

THE STRUCTURE OF DEPENDENCE OF EXPORT ON MANUFACTURE IN INDIA UNDER LIBERALISATION

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Abstract : An attempt has been made in this paper to study the pattern of dependence of Indian export on manufacture over the period 1993-94-2006-07 by considering a decomposition frame work where the quantum of change in total output requirement in the manufacturing sector stimulated by one unit of average export has been decomposed into three components, namely structural change effect, export composition change effect and interaction effect. It is observed that liberalization gets deepen as more and more time passes and the relaxation of controls seems to have manifested perceptible impact on the pattern of dependence of export on manufacture through the change in production structure of the Indian economy.

Keywords: Composition Change Effect, Export Dependence, Interaction Effect, Structural Change Effect

Introduction

The pattern of trade, as is observed in the economic literature, indicates that developing countries mainly export agricultural and other primary sector products and import, by and large, manufactured goods. This phenomenon seems to reverse in the process of industrialization of the developing countries. Now, from the pattern of world trade over the last two decades, it appears that growing volume of world trade and increasing economic collaboration of most of the countries in the world may have induced increasing participation both from the developed and the developing countries though the gain of trade possibly is distributed in an uneven fashion favouring the developed ones.

As far as the Indian economy is concerned, it is well known that India has traditionally been an exporter of agricultural and other primary sector products and importer of mainly manufacturing goods. Since 1960, because of the impact of industrialization in India and the changing pattern of world trade, the share of non-manufacture in total export of India continues to decline, where as the share of manufacturing goods in total export basket increases remarkably. Apart from this, following 1991 economic policy reforms, the industrial and trade policies of India have undergone several changes with the prime objective of globalization of the economy where the changed economic environment is expected to bring market forces to operate with lesser constraints. One important feature of this policy shift has been the curtailment in the role of Govt. giving top most priority in the relaxation of Govt. controls thereby ushering a new era of economic liberalization. The rationality behind this policy shift was the intention to enhance the export competitiveness of significant proportion of Indian industry. The trade liberalization measures also have

worked towards changing the composition of export basket in favour of manufacturing goods.

The Economic Survey (2010-11) highlights some descriptive facts about the pattern of Indian exports over the period 1960-61 to 2009-10. We observe that the share of manufacturing goods export in total export basket has increased from 45 percent in 1960-61 to 73 percent in 1990-91, to 79 percent in 2000-01 and then decreased to 67 percent in 2009-10. Compared to this, the share of non manufacture export has decreased from 55 percent in 1960-61 to 27 percent in 1990-91, to 21 percent in 2000-01 and then increased to 33 percent in 2009-10. It seems that the factor responsible for aggregate rise of value of export during the reforms period is nothing but the growth of manufacturing exports. This apparent observation itself suggests that dependence of export on manufacture has increased in the era of liberalization in India.

In the increasing share of manufacture in total export basket, no doubt, the changing character of the export composition over time is playing an important role. But only the study of the changing character of the composition of export may not enough to assess the exact role of manufacturing products in export basket. So, it is essential to study how the total (direct and induced) dependence of export basket on manufacturing goods is changing over time. While doing so, naturally, the question of sectoral interdependence crops up because when we pose the question of change in total dependence, of course, the question of the share of manufacture and the significant manufacture using sectors in the export basket is quite relevant.

So, we have made an attempt in this paper to study the pattern of dependence of Indian export on manufacture over the period 1993-94-2006-07. In order to do so, we have undertaken a decomposition frame work where the change in the size of total dependence of export on manufacture over time has been decomposed into three components namely-

- 1) Effect of change in production structure
- 2) Effect of change in the composition of the export basket
- 3) Effect of interaction of (1) and (2)

For the decomposition framework, we have closely followed the procedure suggested by Vaccara and Simon(1968). Based on the US data, they have shown that the two main sources of change of real product ie, the changes in the level and composition of final demand, and the changes in the coefficients, which reflect, among other things, the basic technological processes of producing a given basket of final goods exhaust the total change in real product only under a particular procedure where different set of weights are used for the measurement of the technological change factor and the measurement of the final-demand factor. A procedure which employs the same set of weights for each factor would leave a residual or ‘interaction’ factor.

Now, the paper has been organized as follows-

After discussing the objectives of the paper in section-1, we have discussed the methodology to decompose the change in the total dependence of export in section-2. Section-3 presents the data base of the study. Results are discussed in section-4. Section-5 highlights the concluding remarks with some policy implications.

The Methodological Framework

Leontief open static input-output model appears undoubtedly the most useful basic tool for analyzing the pattern of dependence of export on manufacture. Total output from each industry equals total inter-industrial demand plus the final demand. So, we have the balance relations as follows:

$$X_i = \sum_{j=i}^m X_{ij} + D_i \dots (1) \text{ where } X_i =$$

Output of the i^{th} sector(in value terms)
 D_i = Final Demand in the i^{th} sector (in value terms)
 and X_{ij} = input flow from i^{th} sector to j^{th} sector.

Assuming a production function with fixed coefficients , we can write

$$X_{ij} = a_{ij} \cdot X_j \dots\dots(2) \text{ where } a_{ij} = X_{ij}/X_j$$

By substituting (2) in (1) , gross output or sales of sector i can be expressed as :

$$X_i = \sum_{j=i}^m a_{ij} \cdot X_j + D_i \dots\dots\dots(3)$$

$$j = i$$

Therefore, $X = AX + D$ where $X = (X_i)$, $A = (a_{ij})$ and $D = (D_i)$

$$\text{Or, } D = X - AX = IX - AX = (I - A)X$$

$$\text{Or, } X = (I - A)^{-1}D \dots\dots\dots(4)$$

In the equation (4) if D is prescribed from outside, the required gross output levels X’s get determined. For our present purpose it is not the entire Final Demand but the export part of the final demand that is relevant

Now, from the equation-4 , we can easily say that to find out the industry outputs of a given year, if we take either the final demand or the production structure of another year (other than the given year), a different set of outputs would have resulted. This idea can be clarified by considering a suitable example. Let, o and t be the subscript for two years with some intervening gap. Then, $X_t = (I - A)_t^{-1}D_t$ and $X_o = (I - A)_o^{-1}D_o$ are the gross output levels related to the years t and o respectively. $(I - A)_t^{-1}$, D_t and $(I - A)_o^{-1}$, D_o indicate the technical coefficients and final demands to the corresponding years. So, the change in total output between the years o and t ie,

$$X_t - X_o = (I - A)_t^{-1}D_t - (I - A)_o^{-1}D_o \dots(5)$$

Now, we may like to separate out the factors responsible for the total inter temporal change in output over the years o and t. From the equation-(5), apparently it seems that in the total change in output the contributing factors are the change in final demand and change in technical coefficients. But to separate out the contribution of only final demand change in the total change in output, we assume unchanged production structure reflected in technical coefficients matrix ‘A’ at the base year, o and allow the final demand to change from D_o to D_t . As a result , we get the following expression-
 $(I - A)_o^{-1}D_t - (I - A)_o^{-1}D_o \dots\dots\dots(5A)$

Next, we may like to separate out the contribution of change in production structure reflected in technical coefficient matrix A assuming unchanged final demand vector at the base year t . Obviously the computation will be in the following way allowing only $(I - A)_o^{-1}$ to $(I - A)_t^{-1}$
 $(I - A)_t^{-1}D_t - (I - A)_o^{-1}D_t \dots\dots\dots(5B)$

Comparing the equations 5A and 5B with 5, we see that
 $X_t - X_o = (I - A)_t^{-1}D_t - (I - A)_o^{-1}D_o = (I - A)_o^{-1}D_t - (I - A)_o^{-1}D_o + (I - A)_t^{-1}D_t - (I - A)_o^{-1}D_t \dots (6)$

In other words, the equation-6 suggests that the two sources of change in total output ie, final demand change and the change in technical coefficients of course exhaust the total change in an industry’s output. In the procedure, just described, production structure of the year, o has been used as weights for the measurement of final demand

change factor and the final demand of the year, t as weights for the measurement of technological change factor. According to Vaccara and Simon(1968), a procedure which employs the same set of weights for each factor would leave a residual or ‘inter action’ factor.

Keeping the above fact in mind, now we proceed to calculate the dependence of export on manufacture in the following way.

As indicated earlier, we consider o and t be the subscript for two years with sufficient span of time in between and A(o), A (t) and e(o) e(t) be the corresponding input coefficient matrices and export share vector respectively. If $\hat{a}_{ij(t)} = (\hat{a}_{ij(t)})$ be the row of (I-A)⁻¹ matrix for the tth period corresponding to the Manufacturing Sector and $e_{j(t)}$ is the share of jth sector in the export basket in the period t, then “ $\hat{a}_{ij(t)} e_{j(t)}$ ” gives the total output requirement in the Manufactures sector stimulated by one unit of average export of the period t.

So, we may write

“ $x_i = \hat{a}_{ij(t)} e_{j(t)} - \hat{a}_{ij(0)} e_{j(0)}$ ” = change in total output requirement in the manufacturing sector caused by the change in the composition of the export and the change in the structure of production over the period 0-t. Now, it may be possible to split the quantum “ x_i ” into the components as mentioned below.

$$\begin{aligned} x_i &= \hat{a}_{ij(t)} e_{j(t)} - \hat{a}_{ij(0)} e_{j(0)} \\ &= (\hat{a}_{ij(t)} e_{j(t)} - \hat{a}_{ij(0)} e_{j(0)}) + (\hat{a}_{ij(t)} e_{j(t)} - \hat{a}_{ij(0)} e_{j(t)}) + [(\hat{a}_{ij(t)} e_{j(t)} - \hat{a}_{ij(0)} e_{j(0)}) - (\hat{a}_{ij(t)} e_{j(t)} - \hat{a}_{ij(0)} e_{j(0)})] \\ &= (\hat{a}_{ij(t)} e_{j(t)} - \hat{a}_{ij(0)} e_{j(0)}) + (\hat{a}_{ij(t)} e_{j(t)} - \hat{a}_{ij(0)} e_{j(t)}) + [(\hat{a}_{ij(t)} e_{j(t)} - \hat{a}_{ij(0)} e_{j(0)}) - (\hat{a}_{ij(t)} e_{j(t)} - \hat{a}_{ij(0)} e_{j(0)})] \\ &= (\hat{a}_{ij(t)} e_{j(t)} - \hat{a}_{ij(0)} e_{j(0)}) + (\hat{a}_{ij(t)} e_{j(t)} - \hat{a}_{ij(0)} e_{j(t)}) + (\hat{a}_{ij(t)} e_{j(t)} - \hat{a}_{ij(0)} e_{j(0)}) - (\hat{a}_{ij(t)} e_{j(t)} - \hat{a}_{ij(0)} e_{j(0)}) \\ &= (\hat{a}_{ij(t)} e_{j(t)} - \hat{a}_{ij(0)} e_{j(0)}) + (\hat{a}_{ij(t)} e_{j(t)} - \hat{a}_{ij(0)} e_{j(t)}) + (\hat{a}_{ij(t)} e_{j(t)} - \hat{a}_{ij(0)} e_{j(0)}) \\ &= (\hat{a}_{ij(t)} e_{j(t)} - \hat{a}_{ij(0)} e_{j(0)}) + (\hat{a}_{ij(t)} e_{j(t)} - \hat{a}_{ij(0)} e_{j(t)}) + (\hat{a}_{ij(t)} e_{j(t)} - \hat{a}_{ij(0)} e_{j(0)}) \dots \dots \dots (7) \end{aligned}$$

L.H.S of (7) denotes the total change in dependence of an average unit of export on manufacturing goods. The first term of R.H.S of (7) shows the effect of structural change and the second term shows the effect of change in the sectoral composition of export. Following Vaccara and Simon(1968), same set of weights to each of these two components and fixed base year(period ‘0’ for both the cases) coefficients method have been used in order to get the residual term or ‘interaction factor’ and it is represented by the third term in the RHS of the equation (7). The formulation described above has its dual also. If the technology of the terminal year is taken as fixed and the output change is decomposed into main effects by weighting them by the terminal year values of technology

and final demand, it will generate a residual term of interaction.

Data Base of the Study

Input-Output tables (Total inter-industry Transaction matrix) prepared and circulated by CSO for the years 1993-94 and 2006-07 provide almost all the information required for our purpose. The matrix as obtained from CSO for the year 1993-94 is of order 115*115 where as the Transaction Matrix for the year 2006-07 is of order 130*130. As these tables are at different levels of aggregation of the economy and are valued at respective year’s current prices, we have reduced both the tables to comparable levels (22*22 sectors) of aggregation by applying schemes of aggregation suitable for the respective tables.

In our study manufacture has a further break down into 14 subsectors in the condensed 22*22 Input-Output tables constructed and utilized by us and we have retained the maximum feasible disaggregation of manufacture. The subsectors of manufacture are-

- 1)Food Industry 2) Textile 3) Wood and Furniture 4) Leather Products 5) Rubber products 6) Plastic Prod 7) Petro Products 8) Chemicals 9) Iron and Steel 10) Metals and Non-metals other than Iron & Steel 11) Non electrical Machinery 12) Electrical 13) Transport Equipments 14) Misc Manufacture representing mainly Gems and Jewellery.

Results of the study

We find from Table-1 that the structural change effect is the leading contributing factor to the increase(decrease) of dependence of export on manufacture for most of the sectors in the Indian economy under liberalization. On the other hand, the export composition change effect on the dependence of export on manufacture is less evident.

Table-1:Dependence of Indian Export on Manufacture : 1993-94 -2006-07

Sectors	SCE	ECCE	IE	TE	Food
Industry	(+)0.0095	(-)0.0280	(-)0.0019	(-)0.0204	
Textile	(-)0.0053	(-)0.0603	(+)0.0004	(-)0.0652	
Wood and Furniture	(-)0.0016	(+)0.0010	(-)0.0013	(-)0.0020	
Leather Products	(-)0.0008	(-)0.0359	(+)0.0012	(-)0.0355	
Rubber products	(-)0.0008	(-)0.0016	(+)0.0008	(-)0.0016	
Plastic Products	(+)0.0086	(-)0.0015	(-)0.0001	(+)0.0070	
Petroleum Prods	(+)0.0449	(+)0.0147	(-)0.0104	(+)0.0492	
Chemicals	(+)0.0221	(-)0.0131	(-)0.0080	(+)0.0010	Iron
and Steel	(-)0.0210	(+)0.0225	(-)0.0089	(-)0.0074	Metal
Non-metals	(+)0.0114	(-)0.0513	(-)0.0065	(-)0.0465	
Non ele. Machinery.	(+)0.0120	(+)0.0071	(+)0.0005	(+)0.0196	
Electricals	(+)0.0202	(+)0.0256	(+)0.0101	(+)0.0559	
Transport Equip.	(-)0.0033	(+)0.0096	(-)0.0007	(+)0.0057	
Misc. Manufacture	(+)0.0341	(+)0.1049	(+)0.0333	(+)0.1722	

Source: Own calculation based on the equation-7.

Note : SCE-Structural Change Effect, ECE-Export Composition Change Effect, IE-Interaction Effect TE-Total Effect

CONCLUSION

As more and more time passes, liberalization gets deepen and the relaxation of controls seems to have manifested perceptible impact on the pattern of dependence of export on manufacture through the change in production structure of the Indian economy. The liberalization measures seem to be befitting with the production structure of the Indian economy.

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