CHAPTER III

MEASUREMENT OF IMPORT SUBSTITUTION AND ITS ECONOMIC EFFICIENCY

Replacement of competitive imports by domestic output is regarded as important substitution. Literature on the measurement of import substitution is not scarce. It has been defined as a decline in the import/availability ratio over time, or as a decline in the ratio of imports to national income over time etc.

The word important substitution as a measurable concept first appeared in Chenery's work. Chenery attributed credit to import substitution as a source of Industrial growth. Chenery's method is the most popular method of measuring import substitution. With minor changes, it has been used as the basis of measurement in many subsequent empirical studies viz., Lewis and Saligo; Stear and Vivodas, Alfered Maizel; Bhagwati and Padma Desai; Panchmukhi, P.G. Clark; J. Ahmad; and Elijah, M., James, etc.

Hollis B. Chenery defines import substitution as 'the difference between the growth in output with no change in import ratio and actual growth in output'. The growth in output is attributed to two different effects; the import substitution

effect and the demand effect. The demand effect can be divided into three effects, viz., Final demand, Export demand and Intermediary demand.

Chenery starts with Walrasian general Equilibrium model and modified it into introduce international trade. The model is based on an identity which is as follows:

\[ Z = X + M \]
\[ Z = (W + E + D) + M \]
\[ X = W + E + D - M \] \hspace{1cm} \text{(1)}

Where:
- \( X \) = Production
- \( M \) = Imports
- \( D \) = Final demand
- \( E \) = Export demand
- \( W \) = Intermediary demand

\[ \Delta X + \Delta M = \Delta Z = \Delta W + \Delta E + \Delta D \] \hspace{1cm} \text{(2)}

Let:
- \( U^o = \frac{X^o}{Z^o} \) and
- \( U'^o = \frac{X'^o}{Z'^o} \)

Therefore:
- \( X^o = U^o Z^o \) and
- \( X'^o = U'^o Z'^o \)
Then \[ \Delta X = X' - X^o = U'Z' - U^o Z^o \] ........(3)

Substituting \( Z^o \) by \( Z^i - Z \) in (3) we get,

\[ X = U'Z' - U^o (Z^i - Z) \]

\[ X = U'Z' \ldots \]

\[ X = (U' - U^o)Z' = U^o (W + E + D) \] ........(4)

Therefore, it is clear from above equation that the change in value of output is summation of two effects, viz.,

1. \((U' - U^o)Z'\): Change in the production/availability ratios causing a change in output. This is the measure of import-substitution.

2. \(U^o (A_Z)\) : Change in demand conditions causing a change in output.

This formulation assumes that import substitution is a deviation from proportional growth of production and imports. The residual effect in the above formulation is the output component backed by demand expansion.

Chenery, further divides the import substitution effect into three effects:

It is as follows:-

\[ (U' - U^o)Z' = (U' - U^o)Z + (U' - U^o)(D+E) + (U' - U^o)W \]
The first term represents pure import-substitution, which would have taken place if there were only proportionate growth in demand. The other two elements results from the deviation from proportionality in final and intermediate demands. He had called them as supply effects and they were treated to be zero because of no change in comparative cost and in import proportions.

The main drawback of Chenery's measure is its failure to include intermediate demands generated by import substitutions. Import substitution may result in an increase in production not only at final level but also in its supplier industries and in their supplier industries and so on. Since import substitution is not independent of demand effect, a bifurcation of both effects seems dubious. The measure is quite sensitive to the level of income at which it is measured. Sutcliffe showed that the Chenery measure is sensitive to the level of income at which it is measured. As a result, even, a small increase in domestic production of industrial output starting from low per capita incomes show high import substitution. The empirical validity of this measure depends upon the non-negativity of the change in production level over time. The measure may give a higher value for import-substitution of z', is not deflated appropriately.

3. Ibid.
An alternative formulation was due to Alfred Maizel. According to this formulation, import substitution can be defined as a change in import/availability ratios over time multiplied by total supply of the end year.4

\[ x + M = Z = W + D + E \quad \text{ ........ (1)} \]

or \[ AX + AM = AZ = AW + AD + AE \]

Let \[ m^o = M^o/Z^o \]
\[ m' = M'/Z' \]

Then \[ \Delta M = m'Z' - M^oZ^o \quad \text{ ........ (2)} \]

Substituting \( Z^o \) by \( Z' \) in equation (2)

\[ \Delta M = m'Z' - m^o (Z' - AZ) \]
\[ \Delta M = m'Z' - m^oAZ \]
\[ \Delta M = m'Z' - m^oZ' + m^o (AZ) \]
\[ \Delta M = (m' - m^o)Z' + m^o (AW + AD + AE) \quad \text{ ........ (3)} \]

There the symbols have the same meaning as earlier expressed as \( M = \text{Imports} \).

The first term in right hand side of the equation (3) is the measure of Import substitution. The second term shows the demand effect causing change in imports.

This measure gives the magnitude of import substitution which is same as chenery but with different signs. This can be shown as following.

Chenery measure of import substitution is given by:

\[(U' - U^0)Z' \]

\[\{ (1-m') - (1-m^0) \}\ Z'\]

This becomes \((-m' + m^0)Z'\) and \(-(m' - m^0)Z'\)

Which is the measure of Maizels with different signs. Thus no choice exist between chenery and Maizel measures. But these two measure can be used to find out the contribution of demand in change in production and change in imports - availability ratio is former case and constant import/availability ratio in later case. This measure is also subject to then above criticism as it is not basically different from chenery.

Another measure is due to Elijah M. James. His model is also based on an identity which is as follows:

\[Z' = X' + M' \] \(\ldots (1)\)

\[M = M^0 - M' \] \(\ldots (2)\)

\[M^0 = \frac{M^0}{Z^0} Z^0 \]

\[M' = \frac{M'}{Z'} Z' \]

let \[M^0 = M^0 Z^0 \]

\[M' = m' Z' \]

Then \[= m^0 Z^0 = m' Z' \] \(\ldots (3)\)
By adding and subtracting $m'Z^0$, we get

$$M = m^0Z^0 - m'Z^0 + m'Z^0 - m'Z'$$

By rearranging we have:

$$\Delta M = (m^0Z^0 - m'Z^0) + (m'Z^0 - m'Z')$$

$$\Delta m = (m^0 - m')Z^0 + m'(Z^0 - Z') \quad ...(4)$$

Where the symbols have the same meaning as earlier expressed. The first term on the right hand side of equation (4) is the measure of import substitution. The second term shows the demand effect causing change in imports.

This measure shows import substitution as a difference between in import availability ratio multiplied by initial year supply. The drawback of the measure is its failure to include intermediate demands generated by import-substitution. And, this measure separates the import substitution effect from demand effect on change in production. This measure can be used only when production does not fall. The magnitude of import substitution will be influenced by the value of $Z^0$. An attempt is made to incorporate intermediate demands in the estimation of import-substitution by Chenery, Shishido and Wantabee & Jaleel Ahmad, used inter-Industry model to incorporate

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According to Chenery, Shishido and Wantabee, they have concluded that 75 percent of Japan industrial growth is due to the change in supply conditions. It include substitutions of domestic output for imported manufactured goods, substitutions of manufacturing goods for primary goods, and other technological changes. They have used an inter-industry model of 22 sectors to explain the deviations from proportional growth in output. See, Hollis B. Chenery, S. Shishido and T. Wantabee, "The Pattern of Japanese Growth, 1914-54", Econometrics, Vol. 30, No. 1, Jan 1962, pp. 138. Ahmad, J. op.cit.
the intermediates demands in the estimation of import-substitution. Assuming constant technology over time he draw the following identities.

\[ X^t_i = Y^t_i + E^t_i - M^t_i + \sum a_{ij}^t x^t_j \quad \ldots (1) \]

\[ X^0_i = Y^0_i + E^0_i - M^0_i + \sum a_{ij}^0 x^0_j \quad \ldots (2) \]

Where \( X \) = domestic output

\( Y \) = domestic final demand

\( M \) = Imports

\( E \) = Exports

\[ \sum a_{ij}^t x^t_j \] = intermediate use of commodity \( i \) in all sectors, and subscripts and subscripts refer to sectors and time periods respectively. The notion of proportionality is introduced by defining the ratio of domestic demand in the two periods as

\[ \lambda = \frac{\sum_i Y^t_i}{\sum_i Y^0_i} \]

Multiplying equation (2) by the proportionality factor (\( \lambda \)), subtracting (2) from (1), and solving for \( X^t_i \) Yields:

\[ X^t_i - \lambda X^0_i = \sum \sum r_{ij} (Y^t_j - \lambda Y^0_j) + (E^t_j - \lambda E^0_j) \]

\[ + \sum \sum r_{ij} (\lambda M^0_j - M^t_j) \]
Where \( r_{ij} = (1-A)^{-1} \) is the inverse of Loentief matrix.

In this formulation, the first term on the right hand side is the influence of non-unitary income elasticities of final demand and exports, while the second term measures the effect of import substitution. This method is based on the assumption of constant technology which may not hold good over a time since the technical coefficients would change with the changed condition. That assumptions of constant technology becomes unrealistic.

This measure, while incorporating, the intermediate demands departs from the original notion of import substitution as a decline in the ratio of imports to total supply. This method is based on the assumption of constant of technology which may not hold good over a time, since the technical coefficient would changed over the time due to new innovations.

In order to include implicit intermediate demand while preserving the notion of import substitution as a decline in this ratio of imports to total supply, Morely and Smith developed an alternative method.\(^6\)

Indirect imports can be included explicitly with an input - output table.

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\[ X^t = F^t + A^tX^t - M^t \]

where \( X^t \) = the vector of gross production in period \( t \).

\( F^t \) = the final demand vector

\( A^t \) = the input-output table

\( M^t \) = the import vector.

Solving for \( X^t \) and rearranging yields:

\[ X^t + (1-A^t)^{-1}m^t = (1-A^t)^{-1}F^t \]

\[ X^t + M^* = Z^*t \]

\( M^* \), the new vector of imports, converts imports to a gross production basis and allocates them to their proper domestic sectors. \( M^* \) can be interpreted as the amount of domestic output necessary to eliminate imports altogether for a given level of final demand. \( Z^*t \) is the total supply vector, also measured on gross production basis.

If \( A^t = A^o \); there definition can be substituted in Chenery's equation (i.e., \( \Delta X_1 = AZ_1U_1^o + Z_1^*\Delta U_1 \))

Where \( U_1^o = X_1^o/Z_1^o \)

\( o, t \) (base \( t \) the terminal years)

We get the following:

\[ \Delta X_1 = Z_1^* U_1^* + Z_1^* \Delta U_1 \]
Merely and Smith used $M^*$ instead of $M$ as the import component of total supply. For the pattern of growth and IS occurring in most countries, the traditional method will substantially underestimate IS compared to the method proposed by Morley and Smith. The differences will be concentrated in intermediate industries such as steel and Chemicals.

Both the Chenery and Morley - Smith methods would yield identical results for import substitution in sectors producing exclusively for final demand, while the differences between the two, would be negligible, if only a small part of sector output is devoted to intermediate use. In the case of intermediate products. However, the Chenery measure is likely to underestimate import substitution, since it will allocate most of the sectoral increase in output to increase in domestic intermediate demand.

Import substitution, then, is the export difference between actual imports in the end period and import ratio remained at the level of the base period. All known methods of import substitution attempts to partition the effect of non-unitary elasticities of demand from that of a change in import ratio.

Fane had observed that Morley and Smith would record no import substitution and no demand expansion for industries
supplying their output for the intermediate demand of the Industry. For example, if \( M_1 \) is reduced and \( X_1 \) is increased, there is an increase in the intermediate demand for the output of the direct and indirect supplier, of industries \( i \). Suppose that industry \( j \) is one of there supplier, the resulting increase in demand for the output of industry \( J \) represent a potential source of growth for \( J \) due to demand expansion which will lead to increase in final demand for the output of industry \( J \). But it has not been missed by Morley and Smith's definition of demand expansion. According to Fane, "Chenery would recard expansion in domestic intermediate demand for there industry, but there sources of growth were exactly off set by negative import substitution. Import rose by the full amount of the Extra intermediate demands and domestic gross output failed to capture any of the potential growth. He also accepted Chenery criterion for import substitution and proposed a method for reconciling the different results which can be obtained using aggregate or disaggregate data.

The proposal is that import substitution is industry \( i \) be measured in two parts, Import substitution within the Industry denoted by \( S_i \), and the Extra contribution \( S^*_i \) of growth in industry \( i \) for import substitution, \( S_i^* \) is then defined using.

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\[ S_{1}^{*} = S_{1} + S_{1}^{*} \]

Using formula appropriate for small changes Fane, defined \( ds_{1} \) and \( ds_{1}^{*} \) by

\[ ds_{1} = Z_{1} dU_{1} \]

and

\[ ds_{1}^{*} = (U_{1} - U) d\omega_{1} \]

Where \( X = E X_{1} \)

\[ Z = E \omega_{1} \]

\[ U = X/Z \]

\( S_{1} \) and \( S_{1}^{*} \) are obtained from \( ds_{1} \) and \( ds_{1}^{*} \) by integration) the rational for the definition of \( ds_{1}^{*} \) is that growth in an industry with a higher then average ratio of domestic production to total supply leads to an increase in this ratio for the whole group.

The contribution of IS to the growth of all industries devoted by \( S_{1} \) may be defined by applying equation to aggregate data.

\[ Ds = ZdU \]

One may wish to consider two or more level of aggregation over industries. The total contribution by group to \( J \) is for all industries is given by:

\[ dS_{J}^{T} = E_{1} dS_{1}^{T} j \]
Therefore Fane has established the alternatives measures of import substitution in a individual group and its contribution to import substitution in all industries.

An important study to measure import-substitution in the Indian Economy is that of Padma Desai's. She tried to measure import substitution in the Indian economy is that over the period 1951-63, choosing four years viz., 1951, 1957, 1961 and 1963. She has tried different measures which are related to a change in the ratio of imports to total supply and showed that different measures give different estimates to import substitution. Due to this, ranking of industries was also different under different measures. The difference are due to weights given, degree of aggregation and ways of handling intermediate demand generated by import-substitution in final goods. She has collected data on imports and production in an adhoc manner at market prices. She confirmed her study to the census sector and ranked the industries according to their import substitution using the following measures:

\[ \frac{M' - M^o}{Z' - Z^o} \]

This measure shows import substitution if there is a generative change in import/availability ratios over time.

This measure is a proportional measure of import substitution.

\[
\frac{M'/Z' - M^o/Z^o}{M^o/Z^o}
\]

This is a variant of Chenery's measure.

\[
\left( \sum_{i=1}^{n} \frac{x_i^1}{z_i^1} \right) - \left( \sum_{i=1}^{n} \frac{x_i^o}{z_i^o} \right)
\]

This measure is due to Lewis and Siligo. The measures which take the difference between import/availability as a measure of import substitution can be used only to know the import dependence rather than import-substitution particularly when supply falls.

The measure (1) and (2) will give the different magnitudes of imports substitutions with opposite signs compared to that of Chenery. The second measure give the higher value of import substitution then measure (1) as it is weighted by \( Z^o/M^o \). The measure (3) and (4) is an aggregative measure obtained by summing up the values of import-substitution in each industry.
From all these, it is clear that the direction of change in import substitution will be identical but the magnitudes of import-substitution will be different. Hence, the ranking of the different industries will differ. Her conclusion's are as follows:

(a) For the entire decade 1951-61 or 1951-63 import substitution in the investment group seems to predominate.

(b) For 1951-57 broadly over-lapping with the first plan period, all measures underline the relative importance of import substitution in the consumption group followed by the investment group and intermediates in that order.

(c) All measures show that for 1957-63, (i.e. approximately, with the beginning of the second plan and its emphasize on heavy industries) import substitution in the consumer goods industries has been the lowest, and investment goods generally dominating using semi-logarithmic form for consumer goods, raw materials and investment goods, she concludes that individual industry import/availability ratios indicate the import substitution in 'newer' consumer goods industries, which formed approximately 34% of the gross value of organized sector. Consumer goods output at factor cost in 1963, was outstanding, where as the different measures show in terms of a suitable
weighted framework that the overall, consumer goods import-substitution was out weighted by investment goods import-substitution.

A very interesting and technical study on import substitution had been done by Viney Bharat Ram. He has worked on micro level concept of import substitution. He defined import substitution as the ratio of the foreign exchange value of items deleted from the initial list to the total foreign exchange value of wholly imported products. The idea of deletion relates to the notion that import substitution takes place by stages. Further he suggests that if there are more than one stage then there could be a choice to the sequence, timing and extent to which imported items are replaced by domestic substitutions. He examined process of import substitution through the age of the industrial decision, for industrial decision maker consider both the short run and long run decision and therefore, he consider both flow items and capital stocks. These items require imported goods and services.

Bharat Ram has given the following measure of import substitution. He has used import output matrix to measure the proportion of the value of import content in the final output to the value of the final output.

Bharat Ram defines the following identities for any year $t$.

$$a_{ij} = \text{input of sector } j \text{ per unit output of sector } i.$$  

$\frac{a_{ij}}{c_{jt} + F_{jt}} = \text{proportion of import to the total supply of sector } j$. He assumed whatever has been imported during a year has been consumed during that year.

$$(a_{ij} \cdot l_{it}) \frac{F_{jt}}{w_{jt} + F_{jt}} = \text{imported import of Sector } j \text{ required for } l_{it} \text{ units of sector } i.$$

He further assumed that the proportion of imported input of sector $J$ to the total import of sector $j$ for the output of sector $i$, is the same for all $i$'s. There is no restriction on the allocation of imported items of sector $j$ for the output of sector $j$.

Then,

$$\sum_{(aji Q_{jt})} \frac{F_{jt}}{Q_{jt} + F_{jt}} = \text{total intermediate import content in sector } i \text{ when the output is } Q_{jt}$$

Hence

$$F'_{ij} = \sum_{all \ j} \frac{(aji Q_{jt}) F_{jt}}{Q_{jt} + F_{jt}}$$

$$= \sum_{aji} \frac{F_{jt}}{Q_{jt} + F_{jt}}$$

Therefore, his measure of import substitution seems to be more realistic as he measured import substitution at every
stages of production. He don't rely on the only final imports but he includes imports at every stage of production which would determine the actual magnitude of the import substitution in a given sector.

Nambiar had used the Chenery measure of import substitution in his work. His definition of imports includes also the intermediate demand for imports in the import bill indirect imports has been included explicitly in his estimates using an input output table.

Nambiar has measured inter industry import substitution in forty five Indian manufacturing sector during the period 1954-74. He measured import substitution as a proportion of sectoral growth in output and also ranked them in a descending order, from higher to lower. Secondly he grouped the sectors according to stages of fabrication vis-a-vis consumer goods, intermediate goods (raw material origin, intermediate goods II (goods at higher level of fabrication) investment goods III and measured in each of the group.

He observed that imports of consumer goods in Indian economy had already shrunk to insignificance by 1955-58, and consequently IS process is seen to have entered into the stage

of producers goods, with the result that domestic production of these goods, expended rapidly during the 1960's and early 1970's relation to the former group.

**Import Substitution and Its Economic Efficiency:**

Development of trade theory has been enriched by the recent contribution of new concepts such as effective rate of protection (ERP) and domestic resource cost (DRC). These new concept have emerged largely in the context of analysing the effect of the trade policies on the domestic producing activities and the tradeflows.

Effective rate of protection (ERP) provides a suitable measure for studying the incentive effects of protection and for predicting the direction in which resources will be pulled by a given set of trade distortion. Developed by Johnson and Cordon, its measures the percentage increase, arising from protection, in domestic value added over value added in a free trade situation.\(^{11}\)

There are several ways of defining ERP. The most frequently used formula for estimating the ERP is:

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\[
\text{ERP}_j = \frac{t_j - E_i a_{ij} t_i}{1 - E_i a_{ij}} \text{ where}
\]

\( t_j \) = tariff rate on \( j \)th activity.

\( t_i \) = tariff rate on the input \( i \).

\( a_{ij} \) = share of \( i \) in the cost of \( j \);

in the absence of tariffs, both valued at their respective international prices, the tariff on the inputs represent the implicit tariffs. These are defined as the ratio of the domestic prices minus the c.i.f. import price, to the c.i.f. import price in local currency. The \( t_j \) similarly stand for implicit tariff on output.

The ERP measures the relative increase in the rewards to the primary factors of production caused by the adoption of trade policies and hence the ranking of the industries by ERP is considered to provide some indications of the relative attractiveness of the different industries for the primary factors of production. There are number of objections raised in the literature, against ERP estimates for identifying the resource-allocation pulls. It is also argued that in a country like India, high ERP—might there, because the Industrial licensing system has barred the entry of new firms in a particular time of production and hence has generated high premia to be enjoyed by the existing firms. This implies that ERP for an
industry is associated not with the fact that resources would move towards it but with the fact that they have moved from it. It is observed that estimation of ERP is useful in providing some broad picture of the distortations in the rewards to primary factors of production as a result of the controls and the restrictions policies irrespective of whether exact resource-allocation implications are derived from it or not.

In countries where import substitution or export promotion policies are adopted to overcome balance of payment problems and to achieve rapid industrial and economic growth, it is essential to attempt an estimate of the costs to the economy of saving and/or earning a unit of foreign exchange from the domestic manufacturing activity and also to judge whether the costs are high. Such a estimate of the costs are provided by the DRC technique, developed by Bruno and Kruergar.

DRC attempts to measure the cost of saving and/or earning of unit of foreign exchange, the DRC of the activity measures the social opportunity cost of the domestic resources employed directly in the jth activity and indirectly in the home goods that are used in the ith activity in saving and/or earning one unit of foreign exchange. The concept of DRC is comparable to

the familiar cost benefit ratio. The difference between the two is that, while the later compares the total real costs and benefits, the former compares the net domestic resource cost with the net foreign exchange saved. For judging the efficiency of an activity, its DRC is compared with the shadow rate of exchange opportunity cost of foreign exchange provides the efficiency norms with which the efficiency of individual industries is compared. In the case where DRC exceeds the shadow exchange rate, the domestic manufacturing activity is considered to represent an inefficient use of resources, as the opportunity cost of domestic resources is greater than the foreign exchange saved and/or earned by the domestic manufacturing activity. Similarly, where the DRC is lower than the shadow exchange rate, the domestic manufacturing activity is considered to represent efficient use of the domestic resources. In this respect, the DRC also indicates the particular exchange rate at which the domestic manufacturing activity could compete with comparable activities abroad with out the need for protection. Differences in DRC among different activities represent non optimal allocation of resources. Real output of the economy as a whole can be increased, in such a situation, by transforming resources from high cost activities to low cost activities. The DRC for an activity can be measured by the expression.

Where:

\[ DC_j = \frac{\sum_i V_{ij} S_i + \sum_r X_{ir} r_f S_i}{NVA_j} \]

\[ \frac{1}{1 - E_t m_{ij} - E_{f_j r_f}} \]

\[ \text{Where:} \]

\[ DC_j \] = the domestic opportunity cost of domestic resources employed in the Jth manufacturing activity per unit of output.

\[ NVA_j \] = International value added by domestically owned factors of production per unit of output \( j \).

\( V_{ij} \) = The amount of the \( i \) th domestic factor of production used in the \( j \) th value-adding process.

\( S_i \) = Shadow price of the \( i \) th factor.

\( D_{rj} \) = Amount of the \( r \) th home good used in the production of \( j \).

\( V_{ih} \) = Amount of \( i \) th factor of production used in the production of \( h \) th home good.

\( m_{ij} \) = the amount of the \( f \) th traded good input employed in producing \( j \), valued at international prices.

\( V_{fj} \) = The amount of \( f \) th foreign owned factor of production employed in producing \( j \) per unit.

\( r_f \) = The repatriated return to the \( f \) th foreign owned factors of production.
International prices are normalised at unity here. It is also assumed that no traded imports or foreign owned factors of production are employed in the production of the home goods in formulating this simplified form of the equation for DRC. Home goods are those commodities where trade does not take place and where there are no restrictions imposed by the government on the transaction. In actual practice the production of home goods involves the use of traded inputs.

Domestic costs (in domestic currency) are represented in the numerator and the net exchange earned or saved in foreign currency is represented in the denominator. The DRC, there by measures the net international value added per unit of the domestic resources, i.e., the cost in terms of domestic resources of saving and/or earning one unit of foreign exchange. These concept have been widely used by different trade theorist in the studies regarding allocation of scarce resources and in estimation of economic efficiencies of import substituting and export promotion projects. It should be noted that in making decision about change of regime from import substituting to export promotional strategies, the DRC index was found more useful in terms of its ability to provide a guideline for the selection of potentially efficient export items.
Much importance has been attached to these two concepts, but there are some limitation of these concept regarding the applications of DRC and ERP concepts for resource allocation in an open economy. The assumption of fixed coefficients in DRC/ERP is unrealistic. This assumption does not consider the gains is efficiency through factor substitution. The difficulties in calculating shadow prices has led to the use of international prices in estimation of DRC/ERP which is measured on the basis of c.i.f. prices. Due to it, one can find a negative value of idices DRC/ERP which have little meaning for allocations purpose. There may be divergence in values of ERP/DRC index due to monopolistic factors which are wider than the inefficiencies in resources allocation under protection. Therefore, the monopolistic power under protected firms which can generate negative value added has not been considered in ERP/DRC techniques.

Many critic of import substitution policy have used the ERP/DRC methods in order to investigate the inefficiencies in allocation pattern of scarce resources of trade policy and distortion on the productivity of these sectors.

Saligo and Stern (1965) for instance, estimated that in 23 out of 48 manufacturing industries in Pakistan, the value added at world prices was negative.\(^\text{14}\) Therefore, alternative

use of ERP has been in measuring the real contribution of an activity to the national product by comparing the discrepancy between value added at domestic and world prices respectively. When there are tariff on final goods and intermediate products. It may therefore be that the real contribution of some import substituting industries to national income is negative, when measured in world prices. In other words value of material inputs in the sector exceeds the value of final products, both measured in world price.

Panchmakhi has estimated ERP for the sectors of the input output table of 1965. He observed that value added at international prices becomes negative for the sector i.e., rubber, animal husbandry, starch and man made fibres.

Again the ERP was negative for bidi, plantation, food grains, sugar can, other crops and printing publishing the value added in domestic prices was less than that in international prices. Therefore, the protection system had put these production activities at a disadvantage compared to the situation of international prices. Out of 69 sectors for which ERPs are obtained, ERPs are larger than the nominal implicit tariff rates, for 53 sectors in case 1 (non traded inputs with zero tariffs) and 12 sector in case - 2 (non-traded inputs which

were included in value added were given protection along with primary factors).

ERP showed a pattern of escalation with the degree of processing. The production activity of intermediate goods received smaller protection than that of finished goods. The capital goods production received less protection than consumer goods or intermediate goods production. It introduced favour to consumer goods with high ERP.

It was revealed that ERP were greater in case of import substituting industries in comparision with export industries which showed a lower ERP. It had been found that import substituting industries were developing on the cost of exports and agriculture and other traditional primary industries which showed low ERPs. W.F. Steel has also used DRC/ERP method to study efficiency norms in Ghana's manufacturing sector. He observed that DRC in manufacturing sector of Ghana was extremely high during 1967-68. A one fifth of the firm had to spent more foreign exchange on direct and indirect input costs than could have been to import the finished product.

Panchmukhi has estimated DRC for the 77 manufacturing sectors of Indian economy for the period 1968-89 and 1963-65.


According to him, the DRC estimates for 1968-69 were negative for the sector, rubber, animal husbandry, starch and men made fibres out of the 69 sectors for which DRC was estimated, the DRC of 25 sectors were in the range of 7.5 to 15.0 and there of the other 24 sectors were in the range of twice the official exchange rate, and those of 10 sectors above three times of official exchange rate which was 7.50 per one US $. Therefore, most of the sector were economically inefficient.

R.G. Nombiar used the concept of DRC to know the success and efficiency of the different import substituting sectors. His conclusions are follows:

1. The IS strategy is seen to have succeeded in its primary objective of altering the structure that would generate pressure to activate latent growth forces.

2. The costs of saving foreign exchange through domestic manufacturing there found to be high in 12 domestic sectors of which 9 are major import substituting one's and continued operation of which at the costs and level of utilisation of 1973-74 could be justified only on the grounds of high backward and forward linkages.

3. Relatingly high capital/labour ratio, high tariff and low productivity are identified as source of high costs.

Therefore efficiency of firm can be improved by reducing protection, liberalising imports and by increasing capacity utilisation.

It has been revealed by the above discussion that measures of import substitution are indicator of growth. It works as an instrument in decision making in resource allocation and trade policy formulation. The ERP and DRC techniques are better tools in project selection and appraisal regarding the import substituting and export promoting activities.