CHAPTER - III

PRICE AND QUANTITY INDICES

3.1 Introduction :

In spite of the fact that the Pre-Devaluation period reflected a relative stagnation in the value of India's exports, the Post-Devaluation period displayed the symptoms of increase in the value of exports. However, this increase in the value of exports over a period of time is attributable to the combined effects of changes in the volume of exports and of prices. In connection with this, one of the essential problems that is frequently encountred is to seggregate the composite effects of these two factors to determine how much of change in value is accounted for by varying prices and how much of change in the value arises because of changes in the volume of exports.

Further, the export aggregates of a country comprise of heterogeneous groups of commodities for which there is no specific quantity measure common to all. It is through the construction of index numbers that it is possible to get any measure of changes in volume and prices of exports.

In order to seggregate the composite effects of price and quantity changes on the value of exports, the present study is designed to construct price and volume indices for major

commodity groups of exports* viz, consumer goods, intermediate goods for producing consumer goods, intermediate goods for producing capital goods and capital goods on the basis of commodities classfied at three digit level of the Revised Indian Trade classification (RITC), 1965 group.@

Moreover, it is also intended to undertake an analysis of the trend in the relative prices of exports of agricultural and manufactured products.

3.2 Index Numbers: Need for Construction :

The need for the construction of index numbers finds its justification in the fact that price and quantum indicies for different commodity groups and for different years which are published by the Central Statistical Organization, Government of India suffers from two important limitations. Firstly, these indicies are available for 29 groups of commodity exports with different base year for the years 1950-51 to 1976-77. Secondly, for certain years, these indicies are available for financial years, whereas for others in calender years. These limitations make it difficult to compare these indicies for different years

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* For scheme of Classification see, Appendix Table - V-4

@ For RITC 1965 groups, see, Appendix Table IV-3

of the same commodity group. For the years, 1959 to 1973, price
and quantum indicies are available at 1958 price level (i.e.
calender year). However, these indicies are available for the
years 1969-70 to 1979-80 at 1968-69 price level (i.e. Financial
year) and from 1980-81 onwards at 1978-79 price level.

In view of the revision of Indian Trade classification,
the base year for the construction of price and quantum indicies
of different commodity groups of exports has been changed by the
Department of Commercial Intelligence and Statistics from 1952-53
to 1958, and again to 1968-69 and thereafter to 1978-79.

In order to make the price index and quantum index
comparable during the period of 1965-66 to 1981-82, the present
study has attempted to construct these indicies at the 1970-71
price level for the major commodity groups of exports on the
basis of the three digit level of RITC 1965 group i.e. 170
commodities as against 29 commodity groups provided by the
Central Statistical Organization.

During the period under consideration i.e 1965-66 to
1981-82, the Indian Trade classification has been changed twice,
one in April 1965 known as the Revised Indian Trade Classifica-
tion, Revision - 1 and another in April 1977 known as the Revised
Indian Trade Classification, Revision-2. However, in the present
study, we have used the RITC 1965 as the basis of commodity

classification and accordingly the items classified in RITC, Revision-2 have been regrouped as far as possible in accordance with the RITC 1965, Revision-1 in order to establish correspondence between the two classifications.

3.3. Coverage of Commodities:

As far as the coverage of items for computing index numbers is concerned, the present study marks an improvement over the indicies provided by the Government of India.

It becomes evident from Table 3.1 that the number of items included in the construction of index numbers in the present study is greater than the number of items included by the Government of India. It is pertinent to mention that the Government of India has not maintained consistency in the construction of price and volume indicies for different sections of the RITC group i.,e. in some cases, the Government of India has considered the commodities at three digit level or four digit level or seven digit level. For sections Ø, 1, 3, and 4 of the RITC group index numbers are constructed by the Government of India by considering the number of commodities at the three digit level of the RITC 1965 group, whereas for section 5 index numbers are constructed using the number of commodities at the four digit level of RITC 1965 group. But for section seven, the index numbers are constructed by considering the number of commodities at the 7

Table : 3.1

Coverage of Items Included for computing Index Number of Exports

Section	Exports	
	No. of Items included [1]	No. of Items in the Present Study
[1]	[2]	[3]
Ø. Food and Live Animals	61	72
1. Beverages & Tobacco	7	8
2. Crude Materials inedible [except fuels]	91	75
3. Mineral fuels, lubricants and relevant materials	3	11
4. Animal and Vegatable oils and fats	5	11
5. Chemicals	34	61
6. Manufactured goods classified chiefly by materials	168	201
7. Machinery and Transport Equipment	93	106
8. Miscellaneous manufactured Articles	25	71
9. Commodities and transactions not classified according to kind	2	-
ALL SECTIONS	489	616

Source 1 : Directorate General of Commercial Intelligence and Statistics, Calcutta, Govt. of India. 'A Guide to Current Official Statistics of Trade. Shipping And Customs and Execise Revenue of India', P-46, Third Edition, 1978.

digit level of RITC 1965 group. However, the present study has considered the number of commodities at the 4 digit level of the RITC 1965 group in order to construct the index numbers for the major commodity groups of exports on the basis of 3 digit level RITC 1965 group. As regards Section 7 it is impossible to consider the number of commodities at the 4 digit level because there is a diversity in quantity measure at the 4 digit level of commodity group. Therefore, for Section 7 it is considered here at 7 digit level of different commodity group having an identical quantity measure within a group of 4 digit level.

3.4 Construction of Index Numbers : Methodology :

In order to compare exports in the current period with that revalued at 1970-71 prices the unit price index for exports is constructed according to Paasche's formula. Expressed in symbols, the formula can be written as follows:

$$P = \frac{\sum P_n Q_n}{\sum P_o Q_n} \cdot 100$$

Where Po and Pn denote the price of an article in the base year and in the current year respectively and Qn denotes the quantity in the current year.

Thus the Paasche's formula for calculating the unit price index is nothing but the ratio of exports at current prices to exports at constant prices multiplied by 100. In this study, an attempt is made to estimate exports at the 1970-71 price level for the years 1965-66 to 1981-82. It is possible to estimate exports at constant prices, if the quantity data of different commodities and the price per unit are available.

Adjustment for the incomplete coverage :

As far as the estimation of exports at constant prices is concerned, it is associated with the following two important limitations:

(1)   It is impossible to obtain quantity data for almost all commodities entering in to trade.

(2)   In cases of some commodities which were exported during the years (i.e. 1965-66 to 1981-82) other than the base year, it is not possible to get unit price for the commodities in question.

With reference to the above limitations, the important question that arises as to what adjustment if any should be made in the final index to allow for incomplete coverage in commodity detail. The common practice that is prevalent among different countries is to make such an adjustment by assuming that price

changes for the items not covered are the same as those for items which are directly included in the computation. Some of these contries make the adjustment only in the total index for exports i.e. price changes in all items not covered are assumed to be the same as the price changes shown by the aggregate of all items covered by the computation. Finaland and Ireland are two countries adopting this method.[1] Other countries, adopt the same method, but apply to each major commodity class separately, there the assumption is that price changes in items not covered within each separate class are the same as price changes shown by the items included in the calculation for the class. The adjustment is exactly identical to the one as shown above, but since it is made for each class, the adjustment is different for one class than it is for another and the overall index is obtained by aggregating separately adjusted class index numbers. This method is followed by the United States, United Kingdom, Canada, Netherlands and Sweden amongst others.[2]

In case of India, according to Department of Commercial Intelligence and Statistics,[3] adjustments are based on the

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[1]Index Numbers of volume and Prices by R.G.D. Allen in _International Trade Statistics_, ed. by R.G.D. Allend and J.E. Ely., New York, John Wiley & Sons, (1953).

2. Allen, R.G.D., _op.cit._, pp.199-202

3. _Indian Trade Journal_, 31st March, 1976, pp.B820-B821.

assumption that price changes in the items not covered in a section are similar to those shown by the items included in the calculation of index numbers for that section i.e. $P_i = P'_i$

Where P_i is the unit price index for a given section in respect of the included items and P'_i is same for ith section (inclusive of all items).

The unit price index (P_i) for the included items in a section is given by the formula:

$$P_i = \frac{\sum P_n Q_n}{\sum P_0 Q_n} \quad \ldots \ldots (1)$$

The index for the section inclusive of all items will be given by

$$P'_i = \frac{\sum' P_n Q_n}{\sum' P_0 Q_n} \quad \ldots \ldots (2)$$

In the equation (2) the aggregate $\sum' P_n Q_n$ is known but the aggregate $\sum' P_0 Q_n$ is unknown and it cannot be computed directly. Therefore, it is assumed that price changes for not covered items and for all the items are the same. Algebriacally, this can be shown as follows :

$$P_i = P'_i$$

$$\therefore \quad \frac{\sum' P_n Q_n}{\sum' P_0 Q_n} = \frac{\sum P_n Q_n}{\sum P_0 Q_n}$$

$$\therefore \quad \frac{\sum' P_0 Q_n}{\sum' P_n Q_n} = \frac{\sum P_0 Q_n}{\sum P_n Q_n}$$

$$\therefore \quad \sum' P_0 Q_n = \frac{\sum P_0 Q_n}{\sum P_n Q_n} \cdot \sum' P_n Q_n$$

$$= \frac{\sum' P_n Q_n}{\sum P_n Q_n \big/ \sum P_0 Q_n}$$

$= \underline{Total\ Values\ of\ all\ other\ items\ in\ the\ section}$
       unadjusted index for the section

The above value of $\sum' P_0 Q_n$ is substituted in the equation (2) in order to obtain the adjusted index number P'_i .

As far as a section of RITC group is concerned, it includes a large number of commodities at four digit level reflecting large variations in the price changes among the four digit level of commodities of the RITC group. If the quentity data are not available for the article code 5419 of RITC group, the Department of Commercial Intelligence and Statistics assumes that price changes in section 5 excluding article code 5419 are the same as price changes in 5419, but in section 5 of RITC there

are nine divisions i.e. 51, 52, 53, 54, 55, 56, 57, 58 and 59 and within these divisions there are different groups, to illustrate 512, 513, 514 are the groups in the division 51 etc.

In order to avoid these large variations of price changes, we have assumed in this study that price changes in the item at a four digit level not included in a group are similar to those shown by the items included in the calculation of index number for that particular group. For example, if the quantity data for 5419 are not available, it is assumed that price changes in 5149 are the same as price changes in group 541 excluding 5419. Similarly, for example, if the quantity data are not available for article code 2926, we have assumed that price changes in 2926 are the same as price changes in group 292 ex-chluding 2926.

Whereas in certain groups only one commodity is export-ed at the four digit level for which the quantity data are not available, one cannot assume that price changes in that commodity are the same as price changes in that particular group, for example ina group 553 only 5530 was exported, hence exports of 5530 are the same as exports of 553. If the quantity data are not available for the article code 5530, the calculation of 5530 or 553 is based on the assumption that price changes in division 55 excluding 5530 is the same as price changes in 5530.

Further in cases, when the quantity data for different commodities are available but unit price is not available on account of abscence of exports of that particular commodity in the base year i.e 1970-71, the adjustments are indispensable to be effected. The adjustment procedure can be elaborated by the following illustration. If the article code 2626 is not exported in the base year (i.e. 1970-71) but it is exported during the other years, then the averge price of group 262 is applied to 2626. Whenever unit price is not available at three digit level, then the average price of that particular division is applied to that commodity e.g. article 3320 was exported during other years other than in the base year 1970-71 and this is the only commodity which falls under group 332, in that case an average price of division 33 is applied to article 3320.

Moreover, in case of articles 8971 and 8972, the quantity data were lacking for the period of 1965-66 to 1973-74 but value figures were available. Whereas during the period thereafter (i.e. 1974-75 to 1981-82) the quantity as well as value data were available for these articles. This state of affairs on commodity details created a problem of estimation of quantity and price for these articles during the period of 1965-66 to 1973-74. In order to solve this problem we estimated the rate of average percentage change in price per annum for these articles during the period of 1974-75 to 1981-82. Then the rate of average

percentage change in price per annum, so estimated was applied to articles 8971 and 8972 (on the assumption that the same rate of change in prices prevailed during 1965-66 to 1973-74) in order to estimate the prices of these articles in the respective years. Having estimated the prices, we applied them to the value figures to estimate corresponding quantities in the respective years. Thus we could also estimate the base year's price and quantity for these articles.

Quantum Index :

Quantum indices are constructed to show movements in the aggregate value of exports after isolating the effects of price changes. The quantum index number is computed accoring to Laspeyre's formula as furnished below:

$$Q = \frac{\sum P_0 Q_n}{\sum P_0 Q_0}$$

Where, Qo and Qn denote quantity exported in the base year and in the current year respectively and Po refers to unit price of exports in the base year.