be no reason for wasting resources now while planning for the future. Unless inefficient export sectors can develop only through present exports, there is no reason for them to export before their time has come. If they must export in order to develop, the investment in lost resources must be reckoned against the long-term gain. Indeed, planning for the long run, at least in the sphere of world trade, may be quite dangerous given the high degree of uncertainty about future demands, competitors and technologies. It may well be that a series of ongoing, medium-term examinations of exports is preferable to long-term planning.

In the very short run the DRC criterion may also be misleading. The DRC measure spreads fixed costs over all production, the assumption being that if exports are to expand, the whole industry must expand as well, i.e., every industry is at full capacity. In the short run of course this may not be so and the cost of exporting the excess capacity of an industry may be quite a bit lower than implied here. Very short-run export policy must depend more upon presently available supplies than on medium-term efficiency. However, the GOI especially must be careful that its short-term export policies do not become medium- and even long-term policies, as they have tended to do in the past.[31]

Methodologically, the problems involved in export discrimination along the lines suggested in this study are not great. The GOI has all the data needed to rank exports in the way done here, but in far more detail and with far more accuracy. However, the problems in actually discriminating among exports, and exporters, will be much greater, especially, if the attitudes and policies of the GOI toward exports remain unchanged.

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Footnotes

[1]This paper stems largely from research for the author's Ph.D. dissertation [1971]. The research was supported in part by the Center for Research on Economic Development of the University of Michigan and the Indian Mission of the United States Agency for International Development to whom many thanks are due. The author, of course, takes sole responsibility for the facts and interpretations herein.

[2]The inefficiency of Indian import policies has been known for some time (the best summary is found in Bhagwati and Desai [1970]), and several similar charges have recently been made against export policies as well. Actually the charges have been of two types. One, typified by NCAER [1969], has argued that Indian export policies and incentives have been too weak. The other, typified by Bhagwati and Desai [1970], has argued that these policies and incentives have been misdirected and perhaps are even too strong. It is this latter charge that is examined in this study for the post-devaluation period, Bhagwati and Desai having considered only predevaluation schemes.

[3]All of the following issues are discussed in Staelin [1972].

[4]The use of the initials ERP shall refer in this paper to the evaluation of effective protection as defined by Cordon [1966], i.e., the evaluation of the change in factor incomes brought about by the imposition of tariffs. Therefore, ERP shall not, by definition, refer to factor costs.

[5]See, for instance, Tan [1970].

[6]For instance by Krueger [1966] in measuring the total cost of exchange control.

[7]The possible marginal interpretation of ERP examines the marginal

protection to domestic factor incomes resulting from a marginal change in the tariff structure.

[8]This ignores the existence of transport costs whereby the divergence between C.I.F. and F.O.B. prices allows domestically produced inputs to be supplied at a price less than the import price but greater than the export price. The divergence may be large for certain goods. For a more general discussion see Staelin [1972].

[9]It may, of course, be very interesting, if somewhat risky for the reasons given below, to determine the DRC of projects under various different policy assumptions as suggested by Bruno [1972].

[10]Nonfactor value added includes the input of materials and services from sectors not included in A or M.

[11]Detailed discussions of data sources and techniques are found in Staelin [1971].

[12]Some import sectors do have relatively efficient domestic production, but that production is entirely inadequate for domestic needs (e.g., the iron and steel sector). Other import sectors such as non-ferrous metals, have little or no domestic production. Any import sector may in time become a domestic sector as domestic capacity grows, the economy becomes more efficient, and comparative advantage changes. Sectors here labeled as import sectors are those from which any major increases in supply will, in the near future, come from imports.

[13]Sectors with this kind of dual personality are generally those with nonhomogeneous output. It was assumed that marginal supplies would come from imports and domestic production in the same proportions as supplies came from each source in 1964/5, as given in the ISI table.

[14]The import tariff of minus thirty per cent on iron and steel needs some explanation. India produces steel at somewhat above the standard world price ex-factory. However, given the large transport costs for steel shipped to India, the C.I.F. price of steel is above the Indian domestic price. This is possible because the domestic steel price is set by the government-owned steel company at cost, and steel is then rationed. Comparing Indian base steel prices and the unit import prices yielded a price differential of approximately minus forty to fifty per cent. However, much of the imported steel comes from high-cost tied-aid sources and the figure was lowered to minus thirty per cent in order to reflect the possible savings if steel were to be bought on the free market. Lately the world price of steel has been high. On the assumption that it may fall again in the near future, the model was run with a zero tariff on iron and steel. As seen below, there were virtually no important changes in the results.

[15]The shadow price for nonfactor value added is in all cases a weighted average of the other shadow prices, the weights being the (weighted) average factor contents of all sectors used as intermediate goods.

[16]The nontraditional sectors include: electrical equipment, non-electrical equipment, transportation equipment, metal products, cement, man-made fibers, rayon fabrics, ceramics, glass, tires, other rubber products, paper, plastics, dyestuffs, paints and varnishes, drugs and pharmaceuticals, perfumes and cosmetics, and miscellaneous chemicals.

[17]Man-made fibers include all noncellulose fibers such as nylon and dacron.

[18]The justification for a shadow-price ratio of 0.5 is no better, and no worse, than the justification for any other arbitrary figure less than unity. Throughout this study, shadow-price ratios will be rather arbitrarily applied.

They will always be in the correct direction, but since very little work has been done on shadow prices in India, more precise estimates are not possible. However, one of the purposes of this study is to demonstrate that the rankings of Indian industries by the domestic resource cost of foreign exchange is not greatly affected by even relatively large changes in the shadow prices of factors.

Although it would be preferable to apply separate shadow-price ratios to the profits of each sector, the lack of data precludes any meaningful effort in this direction.

[19]This is a form of the Manoilesco-Hagen argument for industrial protection.

[20]See Bhagwati [1969].

[21]As mentioned at the beginning of this section, imported steel is relatively expensive at C.I.F. prices in India. A tariff of minus thirty per cent was implied by the actual domestic/C.I.F. price ratios. Yet the results of the model are not sensitive to this figure, just as they are not very sensitive to the source of steel. If steel were imported at a lower price, equal to the domestic price, the change in rankings would be marginal. The rank correlation between rankings based on the use of high-cost imported steel and those based on the use of low-cost imported steel is 0.99.

[22]This data and much of the data hereinafter attributed to "industry sources" is confidential. All data has been put in terms of the domestic price as a numeraire.

[23]Where steel was an allowed item of import replenishment, steel inputs were considered a direct import. When steel was not an allowed item for import replenishment, it was considered a domestic input and its content in

each export item taken from the Annual Survey of Industries.

[24]Sales taxes were assumed to apply at the rate of five per cent while Central Excise taxes were taken from government sources.

[25]Initially, steel was treated as an import sector.

[26]The actual expression for DRC_i then became

$$DRC_i = \frac{p_L r'_{Li} + p_K r'_{Ki} + p_W r'_{Wi} + p_T r'_{Ti} + p_E r'_{Ei}}{s_{xi} - \sum_m r'_{mi}} .$$

It was assumed (for lack of better data) that all extra costs of export were domestic. The shadow-price ratio p_E is always a weighted average of the labor, capital, and other value added shadow-price ratios, the weights being the factor contents of the "average" intermediate input referred to above.

[27]The very high import content of gas mantles, which leads to the negative DRC value, was derived from figures given by the manufacturer.

[28]The figure for the extra costs of export was arrived at by assuming that the extra costs of export contained factors in the same proportions as the "average" intermediate input referred to previously, and then weighing the shadow-price ratios for labor, capital and other value added by these proportions.

[29]It will be remembered that imported steel is very high cost; its domestic price is thirty per cent below its import price.

[30]Take for instance cotton textiles. Even assuming that the elasticity of export demand for cotton textiles from India is only 5.0, the domestic resource cost of foreign exchange earned through exports of cotton textiles rises to only Rs.11.50 per dollar, still less than the DRC of the median nontraditional export.

[31]It is not hard to explain the tendency of short-term policy solutions to outlive their time. The GOI has typically made export policy only in respone to crises. When crises have been temporarily averted through _ad hoc_ short-term policies, the government drops the whole matter and the policies used to cure specific crises live on in the absence of any subsequent decisions.

Table 1

Vectors of F.O.B./Domestic Price Ratios and C.I.F./Domestic Price Ratios

Export Sector	F.O.B./ Domestic Price Ratio	Import Sector	C.I.F./ Domestic Price Ratio
Electrical equipment	0.50	Electrical equipment	0.75
Non-electrical equipment	0.70	Non-electrical equipment	0.75
Transportation equipment	0.50	Transportation equipment	0.57
Metal products	0.60	Metal products	0.75
Iron ore	3.33[1]	Iron and steel	-0.30[2]
Cement	0.66	Non-ferrous metals	0.91
Leather	1.00	Rubber	0.75
Leather footwear	0.85	Animal husbandry, including raw skins and hides	1.00
Sugar	0.40	Vegetable oil and cakes	0.63
Plantations, including tea and coffee	1.00	Milk products	1.00
Vegetable oil and cakes	0.95	Cotton	0.95
Cigarettes and cigars	1.00	Jute	1.00
Bidi	1.00	Raw silk	0.74
Other tobacco products	1.00	Fruits and vegetables	1.00
Processed cashewnuts	1.00	Fertilizers	1.00
Cotton yarn	0.90	Other forest products	0.75
Cotton textiles	0.90	Crude oil	1.00
Jute textiles	1.00	Paper and paper products	0.75
Wool yarn	1.00	Plastics	0.63
Wool textiles	0.90	Dyestuffs	0.67
Silk textiles	1.00	Insecticides and pesticides	0.91
Man-made fibers	0.40	Drugs and pharmaceuticals	0.63
Rayon fabrics	0.90	Miscellaneous chemicals	0.63
Other textiles	0.90		
Tobacco	1.00		
Ceramics and bricks	0.65		
Glass and glasswares	0.83		
Wood products, including plywood	0.65		

Table 1 (Continued)

Export Sector	F.O.B./ Domestic Price Ratio	Import Sector	C.I.F./ Domestic Price Ratio
Timber	1.00		
Chinaware and pottery	0.83		
Rubber footwear	0.90		
Tires and tubes	0.60		
Other rubber products	0.90		
Paper and paper products	0.85		
Plastics	0.54		
Dyestuffs	0.60		
Paints and varnishes	0.80		
Drugs and pharmaceuticals	0.80		
Soap and glycerine	0.75		
Perfume and cosmetics	0.80		
Miscellaneous chemicals	0.55		
Matches	0.70		

[1]In the ISI input-output table, iron ore is valued at its price ex-works which is very low compared to its price at the port since transport charges from the mine to the port are more than 100% of the ex-works value. The F.O.B. price of iron ore therefore exceeds its domestic ex-works price by a large margin; when transport charges and port charges are added, however, the F.O.B. price is approximately equal to the price of the ore at the port.

[2]See an explanation of this figure in a footnote to the text.

Source: As explained in the text.

Table 2

Export Sectors Ranked by DRC Under Various Shadow Prices and Steel Sources, and by Direct Import Content (DRC in rupees per dollar)

	Steel Imported										Steel Domestic	
			$p_K=1$, $p_L=1$ $p_W=1$, $p_N=0.9$		$p_K=1$, $p_L=1$ $p_W=0.5$, $p_N=0.7$		$p_K=1.5$, $p_L=0.5$ $p_W=0.5$, $p_N=0.55$		$p_K=1.5$, $p_L=$—[1] $p_W=0.5$, $p_N=0.55$		$p_K=1.5$, $p_L=0.5$ $p_W=0.5$, $p_N=0.55$	
	Direct Import Content (in %)[2] (1)	Over-all Rank (2)	DRC (3)	Over-all Rank (4)	DRC (5)	Over-all Rank (6)	DRC (7)	Over-all Rank (8)	DRC (9)	Over-all Rank (10)	DRC (11)	Over-all Rank (12)
Silk textiles	45	33	4.76	1	4.28	1	2.74	1	3.99	5	2.74	1
Rayon fabrics	5	12	6.15	2	4.61	3	3.66	8	3.67	2	3.66	8
Cigarettes and Cigars	10	19	6.28	3	4.55	2	3.46	3	4.18	8	3.45	3
Leather	54	37	6.44	4	4.64	4	3.60	5	4.20	9	3.60	5
Other tobacco products	2	4	6.44	4	4.79	5	3.43	2	4.63	15	3.43	2
Processed cashewnuts	67	41	6.55	6	5.56	15	3.46	3	5.33	21	3.46	4
Wool yarn	57	39	6.56	7	5.26	9	3.63	6	3.63	1	3.63	6
Bidi	3	8	6.62	8	4.99	6	3.63	6	4.57	14	3.63	6
Jute textiles	57	39	6.68	9	5.53	14	3.71	9	3.71	3	3.70	9
Iron ore	1	1	6.77	10	5.21	7	4.23	18	4.23	10	4.23	18
Other rubber products	26	29	6.86	11	5.25	8	3.88	14	3.89	4	3.86	13
Rubber footwear	25	28	6.87	12	5.98	20	3.80	12	5.46	23	3.80	12

Table 2 (Continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Plantations, inc. tea and coffee	4	10	7.27	13	5.46	12	3.76	10	5.40	22	3.76	10
Other textiles	6	14	7.31	14	5.28	10	4.09	16	4.12	6	4.08	16
Cotton textiles	3	8	7.39	15	6.79	26	4.10	17	4.12	6	4.10	17
Tobacco	2	4	7.45	16	5.62	16	3.86	13	5.65	25	3.86	13
Timber	1	2	7.46	17	6.67	23	3.76	10	6.63	29	3.76	10
Vegetable oil and cakes	3	8	7.50	18	5.46	12	3.90	15	5.49	24	3.90	15
Perfumes and cosmetics	15	22	7.61	19	6.20	22	4.27	20	4.92	19	4.25	19
Paper and paper products	18	23	7.78	20	6.13	21	4.69	25	4.88	17	4.68	26
Paints & varnishes	21	25	7.81	21	5.80	18	4.35	22	4.47	12	4.30	22
Soap & glycerine	33	30	7.82	22	5.39	11	4.29	21	4.92	18	4.27	21
Wool textiles	2	4	8.00	23	5.69	17	4.26	19	4.26	11	4.26	20
Cotton yarn	53	8	8.01	24	7.10	28	4.46	23	4.48	13	4.46	23
Leather footwear	4	10	8.24	25	6.80	27	4.50	24	6.38	28	4.50	24
Drugs and pharmaceuticals	8	17	8.50	26	5.92	19	4.69	25	4.87	16	4.67	25
Chinaware and pottery	6	14	8.51	27	6.77	25	4.87	27	6.22	26	4.87	27
Glass & glassware	12	20	8.63	28	6.76	24	5.03	28	5.15	20	5.02	28
Matches	13	21	9.89	29	7.90	31	5.35	29	7.49	34	5.35	29
Ceramics & bricks	5	12	11.12	30	8.46	32	6.15	31	6.25	27	6.14	33
Wood products, inc. plywood	2	4	11.22	31	7.58	29	5.79	30	6.84	30	5.78	31

Table 2 (Continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Cement	8	17	11.42	32	8.90	33	6.88	32	6.89	31	6.80	34
Dyestuffs	18	23	12.18	33	7.87	30	6.90	33	6.94	32	6.85	35
Non-electrical equipment	42	31	12.50	34	9.69	35	7.11	34	7.28	33	5.56	30
Plastics	23	26	13.22	35	10.04	36	7.79	36	7.85	36	7.51	37
Tires and tubes	43	32	13.61	36	9.32	34	7.53	35	7.55	35	7.33	36
Misc. chemicals	23	26	14.18	37	10.61	37	8.60	37	8.74	37	8.48	39
Sugar	8	17	19.45	38	14.81	38	10.61	38	14.51	41	10.61	41
Electrical equipment	57	39	20.86	39	15.56	39	11.56	39	11.64	38	8.63	40
Metal products	70	42	21.98	40	15.83	40	11.80	40	11.82	39	5.97	32
Transportation equipment	53	35	24.12	41	20.14	42	14.17	41	14.35	40	8.19	38
Man-made fibers	49	34	26.69	42	18.95	41	16.68	42	16.72	42	16.40	42

[1] In column 7, labor in the mining and manufacturing sectors is given a p_L=0.5 and labor in all other sectors a p_L=1.0.

[2] As a proportion of the export price.

Source: Calculated as explained in the text.

Table 3

Export Products Ranked by DRC under Various Shadow Prices and Steel Sources, and by s_x and Import Content

Item			Steel Imported						Steel Domestic			
	s_x (in %)	Rank	Total Import Content (in %)[2]	Rank	DRC with $p_K=1$, $p_L=1$, $p_W=1$, $p_E=1$	Rank	DRC with $p_K=1.5$, $p_L=0.5$, $p_W=0.5$, $p_E=0.54$	Rank	DRC with $p_K=1$, $p_L=1$, $p_W=1$, $p_E=1$	Rank	DRC with $p_K=1.5$, $p_L=0.5$, $p_W=0.5$, $p_E=0.55$	Rank
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Stainless steel dissecting set	109	1	66.1	50	8.40	1	4.73	1	7.58	1	5.03	1
Lifting and pulling machine	78	7	18.2	10	9.90	2	6.15	3	9.75	5	6.08	5
Charcoal-heated iron	97	3	18.0	9	9.98	3	6.00	2	9.75	5	5.93	3
Transmission line tower	68	14	27.1	20	9.98	3	6.38	5	9.15	2	6.08	5
Road roller	74	8	30.7	26	10.20	5	6.45	7	9.83	7	6.30	8
Oil expeller	81	5	25.3	18	10.35	6	6.60	8	10.20	8	6.60	12
Knitting machine	102	2	23.2	16	10.65	7	6.23	4	10.50	12	6.23	7
Hand tools	72	10	34.3	33	10.73	8	6.38	5	9.45	3	5.70	2
Rivit (a)	67	17	13.6	3	10.80	9	7.05	13	10.58	13	6.98	14
Black conduit (d)	60	26	14.0	5	11.03	10	7.43	16	10.80	14	7.35	19
Diesel engine (a)	67	17	29.4	23	11.18	11	6.90	10	10.20	8	6.53	10
Bench vise (b)	87	4	39.0	34	11.18	11	6.60	8	9.68	4	6.08	5
Diesel engine (b)	69	12	30.1	24	11.33	13	6.98	11	10.28	10	6.53	10
Steel wool	74	8	8.0	1	11.70	14	8.18	21	11.48	17	8.10	24
Turbine pump	66	20	21.5	14	11.85	15	7.13	14	11.48	17	6.98	14

Table 3 (Continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Black conduit (c)	57	29	14.4	6	12.08	16	8.10	19	11.78	21	7.95	23
Bench vise (a)	81	5	40.0	35	12.15	17	7.13	14	10.28	10	6.38	9
Bibcock (b)	72	10	31.0	27	12.23	18	6.98	11	11.85	22	6.83	13
Lockset	61	23	20.2	12	12.38	19	7.50	17	11.70	20	7.20	17
Galvanized conduit (c)	61	23	26.9	19	12.83	20	8.55	25	12.23	23	8.25	25
Black conduit (b)	55	35	14.9	7	12.90	21	8.63	27	12.60	25	8.48	27
Diesel engine (d)	61	23	34.1	32	13.13	22	8.10	19	11.63	19	7.35	19
Gudgeon pin	62	21	25.2	17	13.13	22	8.63	27	12.90	27	8.48	27
Rivit (b)	67	17	44.2	37	13.20	24	7.95	18	---[1]	--[1]	---[1]	--[1]
Steel weld mesh	52	39	13.8	4	13.58	25	8.70	29	13.28	28	8.55	29
Diesel engine (c)	59	27	32.5	29	13.80	26	8.45	22	12.23	23	7.73	22
Spring steel flat	55	35	10.7	2	13.88	27	10.05	37	13.50	30	9.83	38
Sewing machine	56	32	20.4	13	13.88	27	8.48	22	13.35	29	8.25	25
Automobile parts	57	29	32.1	28	14.25	29	8.93	30	13.73	31	8.63	30
Taps	68	14	52.4	44	14.48	30	8.55	25	11.48	17	7.20	17
Galvanized conduit (d)	52	39	29.0	22	14.70	31	9.98	36	13.73	31	9.38	35
Galvanized conduit (b)	54	37	28.7	21	14.93	32	10.05	37	14.03	33	9.45	36
Refrigerator	61	23	42.6	36	15.23	33	8.55	25	12.75	26	7.58	21
Black conduit (a)	49	47	16.3	8	15.23	33	9.90	35	14.78	35	9.83	38
Trailer	49	47	19.6	11	15.38	35	9.60	34	14.40	34	9.15	32
Door lock	51	41	22.2	15	15.83	36	9.53	32	14.93	36	9.15	32
Electric fan	50	44	33.6	30	15.90	37	9.53	32	15.08	38	9.15	32
Steel tube furniture	67	17	56.1	46	16.05	38	9.30	31	11.18	15	7.05	16
Filter element	51	41	33.9	31	17.18	39	10.65	40	16.20	40	10.13	41

Table 3 (Continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Capacitor (a)	48	49	50.4	40	17.70	40	10.43	39	16.65	42	9.98	40
Galvanized conduit (a)	47	50	30.6	25	17.85	41	12.00	43	16.50	41	11.18	44
Dynamo armature	55	35	50.0	39	18.60	42	10.80	41	15.83	39	9.45	36
Water fitting	54	37	60.2	48	20.10	43	11.55	42	22.35	51	10.88	42
Projector	50	44	51.6	41	20.18	44	12.68	46	18.75	45	11.93	48
Capacitor (b)	43	52	52.1	42	21.15	45	12.60	45	19.58	48	11.70	47
Egg beater	56	37	53.0	45	21.53	46	12.45	44	15.00	37	9.15	32
Radiator	43	52	46.0	38	24.30	47	14.18	47	19.20	46	11.55	46
Automobile axle	44	51	57.3	47	28.88	48	17.40	48	17.25	43	10.95	43
Agricultural sprayer	50	44	67.2	51	29.25	49	17.78	49	20.33	49	12.75	50
Hacksaw frame	39	56	52.1	42	30.68	50	18.23	50	18.08	44	11.18	44
Enamel wire (a)	68	14	81.7	54	33.75	51	20.18	51	33.75	52	20.18	53
Twist drill	39	56	60.5	49	36.08	52	21.30	52	19.20	46	11.93	48
Basin mixer	41	53	68.0	52	41.18	53	23.63	53	34.35	53	19.95	52
Enamel wire (b)	59	27	93.4	56	74.40	54	44.40	54	63.60	55	38.03	55
Bibcock (a)	28	58	79.6	53	97.50	55	56.18	55	62.85	54	36.83	54
Enamel wire (c)	56	32	94.5	57	98.70	56	59.03	56	79.43	56	47.85	56
Black conduit (e)	39	56	91.0	55	124.20	57	73.58	57	21.98	50	14.03	51
Gas mantle	50	44	108.8	58	-69.53	58	-40.73	58	-100.88	57	-59.78	57

[1] Rivit (b) was deleted as it differed from rivit (a) only in having its steel content imported.

[2] As a proportion of the export price.

Table 4

Frequency of Cash Assistance of Various Rates in
Each Tertile of the DRC Rankings

Tertile Ranking	Rates of Cash Assistance (in per cent)						
	NA	0	5	10	15	20	25
Least efficient tertile	1	3	0	9	3	1	1
Middle tertile	0	0	0	4	7	6	3
Most efficient tertile	1	1	0	6	5	6	1

Source: Rankings are taken from Table 3 and are before shadow pricing. Cash Assistance rates are taken from industry sources.

Table 5

Frequency of Additional Cash Assistance Rates in
Each Tertile of the DRC Rankings

Tertile Ranking	Rates of Additional Cash Assistance (in per cent)		
	5	7-1/2	10
Least efficient tertile	2	2	0
Middle tertile	9	1	0
Most efficient tertile	7	0	0

Source: Rankings are taken from Table 3 and are before shadow pricing. Cash Assistance rates are taken from industry sources.

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