# SELF-RELIANCE AND EXPORT PERFORMANCE: A CASE STUDY OF INDIA AND INDONESIA

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## I. INTRODUCTION

IN MANY less-developed countries, reduction in import dependence and diversification of the industrial structure are regarded as important objectives of planned economic development. From the point of view of the theory of international trade, both of these fall in the category of noneconomic objectives and, hence, call for a departure from a policy of unified exchange rates.[1] In order to achieve these objectives, a host of policy measures are generally adopted with a great deal of emphasis on policies of import substitution; India and Indonesia have been no exception.

For instance in India, since the occurrence of the foreign exchange crisis (1957–58) the government of India has pursued a policy of rigid import controls, with the exception of commodities which are imported under P.L. 480. The import policy has had two objectives: (a) to curb nonessential imports and (b) to produce previously imported goods domestically (achieve self-reliance).[2] Since these policies involve departures from a model of unified exchange rates, they invariably involve some social costs. While the present paper does not address itself to measuring the social costs involved in departures from unified exchange rates, it attempts to quantify the degree of sectoral import dependence on the basis of an inter-industry model.

The inter-industry model is especially helpful in analyzing sectoral import dependence because (a) the inter-industry model can measure indirect import dependence and (b) the open input-output model can suggest areas in which import dependence may be reduced by restricting nonessential consumption (which is significant in many less-developed countries). We shall present the model in Section II and results in Section III.

## II. THE MODEL

The following notation is used.

[1] See Bhagwati [2], and Bhagwati and Srinivasan [3].

[2] For the Indian trade policy, see, for example, Bhagwati and Chakravarty [4]. In Indonesia, a system of comprehensive licensing of imports has been operated by the Indonesian government since 1958. The import policy from the First Five-Year Plan (1969–73)

$a_{ij}$ = Leontief input coefficients.
$E_j$ = exports of sector $j$.
$F_j$ = final demand of sector $j$.
$m_i$ = import input coefficients.
$k_{ij}$ = elements of $[I - A + m]^{-1}$ where $[A]$ represents an mxn matrix of technology, and $[m]$, a diagonal matrix of import coefficients.

In the transactions tables prepared by the Indian and Indonesian governments no distinction has been made between competitive imports and noncompetitive imports. A matrix of inter-industrial distribution of imports, showing inputs of domestic origin separately from those arising through imports has also not been prepared. Each cell of the transaction table only presents the total transactions and is not split into two subcells, one for imports and the other for the domestic component.

Since the matrix of the inter-industrial distribution of imports is not available in the case of both the Indian and the Indonesian economies, such a matrix can only be derived on the basis of certain assumptions. Two alternative and mutually exclusive assumptions may be made regarding the allocation of imports into various sectors. One can assume that all imports are noncompetitive, hence, there exists a proportionality relationship between imports and gross domestic output levels. Alternatively one can assume that all imports are competitive, hence, are distributed across the rows of the transactions table in the same way as the total supply.[3] We have made computations on the basis of both the assumptions. These computations do not lead to any significant difference in the qualitative nature of our results, hence, we shall only report results obtained on the basis of the proportionality assumption. This assumption can be more precisely stated as:

$$m_{ii}=M_i/X_i \,. \tag{1}$$

Equation (1) provides us with a diagonal matrix of import coefficients.

By using equation (1), we are assuming that all imports are noncompetitive. This is not an unreasonable assumption, given that there is considerable governmental effort to reduce the level of imports.[4] It is of course difficult to say whether such coefficients will be stable over time.

Sector-wise inter-industrial import requirements on current account can be computed with the help of the following expression:

$$\sum_{i=1}^{m} m_i k_{ij} F_j = V_j, \; (j=1, \cdots, m)\,, \tag{2}$$

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has been directed towards the improvement of plant making goods to replace imports or goods for export and the restriction of nonessential imports (see [1]).

[3] For methods of generating import coefficient tables, see Hazari [5].

[4] In India, imports are of specialized types due to quantitative restrictions being based on the principle "that domestic availability justified exclusion of imports." See, for example, [4] and [6].

where $V_j$ indicates the total direct and indirect imports required by sector $j$ to sustain $F_j$.

For measuring the sectoral import dependence in relation to its exports the following index of capacity to import is used:

$$\sum_{i=1}^{m} m_i k_{ij} F_j / E_j = V_j / E_j = N_j, \ (j = 1, \cdots, m), \tag{3}$$

where $N_j$ indicates the imports required (direct and indirect) per unit of export to sustain $F_j \cdot N_j$ lies between 0 and $\infty (0 \leqq N_j \leqq \infty)$. If $N_j = 1$, the exports of the sector under consideration are exactly equal to its import requirements. If $N_j = 0$, the sector requires no direct or indirect imports for sustaining $F_j$. If $N_j > 0$, but less than unity $(0 < N_j < 1)$, then the sectoral exports are sufficient for sustaining sectoral import requirements. Finally, if $N_j > 1$, a unit of export is not sufficient for sustaining sectoral import requirements.

By considering the trading sectors only, i.e., sectors that actually export and import, it is possible to exclude 0 and $\infty$ as values of $N_j$. In the analysis of developing countries, however, potential trading sectors (i.e., sectors that are capable of participating in international trade) should be considered. The sectors that are incapable of exporting their output may be omitted (typically services sectors) from the analysis.

The relative capacity to earn foreign exchange per unit of export is indicated by

$$\left(E_j - \sum_{i=1}^{m} m_i k_{ij} E_j\right) \Big/ E_j = 1 - \sum_{i=1}^{m} m_i k_{ij} \, . \tag{4}$$

This expression shows the amount of net foreign exchange earned per unit of export. Such an index is useful for ranking sectors according to the capacity to earn foreign exchange per unit of export. It is important to distinguish the index contained in equation (4) from the index contained in equation (3). The index contained in equation (3) depends on final demand, hence, does not indicate the technical capacity of the sector to earn foreign exchange. A sector may have a high $N_j$ and a high capacity to earn foreign exchange. All that the government needs to promote self-reliance in such a sector, is to curb non-essential consumption.

## III. RESULTS

The empirical computations for India are based on the (77 × 77) sector input-output table prepared by the Perspective Planning Division of the Planning Commission of India for the year 1964–65. The results for Indonesia were obtained on the basis of the (43 × 43) sector input-output table prepared by Leknas-Kyodai (National Institute of Economic and Social Research) and the Center for Southeast Asian Studies (Kyoto University) for the year 1969. The Indian table was not aggregated to the size of the Indonesian table, as the present study

is not concerned with a structural comparison of the Indian and Indonesian tables.

The sectoral capacity-to-import index has been obtained for both India and Indonesia via equation (3). Sectors characterized by values of $N_j > 1$ are presented in Tables I and II for India and Indonesia respectively. $N_j > 1$ implies that the sectors fail to meet their own import requirements. A study of Tables I and II reveals that in the case of both the countries most of the sectors that fail to meet their own import requirements are modern sectors, i.e., sectors that contain industries set up in the post-independence period. For example, in India, electrical equipment, transport equipment, metal products, vanaspati, etc. are modern sectors that fail to meet their own import requirements. In the case of Indonesia, for instance, metal products, rubber and products, food manufacturing, nonmetallic mineral products, leather and products, etc. are modern sectors that are unable to meet their own import requirements.

In Tables I and II, we have also listed the potential trading sectors for both India and Indonesia. Potential trading sectors are defined as those which produce goods that are in principle exportable. In the case of India, these sectors are

TABLE I

SECTORS CHARACTERIZED BY INABILITY TO MEET THEIR OWN IMPORT REQUIREMENTS: INDIA

| Number | Name | Values of $N_j$ |
|---|---|---|
| 2 | Electrical equipment | 44.24 |
| 3 | Nonelectrical equipment | 68.11 |
| 4 | Transport equipment | 13.07 |
| 5 | Metal products | 15.45 |
| 13 | Other leather products | 1.05 |
| 14 | Leather footwear | 2.49 |
| 21 | Vanaspati | 6.85 |
| 27 | Cigarettes and cigars | 6.95 |
| 38 | Woolen yarn | 1.61 |
| 43 | Artificial fabrics | 2.31 |
| 48 | Fruits and vegetables | 1.31 |
| 59 | Petroleum products | 2.87 |
| 69 | Drugs and pharmaceuticals | 1.54 |
| 24 | Milk products | $\infty$ |
| 25 | Breweries and soft drinks | $\infty$ |
| 26 | Biscuits and confectionery | $\infty$ |
| 28 | Bidi | $\infty$ |
| 32 | Foodgrains | $\infty$ |
| 55 | Chinaware and pottery | $\infty$ |
| 61 | Rubber footwear | $\infty$ |
| 62 | Tires and tubes | $\infty$ |
| 65 | Plastic | $\infty$ |
| 70 | Soap and glycerine | $\infty$ |

Note: All sectors characterized by $N_j = \infty$ are potential trading sectors.

TABLE II

SECTORS CHARACTERIZED BY INABILITY TO MEET THEIR OWN IMPORT REQUIREMENTS: INDONESIA

| Number | Sector | Values of $N_j$ |
|---|---|---|
| 21 | Rubber and products | 4537.519 |
| 25 | Nonmetallic mineral products | 253.832 |
| 19 | Printing | 129.303 |
| 27 | Metal products* | 55.482 |
| 37 | Commercial trade | 13.936 |
| 28 | Manufacturing and repairing machine | 7.325 |
| 11 | Food manufacturing | 6.672 |
| 20 | Leather and products | 4.851 |
| 24 | Other chemical products | 3.740 |
| 10 | Other mining and quarrying | 2.019 |
| 15 | Wearing and textile goods | 1.485 |
| 23 | Petrochemical products | 1.110 |
| 14 | Textiles | $\infty$ |
| 17 | Furniture and fixture | $\infty$ |
| 18 | Paper and products | $\infty$ |
| 26 | Basic metals | $\infty$ |
| 29 | Manufacturing and repairing of electrical machine | $\infty$ |

* Metal products except machinery and transportation equipment.

milk products, breweries and soft drinks, biscuits and confectionery, foodgrains, chinaware and pottery, rubber footwear, tires and tubes, plastic, and soap and glycerine. In the case of Indonesia, they are textiles, furniture and fixtures, paper and products, manufacturing, and basic metals. The failure of these sectors to export may be due to three factors: (1) their inability to meet domestic demand, (2) their inability, in some cases, to produce products that meet international standards, and (3) high cost of production due to trade policies. Since all these sectors are potential trading sectors, it is important for the governments of both India and Indonesia to make an effort to export the products of these sectors.

Tables III and IV list sectors characterized by values of $N_j = 1$ or less than 1 for India and Indonesia. Most of these sectors are traditional in India's and Indonesia's economic structure. Only a few modern sectors in India are in a position to meet their own import requirements, e.g., perfumes and cosmetics, rubber products, and paper and paper products. In the case of Indonesia, only fertilizer and miscellaneous manufacture are the modern sectors that meet their own import requirements.

Two conclusions follow from Tables I, II, III, and IV: (1) In both countries, self-sufficiency in modern sectors is a far off goal. This may not appear to be true in studies that do not take indirect interdependence into account. (2) When both direct and indirect import requirements and final demand are considered, then it appears that the structure of trade has not changed very much from the traditional one, in terms of ability to earn foreign exchange. One should, how-

ever, be careful in drawing policy conclusions from input-output analysis. For instance, we cannot conclude from Tables I–IV that the sectors that lose foreign exchange should be discouraged. Such a conclusion can only be derived on the basis of an optimizing planning model. Tables I–IV only help in policy evaluation, i.e., in answering the question as to what the structure looks like, given that certain policies have been pursued in the past.

TABLE III

TRADING SECTORS CHARACTERIZED BY SELF-SUFFICIENCY: INDIA

| Number | Name | Value of $N_j$ |
|---|---|---|
| 6 | Iron and steel | 0.1618 |
| 7 | Iron ore | 0.0712 |
| 8 | Cement | 0.2653 |
| 10 | Other minerals | 0.1630 |
| 12 | Leather | 0.0176 |
| 15 | Animal husbandry | 0.1647 |
| 17 | Sugar | 0.0367 |
| 18 | Plantations | 0.0268 |
| 20 | Vegetable oils | 0.2631 |
| 29 | Other tobacco products | 0.3798 |
| 30 | Fruits and vegetable pres. | 0.3557 |
| 31 | Cashew nut processing | 0.0305 |
| 33 | Cotton | 0.0842 |
| 34 | Cotton yarn | 0.2492 |
| 35 | Cotton textiles | 0.7525 |
| 36 | Jute | 0.0144 |
| 37 | Jute textiles | 0.0066 |
| 39 | Woolen textiles | 0.5388 |
| 40 | Raw silk | 0.0007 |
| 41 | Silk textiles | 0.2794 |
| 44 | Other textiles | 0.1621 |
| 45 | Oilseeds | 0.9574 |
| 47 | Tobacco | 0.0085 |
| 49 | Other crops | 0.0112 |
| 51 | Ceramics, bricks, etc. | 0.0455 |
| 52 | Glass and glassware | 0.7603 |
| 53 | Wood products | 0.1826 |
| 56 | Wood others | 0.0677 |
| 57 | Other forest products | 0.0377 |
| 63 | Other rubber products | 0.9414 |
| 64 | Paper and paper products | 0.6946 |
| 66 | Dyestuffs | 0.0256 |
| 67 | Paints and varnishes | 0.0353 |
| 71 | Perfumes and cosmetics | 0.5124 |
| 72 | Miscellaneous chemicals | 0.0634 |
| 75 | Coal and coke | 0.1206 |

TABLE IV

TRADING SECTORS CHARACTERIZED BY SELF-SUFFICIENCY: INDONESIA

| Number | Name | Value of $N_j$ |
|---|---|---|
| 2 | Other farm and food products | 0.105 |
| 3 | Farm nonfood crops | 0.214 |
| 4 | Estate crops | 0.095 |
| 5 | Animal husbandry | 0.207 |
| 6 | Forestry | 0.047 |
| 7 | Fishery | 0.266 |
| 8 | Oil mining | 0.119 |
| 9 | Tin mining | 0.013 |
| 12 | Beverages | 0.012 |
| 13 | Tobacco | 0.003 |
| 16 | Wood, bamboo, rattan, etc. | 0.146 |
| 22 | Fertilizer | 0.996 |
| 31 | Miscellaneous manufacture | 0.219 |
| 35 | Warehousing | 0.891 |

On the basis of equation (4), we derived results regarding the intrinsic ability of sectors to earn foreign exchange. In the case of India, we list the top fifteen sectors, i.e., sectors which show a great deal of export profitability. For Indonesia we list all the sectors. One general comment can be made about the export profitability in both countries. In both the countries the traditional sectors do exceedingly well. In other words, most of the modern sectors are characterized by high import intensities. However, final demand does play a role. For example,

TABLE V

RANKING OF TOP FIFTEEN SECTORS IN TERMS OF EXPORT PROFITABILITY: INDIA

| Number | Name | Rank | Foreign Exchange Earned per Unit of Export |
|---|---|---|---|
| 49 | Other crops | 1 | 0.9985 |
| 53 | Wood products | 2 | 0.9980 |
| 15 | Animal husbandry | 3 | 0.9969 |
| 17 | Sugar | 4 | 0.9967 |
| 29 | Other tobacco products | 5 | 0.9947 |
| 37 | Jute textiles | 6 | 0.9936 |
| 45 | Oilseeds | 7 | 0.9896 |
| 39 | Woolen textiles | 8 | 0.9888 |
| 64 | Paper and paper products | 9 | 0.9865 |
| 7 | Iron ore | 10 | 0.9864 |
| 38 | Woolen yarn | 11 | 0.9859 |
| 21 | Vanaspati (hydrogenated oil) | 12 | 0.9855 |
| 18 | Plantations | 13 | 0.9849 |
| 12 | Leather | 14 | 0.9827 |
| 52 | Glass and glassware | 15 | 0.9818 |

TABLE VI

RANKING OF SECTORS IN TERMS OF EXPORT PROFITABILITY: INDONESIA

| Number | Name | Rank | Foreign Exchange Earned per Unit of Export |
|---|---|---|---|
| 13 | Tobacco | 1 | 1.000 |
| 7 | Fishery | 2 | 0.999 |
| 5 | Animal husbandry | 3 | 0.994 |
| 2 | Other farm and food products | 3 | 0.994 |
| 12 | Beverages | 4 | 0.991 |
| 9 | Tin mining | 5 | 0.987 |
| 35 | Warehousing | 6 | 0.966 |
| 6 | Forestry | 7 | 0.953 |
| 20 | Leather and products | 8 | 0.925 |
| 16 | Wood, bamboo, rattan, etc. | 9 | 0.906 |
| 4 | Estate crops | 10 | 0.905 |
| 11 | Food manufacturing | 11 | 0.899 |
| 31 | Miscellaneous manufacturing | 12 | 0.889 |
| 8 | Oil mining | 13 | 0.881 |
| 34 | Transportation | 14 | 0.843 |
| 21 | Rubber and products | 15 | 0.839 |
| 19 | Printing | 16 | 0.787 |
| 3 | Farm nonfood crops | 17 | 0.786 |
| 15 | Wearing and textile goods | 18 | 0.717 |
| 27 | Metal products | 19 | 0.643 |
| 23 | Petrochemical products | 20 | 0.631 |
| 25 | Nonmetallic mineral products | 21 | 0.330 |
| 10 | Other mining and quarrying | 22 | 0.270 |
| 24 | Other chemical products | 23 | 0.269 |
| 37 | Commercial trade | 24 | 0.168 |
| 28 | Manufacturing and repairing machine | 25 | 0.053 |
| 22 | Fertilizer | 26 | 0.004 |

take the case of vanaspati in India.[5] Vanaspati has rank 12 on the basis of the export profitability index but is characterized by an inability to meet its own import requirements. Vanaspati is a clear case of a commodity that can be exported by curtailing domestic Indian consumption and generating an export surplus. Similar examples can be given from Indonesia. For instance, in Indonesia leather and products has rank 8 in terms of the export profitability index and is characterized by an inability to meet its own import requirements.

[5] In a study, Hazari [5] has identified vanaspati as a nonessential consumption good.

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