CHAPTER 3
METHOD AND MATERIAL

Method and material are, at best, mere instruments to comprehend and interpret a problem, and not ends in themselves. Their operative value is related, on the one hand, to the problem and, on the other hand to the alternative tools, that would be useful in the process of inferences and analyses. No social or economic problem can be explained adequately with the help of a single tool or technique. One has to be adjustable, imaginative and careful in choosing the right method. This requires knowledge of the entire configuration of problem and different possible research methods that might help the analysis. The second fact that needs emphasis is that the broader the purpose and wider the problem, the more composite should be the tools. Even where one method is applied, other could and should be used at least for verifying the conclusions.

The present chapter is structured as follows: the first section provides the details of different sources of data used in the study. Section 3.2 is devoted to explain the methods of estimating the growth and instability measures of export earnings. Section 3.3 presents the tools used in estimation of terms of trade. The final section provides the techniques of calculating estimation of potentialities of trade.

3.1 Nature and Sources of Data

The present study is based upon the time series secondary data collected from various published and unpublished sources of Government Agencies. The data for value and volume for principal export and product aggregates for India, NAFTA and the world have been gathered from various issues of Economic Surveys, Government of India, Ministry of finance, New Delhi, Handbook of Statistics on Indian Economy, Reserve Bank of India, Mumbai, various issues of Monthly Statistics of Foreign trade of India, Director General of Commercial Intelligence and Statistics (DGCIS), Calcutta, various issues of International trade Statistics Yearbook UNCTAD. Apart from it the information published in newspaper was also used and the
internet services have been also explored. The unit values are calculated by dividing export earnings by the corresponding quantity for each year. The export earnings are taken in the rupees.

3.1.1 Period of Analysis

To estimate the growth, instability of export earnings and its impact, the study broadly covers the period of fifteen years from 1996-97 to 2010-11. To make analysis of growth and instability by commodity structure and trading partners, the selection of a commodity and trading partner's classification scheme, which is uniform over the time period under study is required as the first step. The classification scheme most widely used for this purpose is the harmonized system of classification at six digit level (HS).

3.2 Methodology and Techniques of Analysis

3.2.1 Estimation of Growth Rates

The compound growth rates indexes are calculated by using the following type of function:

\[ Y_i = a (b_i)^t \]
\[ \log Y = \log a + t \log (b_i) \]

Where,
\[ Y_i = \text{export value of } i^{th} \text{ item}, \]
\[ t = \text{time variable}. \]

Annual compound growth rate \((r)\) was computed as:
\[ r = \frac{\text{antilog} (b_i) - 1}{100}. \]

3.2.2 Estimation of Instability

Nearly all measures of instability are based on a comparison of the actual values of a time series with the values, which would be 'predicted' (e.g. linear or exponential trend).
As a measure of instability this analysis utilizes an exponential index (IXEXP). IXEXP is defined as the coefficient of "unexplained" variations.

For calculating instability index the following formula was used:

\[ I = \sqrt{\frac{\sum_{i=1}^{n} e_i^2}{n-k}} \]

Where,

- \( e_i \) = value of residual of the \( i \)th observations.
- \( n \) = number of observations, and
- \( k \) = number of variables

Chand and Tiwari (1991), Jeromi and Ramanthan (1993) and, Goyal et al., (2000) and Kaushik and Karol (2001) have used this instability index (I) which is based upon the residuals.

3.2.3 Estimation of Terms of Trade

The Net Barter Terms of Trade (NBTT) are defined as the ratio of unit value index of exports to imports as below:

\[ \text{NBTT} = \frac{\text{Index of Unit Value of Exports}}{\text{Index of Unit Value of Imports}} \times 100 \]
For the best results of Net Barter Terms of Trade (NBTT), it is very important to collect data at most micro level, i.e. 8-digit HS classification (Singla and Sinha, 2012). But the major problem with this data was the irregularity or very negligible presence of the commodities during the study period. Therefore, the data has been collected at 6-digit HS classification. Though, there has been problem with this data too, i.e. with the inclusion or exclusion of some major commodities at 8-digit HS classification, the values of some commodities at 6-digit HS classification fluctuated sharply. But, there was no other choice because the quantity is available only for these two commodity groups. However, an attempt has been made to minimise this limitation by skipping those commodities which fluctuated sharply due to this reason and those commodities whose share with time have become negligible. Thus, the commodities have been selected on the basis of their share and regular yearly presence during the study period.

In foreign trade analysis it is very difficult to get quoted prices for internationally traded commodities. Hence one will have to make use of the unit values, instead of prices. Unit value is derived by dividing the value reported in the trade statistics by reported quantity. The unit value indices for exports and imports have been constructed with the help of chain base indices by applying the Passche formula as below:

\[
\text{Passche Index} = \frac{\sum P \cdot Q_1}{\sum P \cdot Q_0} \times 100
\]

Where,

- \( P \) stands for price,
- \( Q \) stands for quantity
- \( 1 \) stands for current year, and
- \( 0 \) stands for base year.
Since the quantities of goods traded changed over the time, we used the current year quantities as weights, in order to intermix the effects of changes in the price and quantity mutually. The chain base indices have been computed for the period from 1996-97 to 2010-011 with the base year 1996-97. After that Net Barter Terms of Trade (NBTT) have been calculated by using the above mentioned formula.

For calculating India's terms of trade with the NAFTA as a whole, data related to 10 major commodities of India's exports to NAFTA has been used. These were shrimps & prawns frozen, cashew nuts fresh/dried shelled, Men's/ Boy's shirts of cotton, T-shirts etc of cotton, blouses of cotton, other furnishing articles of cotton, not knitted/ crocheted, other made up articles, others, articles of other precious metal w/n plated or clad and other products of iron/ non-alloy steel otherwise plated/coated with zinc. On the other side of imports, nine major imports from NAFTA were taken. These were the newsprint in rolls or sheets, cotton, not carded or combed, others, unwrought silver, other unwrought forms, other waste and scrap, copper waste and scrap parts and accessories of machines of hdg no. 8471, ammonium dihydrogen ortho phosphate (mono ammonium phosphate)/mxtrs thereof with diammonium hydrogenorthophosphte (diammonium phosphate) and diammonium hydrogen orthphosphate (diammonium phosphate).

3.2.4 Estimation of potentialities

If India's export of a particular product to NAFTA (USA, Canada and Mexico) is less than NAFTA'S total import of that product, assuming that NAFTA has enough demand for that product, then there is an opportunity for increase in Indian export of those products. However, there is another factor that might limit the export potential, i.e. export-capacity of India. Total Indian export to world of a particular product may be a good indicator of export capacity for India. Taking all these aspects into consideration we shall use the following index for potential trade.

The Potential Trade is:
Potential trade = Minimum of (NAFTA’s total import of product x, India’s total export of product x) — India’s existing exports of product x to NAFTA.

The projections of export potential to each other were made with the help of semi-log equation:

\[ \log Y_t = a_0 + a_1 X_t \]

Where,

\( Y_t \) = level of imports/exports over the period of time,

\( X_t \) = index for time,

\( a_1 \) = trend growth rate imports/exports and

\( a_0 \) = constant or intercept.