Chapter - III

Research Methodology

This chapter deals with the research methodology adopted to carry out the study. The significance of the study, purpose, data collection, sampling method, statistical techniques and analysis of the data included here under:

3.1 Rationale of the Study

Improving housing finance supports economic development through several channels: increasing saving, investment and employment; strengthening and deepening the financial sector; and reducing poverty. Without financing options, low-and middle-income households cannot afford to purchase homes. Since a house is often the primary investment and savings vehicle for those groups, a lack of housing finance also constrains overall saving rates. Low saving and investment rates restrict economic growth and limit economic development. Housing finance encourages the growth of the financial services sector, which is key factor in economic development.

It is observed that though there are many studies worldwide have been conducted on housing finance including comparison between different HFCs, growth, performance, problems, challenges, and future prospects of housing finance as an industry segment. There is dearth of literature related to impact of housing fiancé on Indian economy, so that the present study seeks to bridge the above research gap by making a systematic study of the growth and impact of institutional housing finance on Indian economy.

In order to get inter-industry linkages of housing with the rest of the economy for estimating the impact of investment in housing on GDP and employment in the economy, it is absolutely essential to use the Input-Output matrix prepared for the latest possible year in the Indian economy. Housing - particularly residential dwellings is an important and integrated part of the construction sector as it is defined in the National Accounts Statistics - Sources and Methods, 1989. In all of the detailed Input-Output tables prepared by Central Statistical Organization and Ministry of Statistics and Programme Implementation, housing has not been separated from the aggregative construction sector. On the other hand, the broad estimates provided on
the input-structure within the housing sub-sector and the construction sector from different sources suggests broad similarity and comparability of the two activities when considered in an aggregative form. On the face of it, therefore, housing and construction cannot be seriously and significantly considered distinct activities in terms of inputs used if the level of aggregation of sectors in the economy is sufficiently high. In the study, the economy is disaggregated to the level of only 19 broad sectors which are obtained by appropriately aggregating the 128x128 sector input-output table from the Central Statistical Organization and Ministry of Statistics and Programme Implementation for the year 2007-2008. At such a high level of aggregation, the input-structure of housing sub-sector is most likely to be very similar, if not the same, as the input-structure for construction sector. If the input-structure of the two is similar, methodologically it does not matter whether the two are separated or disaggregated into distinct sectors as far as the impact of any incremental activity in the two sectors on the GDP and employment in the economy is concerned.

More precisely, the methodology requires considering incremental investment in housing all other things remaining the same. Therefore, an increase in the housing investment alone is identical to the increase in the construction investment to the same extent (i.e., \( \Delta H = \Delta C \)) Now, if the input-structure of housing and construction is very similar, the estimation of income and employment multipliers based on the construction sector’s input-structure is valid and very close to the one based on the housing sub-sector’s input-structure if it was separately available. Since reliable and comparable data on the housing sub-sector’s input-structure are not available for the Indian economy, the foregoing logic suggests that at a sufficient aggregative level, considering construction sector’s input-structure as a substitute for the housing sub-sector’s input-structure is a fully justified simplification it also provides a solution to the data problems. (Dholakia & Dholakia, July 2000)
3.2 **Objective of the Study**

The main objective of the research is to study the growth and impact of institutional housing finance on Indian economy. The subsequent objectives in order to fulfill this main objective are as follows:

1. To make an overall review of the emergence of the institutional system for housing finance in India and also to trace the broad pattern of its composition over the years.
2. To study the impact of housing finance investment in the housing sector on GDP and employment.
3. To study the multiplier effect of housing finance investment.
4. To examine the role played by housing finance in inclusive growth of the economy.

3.3 **Data Collection**

The data was collected using secondary sources of information. The data relating to institutional housing finance and construction was collected from Central Statistical Organization (CSO), Ministry of Statistics and Programme Implementation (MOSPI), others government reports, reports on trend and progress of housing finance in India, annual reports of NHB, Ministry of Urban Development, Housing and Urban Development Corporation (HUDCO), Centre for Monitoring Indian Economy (CMIE), and other related websites as well as from various journals, magazines, newspapers etc. For estimating multiplier effect Input–Output Matrix 2007-2008 was collected from Central Statistical Organization and Ministry of Statistics and Programme Implementation published in 2012 is used.

3.4 **Statistical Techniques**

The data was analyzed by using descriptive statistics, Compound Annual Growth Rate (CAGR), various tables & charts, linear regression, Leontief Input-Output matrix etc. The analysis part was carried out on SPSS 17.0 version.
3.4.1 Regression Analysis

The associative relationship between a dependent variable and one or more independent variables can be established by regression analysis. Linear regression analysis was used to consider relationship between a dependent variable and independent variable (Malhotra, 2009). The variable to predict the other variable's value is called the independent variable (or sometimes, the predictor variable). R value is the square root of R-Square and is the correlation between the observed and predicted values of dependent variable. R Square, the coefficient of determination, is the squared value of the multiple correlation coefficients R-Square is the proportion of variance in the dependent variable which can be explained by the independent variables. This is an overall measure of the strength of association and does not reflect the extent to which any particular independent variable is associated with the dependent variable. The construction was considered as independent variables and gross output, GDP, employment and income were dependent variables and significant dimensions affecting Indian economy were identified.

3.4.2 Leontief Input–Output Matrix Analysis

It is customary to use the methods based on Leontief input-output matrix to quantify the extent of inter-sectoral linkages. Leontief Input-output matrix is a useful device of summarizing the origin of each of the various inputs and the destination of each of the various outputs of all industries in an economy. It shows the inter-industry transactions in the form of flow of goods and services. Assuming that there are n sectors in the economy, the gross output of the jth sector by Xj and the amount of ith sector’s output consumed in the process of producing ith sector’s output as Xij. The matrix X consist of elements Xij (I = 1, 2, ..... n; and j = 1, 2, ... ,n) represents the input-output transactions matrix of dimension n x n. From the transactions matrix, we can derive the technology matrix A by defining the technical input-output coefficient Aij = Xij/Xj. The coefficient Aij indicates the amount of ith sector’s output required as input for producing one unit of the jth sector’s output.
The output of any given industry is used partly to meet the inter-industry demand and partly to meet the final demand. Accordingly, the following basic identity indicating how the \(i^{th}\) sector disposes of its output:

\[
\sum_{j} X_{ij} + F_i = X_i \quad (I = 1, 2, \ldots, n)
\]

Where \(\sum_{j} X_{ij}\) shows the total use of \(j^{th}\) industry’s output by each of the \(n\) sectors; and \(F_i\) shows the final demand for the product of sector \(I\).

In matrix notation, the system of equations implicit in the above identity can be expressed as:

\[
AX + F = X
\]

Equation (1) can also be re-written as

\[
X - AX = F
\]

i.e.

\[
(I - A)X = F
\]

Pre-multiplying both sides of the above equation by \((I - A)^{-1}\), we get

\[
X = (I - A)^{-1}F
\]

In the open Leontief system, the final demand vector \(F\) is given exogenously. Therefore, the following question is raise given the final demand for various goods and services, what should be the level of gross output that each sector will have to produce to meet the final demand? The levels of gross output that will exactly meet the final demand for various goods and services will be the ones that will also support all the production activities required in producing various types of output. The output requirements for supporting a specified level of production activity in different sectors depends on the given technology of production as indicated by the technical input-output coefficients. As shown in equation (2), these equilibrium output levels consistent with the given final demand and the corresponding inter-industry demand can be readily obtained once we have the inverse matrix \((I - A)^{-1}\), also known as the Leontief Inverse’.
The elements of the Leontief Inverse have special interpretation. Let the elements of the inverse matrix \((I-A)^{-1}\) is denoted by \(C_{ij}\), \(i = 1, 2... n\); and \(j = 1, 2, ... , n\). The elements of \(j^{th}\) column \((C_{ij}, C_{2j}, ... C_{nj})\) indicate the gross output from each of the \(n\) sectors required to meet one unit of final demand for the product of \(j^{th}\) sector. It is evident that to produce one unit of final output of a given sector, inputs are required from various sectors. It is necessary, therefore, to produce some output in each of the different sectors to support one unit of final output of a given sector. The necessity to produce some positive output levels in other sectors, in turn, implies further requirements of the output of various sectors to serve as inputs in each sector’s output. The total output requirements for all sectors taken together for supporting one unit of final output of a given sector would thus consist of the direct and indirect output requirements. The elements of a given column vector of the inverse matrix \((I-A)^{-1}\) represent the direct and indirect output levels in various sectors associated with one unit of final demand for the output of the corresponding sector.

In order to measures of Inter-Industry Linkages Rasmussen method (1956) is most widely used in order to find the direct as well as indirect forward and backward linkage coefficients using the Leontief inverse matrix \((I-A)^{-1}\) which in turn help to identify the high linkage sectors in the Indian economy the same method has been used in the present study. Given the inverse matrix \((I-A)^{-1}\), measured the strength of different types of inter-industry linkages. Backward linkages are defined as the simple column sums of the Leontief inverse while the forward linkages are the simple row sums of the Leontief inverse. The following two measures are of special significance for our purpose:

(1) The first measure indicates the backward linkage representing the input demand generated by a unit change in the level of production of a given sector. This measure is known as the coefficient of backward linkage or \(BL_j\). The coefficient of backward linkage associated with the expansion of sector \(j\) is measured by:

\[
BL_j = \frac{1}{X_j} \sum_{i=1}^{n} X_{ij}
\]

Intermediate input requirement of sector \(j\) per unit of its gross output
(2) The second measure indicates the total impact of an increase in the output of a given sector on all sectors taken together. This measure, known as ‘Total Forward Linkage Coefficient’ or the ‘index of power of dispersion’ \((Y_j)\) accounts for the direct as well as indirect linkages induced via feedback and spillovers of the initial impact to all other sectors in the economy. The total linkage coefficient associated with the expansion of sector \(j\) is measured by:

\[
Y_j = \frac{\sum_{i=1}^{n} C_{ij}}{\sum_{i=1}^{n} \sum_{j=1}^{n} C_{ij}}
\]

Total direct and indirect requirements of inputs per unit of final demand of sector \(j\) in relation to the corresponding national average

3.5 Hypotheses Framed

The following three hypotheses proposed to be tested are:

H1: No change in the GDP and employment in Indian economy by institutional housing finance.

H2: No multiplier effect after the introduction of institutional housing finance.

H3: No role played by institutional housing finance on inclusive growth.