

CHAPTER 3
OBJECTIVES AND RESEARCH METHODOLOGY

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Over the period of time, the financial sector in India has evolved and with the introduction of financial reforms, financial activities have grown and are being conducted in a better manner. The financial system has become more sophisticated. India has also managed its financial sector with greater resilience in the midst of the global financial crisis in the past. In recent years the Government of India has made efforts towards financial inclusion of the unbanked and under-served section of the population from financial services point of view. These developments entail an examination of the financial sector of India.

From the extensive review of related literature carried out in the previous chapter, it is observed that while substantial work has been done in the area of financial development across many countries, including India, and also cross-country studies, no study is found that undertakes an in-depth analysis of all dimensions of the financial sector development at one place. Most of the studies in the context of India, have focused only on financial institutions as the major component of the financial sector to measure financial development, and very few studies include both financial institutions and markets, simultaneously.

In relation to empirical studies on the link between financial development and economic growth, the observation is that they make use of select indicators, primarily of financial depth, as the explanatory variables. There is clearly a lack of comprehensive studies, particularly in the context of India, that captures all four dimensions all together in a composite manner to measure its impact on financial development. There is a need to gauge the nature and extent of financial sector growth and development in India over the years and establish meaningful interlinkages between its many facets. The present study seeks to fill the gap by encompassing all four dimensions not only in terms of size but also in terms of access, efficiency and stability, across both, financial institutions and financial markets. In the context of the study following are the research questions and objectives.

Research Questions

- Has access to financial services in India improved over time?
- What is the extent of financial deepening in India?
- What is the state of efficiency of the financial sector in India?
- How does the financial sector in India fare on the issue of stability?

- Do these aspects of financial sector influence each other?
- Is there a link between financial development and economic growth in the case of India?

3.1 OBJECTIVES OF THE STUDY

The present study focuses on the analyses of various dimensions of financial development in the context of the Indian economy, which form the primary and major objectives of the study. The secondary objective is to examine the relationship between financial sector development and economic growth. Following are the objectives of this study:

- To measure the extent of financial development in India in terms of access
- To measure the extent of financial development in India in terms of depth
- To analyse the level of efficiency of the financial sector in India
- To analyse the stability of the financial sector in India
- To examine the intra and inter-dimensional linkages of the financial sector in India
- To structure the dimensions into a composite form to gauge overall financial sector development
- To study the impact of financial development on economic growth

The analytical work carried out to fulfil the above stated objectives is presented in chapters four and five.

3.2 RESEARCH METHODOLOGY

The present study is based on time series data on a wide range of financial variables related to the banking and non-banking sector and the financial market. The time period of the study is thirty years which is the post-reform period from 1990-91 to 2019-20. The study is based on secondary data from reliable sources. The data related to scheduled commercial banks is sourced from RBI publications such as Basic Statistical Returns of SCBs in India, Statistical Tables related to Banks in India, Indian Banks at a Glance, Handbook of Statistics on Indian Economy, RBI Bulletin, Report on Trend and Progress of Banking in India and other publications. The data on post offices is sourced from the annual reports of the Department of Post. Data on insurance sector is obtained from the Annual Reports of the Insurance Regulatory and Development Authority (IRDA). Data on some of the variables, particularly, those related to financial markets, including debt, securities, foreign remittances and claims, stock price

volatility, etc., are source from World Bank Database on Global Financial Development. Wherever required proxy variables have been used due to non-availability of data.

The study is descriptive and empirical in nature. The investigation starts with a systematic review of the literature on all four dimensions of financial development. The study makes use of simple statistical tools like graphical presentation, ratios, and growth rates to study the trend in the four dimensions. Three alternative indices of financial inclusion have been constructed using Euclidean Distance and Inverse Euclidean Distance method. The three indices include different sets of indicators chosen on the basis of the construct of the dimensions, and cover different time periods.

As it is not easy to comprehend the extent of financial development in terms individual indicators or dimensions, the research work also includes construction of an index of financial development build on the pyramid structure of dimensional indices at the base and indices of financial institutions and financial markets at the secondary level. The technique of Principal Component Analysis has been used to identify measures to be included in index construction. Further, the intra and interlinkages of the indicators of the four dimensions of financial development have been examined by using correlation analyses along with the testing of their significance.

Structural equation model for confirmatory factor analysis of the latent variables contributing to financial development has also been employed. The last part of the analytical work includes empirical study of the relationship between financial development and economic growth. All kinds of tests required for data reliability have been carried out where required. The study uses the Eviews software to carry out the empirical work.

3.3 FINANCIAL SECTOR DEVELOPMENT FRAMEWORK

The present study has drawn from the construct of financial sector development based on a 4 x 2 framework of dimensions, developed by the World Bank which maintains the Global Financial Development Database. It encompasses four aspects of financial development, namely, access, depth, efficiency and stability across two components of financial sector, viz. financial institutions and financial markets. The indicators used in the study across the four dimensions and two institutions are presented in Table 3.1.

Table 3.1 Indicators of Different Dimensions of Financial Development

Dimensions of Financial Development	Financial Institutions	Financial Markets
Access: Penetration Availability Usage	No. of bank deposit accounts per 1000 adult pop. No. of credit accounts per 1000 adult pop. No. of post office savings accounts per 1000 adult pop. Insurance premium per 1000 adult population No. of bank branches per 100,000 adult population No. of post offices per 100,000 adult population No. of life insurance offices per 100,000 adult pop. No. of ATMs per 100,000 adult population No. of bank branches per 1000 sq. km. No. of ATM per 1000 sq. km. Bank deposit to GDP Bank credit to GDP Post office savings to GDP Small savings to GDP Life insurance premium to GDP Public deposits of NBFC to GDP	Market Capitalization per 1000 adult pop. No. of Listed Companies per 100,000 adult pop. Value traded excluding top 10 traded companies to total value traded Market capitalization excluding top 10 companies to total market capitalization Total Value Traded to GDP Mutual Funds to GDP
Depth	M1, M2, M3 and M4 to GDP Bank deposits to GDP Bank credit to GDP Bank credit to commercial sector to GDP Bank assets to bank assets and central bank assets Post office savings to GDP Small savings to GDP Public deposits of NBFC to GDP Life insurance premium to GDP Consolidated foreign claims of banks to GDP Remittance inflows to GDP Pension funds to GDP Syndicated loan issuance volume to GDP Size of financial system to GDP	Stock market capitalization to GDP Total Value traded to GDP Outstanding public debt securities to GDP Gross portfolio equity & investment funds share liabilities to GDP Corporate bond issuance volume to GDP
Efficiency	$NIM = \text{Net interest income} / \text{total assets}$ Interest expense to deposit Total income to operating expense Bank overhead cost to assets Return on equity = Net profit/average total equity Return on assets = Net profit/average total assets Non-interest income to total income	Stock market turnover ratio
Stability	Bank credit to bank deposit Z – Score Capital adequacy ratio Provision coverage ratio Bank nonperforming loans to gross loans	Stock price volatility Stock returns volatility

3.4 STRUCTURAL DIMENSIONS

Over and above these independent variables used for measurement of financial sector development there are some other variables that capture the financial sector development in terms of structural changes in the financial sector. Likewise, in the relation to demand side vis-à-vis supply side aspects of financial access, relative ratios would indicate how the two emerge. The measures for the same are listed in Table 3.2.

Table 3.2 Indicators of Structural Dimensions

Dimensions	Indicators
Intra-dimensional changes in Core Financial Inclusion Index	Usage to Penetration Ratio Usage to Availability Ratio Penetration to Availability Ratio
Structural Change in the Size aspect of Financial Sector	Bank Assets to Market Capitalization
Structural Change in the Activity aspect of Financial Sector	Bank Credit to Total Value Traded

3.5 METHODOLOGY TO CONSTRUCT FINANCIAL INCLUSION INDEX

In the literature on financial development, some of the studies have constructed the financial inclusion index (FII), a comprehensive way to measure overall improvement in financial access. The present study has constructed three financial inclusion indices for different time period applying a gradient of constructs of the concept of financial inclusion based on well-defined reasoning. All the indices constructed are composite indices of three-dimensional indices, namely, penetration index, availability index, and usage index. All three dimensions are measured by different indicators based on the construct of the concept of financial inclusion and as per data availability. The three FIIs constructed in the study are as shown in Table 3.3. All indicators used in the three indices are listed in Table 3.4.

Table 3.3 Financial Inclusion Indices

Financial Inclusion Index	Period	Construct
Banking services oriented Core FII [C-FFI]	1990-2020	Banks and Post Offices based indicators
Financial Institutions and Markets based Intermediate FII [I-FFI]	2001-2020	Banking, Non-Banking Institutions and Stock Market indicators
Institutions, Markets and Technology based Advanced FII [A-FII]	2010-2020	Financial Institutions and Stock Market indicators

Table 3.4 Dimensions and Indicators used in the Construction of the Three Financial Inclusion Indices

Dimensions	Indicators
PENETRATION OF FINANCIAL SERVICES	No. of bank deposit accounts per 1000 adult population
	No. of bank credit accounts per 1000 adult population
	No. of post office deposit accounts per 1000 adult pop.
	Market capitalization per 1000 adult population
	Insurance premium per 1000 adult population
	No. credit cards per 1000 adult population
	No. of debit cards per 1000 adult population
	No. of electronic transactions per 1000 adult population
AVAILABILITY OF FINANCIAL SERVICES	No. of bank branches per 100,000 adult population
	No. of bank branches per 1000 sq. km.
	No. of ATMs per 100,000 adult population
	No. of ATMs per 1000 sq. km.
	No. of post offices per 100,000 adult population
	No. of insurance offices per 100,000 adult population
	No. of listed companies per 100,000 adult population
	No. of internet users per 100,000 adult population
USAGE OF FINANCIAL SERVICES	Bank deposits to GDP
	Bank credits to GDP
	Post office savings deposits to GDP
	Small savings to GDP
	Life insurance premium to GDP
	Public deposits of NBFC to GDP
	Stock market total value traded to GDP
	Net resources of mutual funds to GDP
	Value traded excluding top ten traded companies to total value traded
	Market capitalization excluding top 10 companies to total market capitalization
	Volume of total electronic payments to GDP

Methodology of Index Construction

All the three indices are constructed using same methodology. The present study uses the methodology used by UNDP but with appropriate modification. The index is constructed at two levels. Firstly, the dimensional index is calculated for all the three dimensions separately and, secondly, a composite index is calculated using the three dimensional index. To construct index at both the level same methodology is used which includes three steps:

- Normalisation of Indicators
- Calculation of Distance index
- Calculation of Final index

Step 1: Normalisation of Dimensions

The variables used in the construction of the index have different units of measurement and therefore cannot be directly aggregated to arrive at an index value. Therefore, all the variables are first normalized to make the unit of the variable free for further computation. The variables are normalized using following formula:

$$D_x = W_i \frac{x - x_{min}}{x_{max} - x_{min}} \quad (1)$$

where,

W_i = Weight attached to variables

x = actual value

x_{min} = minimum value

x_{max} = maximum value

D_x = normalised value

The process of normalization, using the above formula, will convert all the dimensions within the range of zero to one. Within this range zero represent the worst position of the dimension and one represent the idea position with highest value. Higher the value better the improvement in the dimension.

Step 2: Construction of the Distance Index

In the present study the composite index of financial inclusion is calculated by taking simple average of two calculated distance indices. The two distance indices are calculated using two different methods. The first distance is calculated from the worst point that is zero. It shows how much the indices has improved from their worst points up to its best value, that is, one. The following Euclidian distance formula is used to calculate the first distance index

$$X_1 = \frac{\sqrt{d_1^2 + d_2^2 + \dots + d_n^2}}{\sqrt{n}} \quad (2)$$

where,

d_i = Normalised value of indicators

W_i = weights assigned to each indicators

The value of first distance index will lie between zero to one. It will give higher values to the more improved magnitudes of the indicators. In other words, it will show the distance achieved to improve inclusion from its worst point.

The limitation of the first distance index is that while it shows the improvement from the worst point, it does not throw light on the distance yet to be covered to achieve *full* financial inclusion. Therefore, along with Euclidian distance method this proposed index uses inverse Euclidian distance method. It shows the distance yet to be achieved to reach the ideal point of improvement. It is calculated as follows:

$$X_2 = 1 - \frac{\sqrt{(1-d_1)^2 + (1-d_2)^2 + \dots + (1-d_n)^2}}{\sqrt{n}} \quad (3)$$

All the indicators of dimensional index are considered equally important and hence, are given equal weightage. As equal weights have been assigned to each dimension, the ideal goal post would be one. The above two distance methods are used when all indicators are treated equal. The normalised value of all the indicators are subtracted from the ideal point one and then the whole value is subtracted from one after the necessary summation, ratio and under-roots are calculated.

Step 3: Calculation of the Dimensional Index

Lastly, to calculate the final index value of the dimension is derived as the simple average of X_1 and X_2 , that is, the distance index and the inverse distance index.

$$DI = \frac{1}{2} (X_1 + X_2) \quad (4)$$

The value of dimensional index would lie between zero and one. The higher the value, the better is the improvement in the dimension. The above three steps are applied to construct all the three dimensional indices.

Step 4: Calculation of the Financial Inclusion Index

To construct the composite index of financial inclusion, all the three steps are repeated on the dimensional indices. All the three dimensional index are renormalized using the formula number (1). To construct the FII, different weights have been assigned to the three dimensions. Penetration being the most elementary and important aspect of financial inclusion, it has been

assigned the weight of 50 percent, while availability and usage dimensions are assigned weightage of 25 percent each. Accordingly, the formula for distance and inverse distance method will change slightly. In formula (2) the denominator will be modified as the square root of the sum of weights assigned to each dimensions, as follows

$$X_1 = \frac{\sqrt{d_1^2 + d_2^2 + \dots + d_n^2}}{\sqrt{w_1^2 + w_2^2 + \dots + w_n^2}} \quad (5)$$

Likewise, formula (3) will be modified by altering the numerator, where the ideal post of one is replaced by the weights. The ideal post for the three dimensions will be different. The normalize value of all dimensions will be deducted from their respective weights, the formula will be

$$X_2 = 1 - \frac{\sqrt{\{(w_1 - d_1)^2 + (w_2 - d_2)^2 + \dots + (w_n - d_n)^2\}}}{\sqrt{w_1 + w_2 + \dots + w_n}} \quad (6)$$

The last step in the calculation will remain same, the simple average of both distance and inverse distance method.

$$FII = \frac{1}{2}(X_1 + X_2) \quad (7)$$

3.6 METHODOLOGY TO CONSTRUCT INDEX OF FINANCIAL DEVELOPMENT

The Index of Financial Development (IFD) measures the overall development of the financial sector by creating a pyramid structure of primary, secondary and tertiary level indices. The primary index comprises a six-dimensional indices of access, depth and efficiency, where, two sets of the three dimensions aggregate to build two secondary indices. These secondary indices are the Index of Financial Institutional (IFI) and Index of Financial Markets (IFM). Finally, the tertiary index, namely, the IFD is constructed as a composite index of all these eight indices. Similar work is also found in Svirydzienka (2016) and Gupta and Mahakud (2019).

With the above construct of financial sector development, the present study has used 21 different indicators to construct the primary indices as shown in Table 5. The indicators have been identified as having the highest possible variance to account for the variation in the

variable of interest. The technique of principal component analysis has been employed for this purpose as found in Lenka (2015).

Table 3.5 Indicators used in the Construction of the Index of Financial Development

Dimensions	Financial Institutions Indicators	Financial Markets Indicators
ACCESS	No. of bank deposit accounts per 1000 adult population	Market capitalization per 1000 adult population
	No. of bank credit accounts per 1000 adult population	No. of listed companies per 100,000 population
	No. of deposit accounts of post office per 1000 adult population	Value traded excluding top 10 traded companies to total value traded
		Market capitalization excluding top 10 traded companies to total market capitalization
DEPTH	M3 to GDP	Stock market capitalization to GDP
	Bank deposit to GDP	Stock market total value traded to GDP
	Bank credit to GDP	Outstanding domestic public debt securities to GDP
	Bank assets to GDP	Corporate bond issuance to GDP
EFFICIENCY	Net interest margin	Stock turnover ratio
	Interest expense to deposit	
	Non interest to total income	
	Total income to operating expense	
	Return on equity	

The index is constructed using the three steps, (i) normalizing the data (ii) assigning weights to each variable (iii) weighted average. The data is normalized using the following formula

Step 1: Normalization of data

$$D_x = \frac{x - x_{min}}{x_{max} - x_{min}} \quad (1)$$

where,

x = actual value

x_{min} = minimum value

x_{max} = maximum value

D_x = normalised value

In the case of some of the variables of the efficiency, lower values imply greater efficiency. These include net interest margin, total expense to deposit, and bank overhead cost to a total asset. For such variables, formula (1) would give misleading results. Therefore, (1) is modified to reverse the range of normalized value as shown in (2). The reverse normalized formula gives

a higher value to a lower figure and a lower value to a higher figure. The normalized value will bring all the variables within the range of 0 to 1.

The formula is:
$$D_x = 1 - \frac{x - x_{min}}{x_{max} - x_{min}} \quad (2)$$

Step 2: Assigning weights

After normalization second step is to assign weights to all the variables. The method of Principal Component Analysis (PCA) is used to extract the indicators which are responsible for variation in the dependent variable, and to assign weights to them. In the present study, the indicators whose factor loading is above one percent are chosen to construct an index.

Step 3: Construction of the Index

The index is constructed as a weighted average of the variables, that is, all the variables are assigned weights and aggregated to generate the value of the index.

$$I = \sum D_i * W_i \quad (3)$$

All the three steps are followed at each of the level, primary, secondary and tertiary, to construct the relevant indices, that is, the six sub-indices of dimensions, two indices for financial institutions and financial markets and one final index of sector development.

A secondary index is constructed using the same procedures. All the six primary indices are again renormalized and assigned weight to calculate the two secondary index that is FII and FMI.

$$IFI = \sum_3^n FI * W_i \quad (4)$$

$$IFM = \sum_3^n FM * W_i \quad (5)$$

The tertiary index is a composite index of all the dimensions constructed through the weighted average of the secondary index. All the procedure is used again to get the value of the final index. The final index value is arrived using the formula (6). W_I represents the weight assigned to the secondary index, the Index of Financial Institution, and W_M represents the weight assigned to the other secondary index, the Index of Financial Markets.

$$IFD = W_I * IFI + W_M * IFM \quad (6)$$

3.7 INTRA AND INTER-DIMENSIONAL LINKAGES

The present research work includes examination of intra and interlinkages between the indicators of the four dimensions of financial development by using pair-wise correlation between them. The correlation coefficients have been tested for their statistical significance and meaningful inferences have been drawn. The hypotheses of the study related to this section are as under:

Hypotheses related to linkages:

- Financial access and depth are positively correlated
- There is a positive correlation between financial efficiency and financial access, depth and stability
- There is a positive correlation between financial stability and financial access and depth
- There is an association between the indicators within each dimension of financial development

The SPSS software has been used to derive the correlation coefficients and to test for the above hypotheses.

3.8 ANALYSIS OF FINANCIAL SECTOR DEVELOPMENT BASED ON STRUCTURAL EQUATION MODEL TECHNIQUE

One of the technique found in the literature to consolidate the multi-dimensional nature of financial sector development is the structural equation modelling (SEM) approach. SEM is a combination of measurement, path analysis, regression analysis and factor analysis; “The structural model defines the causal relationships and associations between latent variables” (Kang and Ahn, 2021). SEM is a part of confirmatory research. It allows fitting a model to explain the association of the observed measures and indicators with the latent variables that do exist but are not directly measurable, and thereby confirm if the observed measures are fit to represent the latent variables.

In the present context, the concepts of financial access, depth, efficiency and stability, which are the four dimensions of financial development, and also the concept of financial development itself, are abstract constructs that exist but are latent in nature. Therefore, each of the four dimensions as well as financial sector development can be quantified by testing for the association of the measureable indicators of each built into the SEM and can be statistically

evaluated for their significance. Reference to the use of SEM in the context of development related to financial inclusion, financial literacy, financial services, etc., is found in Baistaman, et al. (2020), Ahmad Shah and Mishra (2018), and Pandey, Kiran and Sharma (2022). Kang and Ahn (2021) have given an insightful understanding of model setting and interpretation of results of the SEM approach.

Accordingly, the present study has used the SEM technique to construct structural models of the four dimensions, and a preliminary effort to construct entire financial sector development model. R studio statistical software has been used for the purpose.

3.9 ECONOMETRIC ANALYSIS: FINANCIAL DEVELOPMENT AND ECONOMIC GROWTH

The secondary objective of the research work is to empirically test the relationship between financial sector development and economic growth by undertaking econometric analysis of the same. The alternative dependent variables used are Gross Domestic Product at constant prices and total factor productivity. The explanatory variables include control variables related to capital formation, labour, monetization of the economy, wholesale price index and openness of the economy in terms of foreign trade and investments. A host of alternative indicators of financial development have been used as explanatory variables in different combinations. These include broad money ratio to represent flow of funds to the organized sector; bank deposits, bank credit and bank assets, as proxies of financial intermediation and credit flows to the real sector. Stock market capitalization is used to represent the risk diversification possibilities offered by the financial sector. Alternative dimensional and sector indices constructed in the study have also been used as independent variables. The variables have been taken in the log form for the purpose of linearity. The variables have been checked for stationarity using Augmented Dickey Fuller Unit Root test. All diagnostic tests for normality, homoscedasticity and serial correlation have been carried out. The regression has been run using Eviews software.

The hypotheses related to the econometric analysis are as under:

- Financial depth has a positive effect on economic growth
- Financial inclusion leads to greater economic growth
- Economic growth is positively affected by the financial efficiency
- The index of financial access has a positive effect on economic growth

- The index of financial depth has a positive effect on economic growth
- Economic growth is positively affected the index of financial institutions and markets
- The index of financial sector development has a positive effect on economic growth

3.10 LIMITATIONS

Though diligent efforts have been made to undertake the present research work, some limitations are inevitable. Most limitations are related to non-availability of data and use of proxy variables in place of the actual variables. Since official data for all variables are not available for the entire period of study, some of the analysis is carried out for shorter period of time.

In the context of the indicators of financial sector development used for analysis, the study does not include any qualitative aspect of financial inclusion, as undertaken by the RBI (2021) for instance. Incorporating qualitative aspects of financial services is not within the scope of the present study.

Another important data limitation of the study is that in relation to the analysis of financial efficiency and stability, in particular, the indicators are pre-dominantly bank related. Efficiency and stability measures for other institutions are not included in the analysis as the relevant data is not readily available. Although, the predominance of banking related measures is justified by the fact that banks comprise the major share of the financial sector, the findings are subject to the limitation of omission of those indicators. Similarly, with regard to financial markets, all indicators of efficiency and stability relate to the stock market only. Stock turnover ratio is the only indicator available to represent efficiency of the stock market in the sense of liquidity it provides to the investors.

Further, beyond the host of indicators identified for representing financial development, there are other underlying drivers which shape the financial sector of any country. These include, the legal framework of the country, contract enforcement systems, institutional and regulatory strength and weaknesses of the country. These factors are not within the scope of the present study which is built on quantitative indicators of financial sector development, largely based on World Bank Global Financial Development framework.

With regard to the empirical study on the relationship between financial development and economic growth, proxy variables have been used for the control variables, labour and capital.

Labour has been alternatively represented by gross enrolment in primary or secondary school education, which is far from the accurate measure of labour. Some of the regression models use the proportion of working age group population which presumes as if all people in the age group of 15 to 64 years are part of the labour force. Another alternative for labour as a factor of production, used in the study is labour force participation. While it is a good proxy variable, it does not do justice to the qualitative differences in labour. However, the study has to suffice with the same.

Notwithstanding these limitations, the present study has attempted to undertake rigorous analysis of the available data. The initial analyses are further supported by secondary and tertiary level analyses in terms of intra and inter linkages between indicators and dimensions, construction of multi-level indices based on advanced techniques, to help substantiate the initial findings. The robust findings would be provide useful directions for further financial development in India.