The Concept of Import Substitution

Padma Desai

Recent writings on international trade and development make frequent, use of the concept of import-substitution.

No discussion is available, however, of possible (alternative) definitions of import-substitution, the purpose for which each is suitable and the measurement problems each presents.

This paper considers two alternative concepts of import-substitution.

**IMPORT-substitution (or import paving)** is sometimes held to mean 'reduced dependence on imports' of the economy. For instance, consider the following excerpt: "Although I have allowed for an increase in imports (for 1961-71, India) above the 1960-61 level and thus assumed no absolute import-saving, there would have to be massive import-saving in a relative sense. Imports would have to fall from nearly 8 per cent to little more than 5½ per cent of the national income".¹

The statistical measure that follows from this approach is often taken to be the change, between two periods, in the ratio of imports to national income \( \Delta \frac{M}{GNP} \), where

- \( M \) is the value of imports and \( GNP \), the gross national product.
- However, this ratio is, as will be demonstrated shortly, the result of the interaction between what can be described in the Leontief terminology as the 'structure' of domestic production and imports on the one hand and the 'final bill of goods' on the other; and hence the ratio may alter with a change in either. For example, consider an input-output table for a hypothetical economy. There are three activities: agriculture, manufactures and services. The final bill of goods' column, in conformity with standard usage, is marked \( (X+C+I+G) \). The bracketed entries refer to imports. All imports are inputs with the single exception of manufactures imports (50) for final demand. Each imported item is entered in the import row according to the sector of origin and then shipped by that sector to the sector of use.

The resulting domestic coefficients matrix, in terms of the standard Leontief procedure, would be:

\[
\begin{bmatrix}
0 & 20/103 & 4/7 \\
1/12 & 0 & 9/35 = A \\
1/6 & 35/103 & 0
\end{bmatrix}
\]

When the inverse of (the unity matrix minus this domestic coefficients matrix) is post-multiplied with the vector of final bill of goods (net of imports for final consumption), one emerges with the vector of the gross value of domestic production:

\[
\begin{bmatrix}
0 \\
1/12 \\
1/6
\end{bmatrix}
\begin{bmatrix}
800 \\
250 \\
700
\end{bmatrix}
= \begin{bmatrix}
0 \\
17/60 \\
15/103
\end{bmatrix}
\]

The import pattern can be similarly characterized in terms of an 'import-coefficients matrix'. This matrix (exclusive of imports for final demand) can be written for our hypothetical economy as:

\[
\begin{bmatrix}
0 & 10/103 \\
17/60 & 0 & 0 = B
\end{bmatrix}
\]

Clearly \( (I-A)^{-1} \) and \( B \) describe the 'structure' of the domestic production and imports of the economy provided one is willing to make the Leontief assumption of fixity of domestic coefficients and also extend it to the import sector. The assumption underlying; the import coefficients matrix \( B \) is that the ratio of imported inputs to the total domestic output of each sector of use is unchanging. One could alternatively have assumed that the ratio of imported inputs to the total domestic output of each sector of origin is unchanging. This would naturally yield a different coefficients matrix. In our hypothetical economy, this matrix can be written as a row vector

\[
\begin{bmatrix}
1/6 \\
17/103 \\
3/14 = B
\end{bmatrix}
\]

which, when post-multiplied by the column vector of the gross value of domestic production, yields the total quantity of imports in the economy. However, this alternative formulation of the imports coefficients matrix \( B \) does not appeal to be economically sensible; whereas the assumption underlying matrix \( B \) is plausible insofar as imported inputs represent technically necessary components of the production process in the sector of use — a postulate similar to that underlying Leontief's formulation of the domestic coefficients matrix \( A \). Further it should be emphasised that \( B \) excludes imports of items for final demand."

When \( B \) is post-multiplied with the product of \( (I-A)^{-1} \) and the column vector of 'final bill of goods' (net of imports for final demand), one gets the column vector of imports, by sector of origin, into

<table>
<thead>
<tr>
<th>Services</th>
<th>Manufactures</th>
<th>Agriculture</th>
<th>( X+C+I+G )</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Services</td>
<td>0</td>
<td>200</td>
<td>400</td>
<td>0</td>
</tr>
<tr>
<td>Manufactures</td>
<td>50 (100)</td>
<td>0 180 800 1250 (1030)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agriculture</td>
<td>100 (150)</td>
<td>0 250 850 700 (150)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Imports</td>
<td>100 (220)</td>
<td>0 150 470</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Households</td>
<td>280 (320)</td>
<td>230 120 630</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>700 1250 850</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1

1175
CHOICE OF
3 BUS CHASSIS
206", 190"
and
142" w. b.

DODGE AND
FARGO
passenger vehicles

"2 DIESEL ENGINES TO CHOOSE FROM AND NEW BEAUTIFUL FRONT END"

The going is good with Dodge and Fargo Passenger vehicles

Manufactured by: THE PREMIER AUTOMOBILES LTD. Agra Road, Kurla, Bombay-70

Contact your nearest dealer
the economy (with the exception of imports for final demand):

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>100</td>
</tr>
<tr>
<td>(I - A)</td>
<td>800</td>
</tr>
<tr>
<td></td>
<td>250</td>
</tr>
</tbody>
</table>

It can thus be seen that the ratio of imports to national income M/GNP (47/63 in Table 1) is the result of interaction between given 'structure' and 'final bill of goods'. (The ratio 47/63 in Table 1 includes imports for final demand). To isolate the change in import dependence or the import-substitution in an economy, which is attributable to a change in the 'structure' of the economy, therefore, it is necessary to post-multiply the 'structure' for both periods with the same column vector of 'final bill of goods', and then to compare the resulting ratios of imports to national income. Clearly one must eliminate from the measure any distortions introduced by the fact that different 'final bill of goods' obtain during the periods which are being compared.

This procedure, however, raises the first problem in measuring a change in import dependence, viz. the index number problem: which 'final bill of goods' shall we choose for the comparison of 'structures' at two points of time? Indeed the ranking of different periods in terms of their ratios of imports to national income can be reversed by the choice of suitable 'final bill of goods'. As with all index number problems, there does not appear to be really any satisfactory solution to this problem.

The second difficulty in measuring import-substitution (in the sense of a change in import-dependence) arises from the fact that quite often the change in the 'structure' and in the 'final bill of goods' between the two periods cannot sensibly be considered independently of each other. For example, if one were measuring import-substitution over a long period during which an agricultural economy has, for instance, passed on from ploughs to tractors, it is not particularly helpful to discover import-dependence of the economy in the tractor-age (plough-age) for a 'bill of goods' involving ploughs (tractors). In the tractor-age (plough-age) one is almost certain to want only tractors (ploughs) in the 'final bill of goods'. Indeed, it would be far from meaningful to apply the 'bill of goods' obtaining in the tractor-age (plough-age) to the production and import 'structure' of the plough-age (tractor-age) as the latter lacks the relevant production and import coefficients pertaining to the tractor industry (plough industry).

Thirdly, in a dynamic setting, the 'bill of goods', by way of deliberate investment policy, is designed to bring about rapid transformations; in the production and import 'structure' of an economy. Till the economy settles down to a state of long-run balanced growth, any 'structure' in the terminal period must be regarded as temporary. Therefore, it would not be meaningful to derive the change in import-dependence on the basis of a 'structure' which is itself in the process of change. It would be a matter of sheer chance if one ended up by calculating a change in import dependence between two points of time such that in the second period the economy is tuned to a state of long-run balanced growth.

Before we proceed to the next concept of import-substitution, however, it must be stated that, for growing economies using aid for development, the ratio of imports to national income can rise considerably while imports are augmented through utilisation of aid and then fall because this utilisation has resulted in a change in the 'structure' which has reduced the dependence of the economy on imports. This is, however, no more than a testable hypothesis which may quite conceivably be refuted for some developing countries, owing to a variety of reasons.

II

By import-substitution, economists also refer often to the replacement of imports by corresponding import-competing domestic production. Thus consider: 'The economic development of a country demands, as a general rule, a continuous substitution of imports by domestic production, in so far as foreign markets cannot, without a perceptible deterioration in the country's terms of trade, absorb enough of the country's exports to satisfy its entire demand for imports'.

Nurkse's "balanced growth" doctrine is also based on a concept of import-substitution which is concerned with the replacement of actual and potential imports by domestic production.

Three ways of defining and measuring import-substitution in this general sense can be distinguished in the literature.

1) The most meaningful concept is that which emerges from the literature on the theory of trade and growth. These trade theorists attempt to define the pattern of outputs which would have emerged within a certain institutional framework. Import-substitution is then defined in terms of the departure from such an output-pattern, brought about by a policy intervention such as the imposition of a tariff, for instance. In the theoretical literature, the institutional framework which is taken as the reference point for such a comparison is the Paretian system. In practice, of course, such an approach, while conceptually most attractive is operationally very difficult to use. Even to begin to use this approach, one would need a very careful multiple correlation analysis and a sophisticated interpretation of the institutional framework taken as the reference point.

2) A similar but definitely inferior approach is to take a situation of balanced change (expansion or contraction) of imports and import-competing output as the reference-point. Thus, the base-year proportion of imports to domestic production in an activity is compared with that in the terminal year. If the proportion has fallen, import-substitution is said to have taken place. This measure of import-substitution seems to be implied in some of Chenery's recent work on patterns of industrial growth. However, it does not appear to have any theoretical basis at all, unlike the trade theorists' concept and measure discussed earlier here. Why should the 'balanced growth' situation be taken up as the reference point? No rationale seems to underlie such a procedure.
A concept and measure of import-substitution which one comets across frequently is based upon the proposition that, in an import-competing activity, any expansion of domestic production represents import-substitution since, in the absence of it, imports would have been necessary to maintain the same availabilities. For any import-competing activity, therefore, one could take the absolute value of increased domestic production as representing "import-substitution". This concept could easily be extended to the domestic production of all tradable items, since presumably they would all have had to be imported otherwise.

The chief statistical problem that besets many of these measures, of course, is that of aggregation. It is extremely difficult to classify import-competing activities satisfactorily. Even detailed input-output matrices, having several hundred rows and columns, are much too aggregated to yield anything except the startling result of every sector being characterised by entry for the import row and an entry for the export column. Nothing short of a careful md painstaking disaggregation of activities into import-competing and others would give the kind of measures of import-substitution that one can accept as reliable.

Notes


There appears to be no general postulate, sharing equal plausibility with that applied here to imports of intermediate items, which can be adopted concerning such imports. Possible candidates, however, may be the rules that the imports of items for final demand

(i) remain in a fixed proportion to total final demand (e.g. imported cars bear a constant proportion to domestically produced cars, both for final demand); or

(ii) should be taken to stay at the current year level (which may be meaningful if such imports are being severely curtailed).

To be sure, it can be shown that \( B(1-A)^{-1} \) yields the total, direct and indirect, import requirements associated with unit output of each sector; and that the composition of the final bill of goods merely assigns weights to different sectors. If the elements of each column of the product matrix \( B(1-A)^{-1} \) are added up, one gets a row vector, each element of which gives the direct plus indirect imports of producing unit output of the corresponding sector. By post-multiplying this row vector with the "final bill of goods", one can see immediately that the resulting import bill for the economy is nothing but a weighted sum of the elements of the row vector of (total) import coefficients of each sector, the weights being provided by the elements of the "final bill of goods" column vector.


4


R. Nurkse, "Patterns of Trade and Development", Wickesell Lectures, 1959, Stockholm, p 03. Nurkse also has an appendix which deals with the writings of the trade theorists, (Hicks, Bhagwati, Johnson and others), concerning the effects of growth on trade; this has relevance to the concept of import-substitution, as noted here.