Operationalising Financial Inclusion Index as a Policy Lever: Uttar Pradesh (in India) - A Case Study

Rabi N. Mishra[1], Puneet Verma[2,4] and Sanket Bose[3]

[1] Reserve Bank of India, Lucknow, Uttar-Pradesh, INDIA
[2] Reserve Bank of India, Lucknow, Uttar-Pradesh, INDIA
[3] Indian Institute of Technology, Kanpur, Uttar-Pradesh, INDIA
[4] Corresponding author: Puneet Verma, e-mail: puneetrbi@rediffmail.com

Abstracts

The inter relationship between financial development and economic growth is well explained in the literature. In the recent years, the debate has expanded to include the notion of financial õexclusionö as a barrier to economic development and the need to build an inclusive financial system (Beck *et al*., 2008). Recent empirical evidence using household data indicates that access to basic financial services such as savings, payments, insurance and credit can make a substantial positive difference in improving poor peopleøs lives (Caskey *et al*., 2006; Dupas and Robinson, 2009). To be able to gauge the level of financial inclusion (FI) can help endeavor in this direction more useful as it can guide policy making towards evening out efforts across territories. India with its diversities in extent of development across provinces and within them across regions badly needs a –multi-variate indexø to reflect extent of financial penetration so that policy measures can be effectively organized in sync with requirements. This papers aims at using a Financial Inclusion Index (FII) to rank 71 districts of Uttar Pradesh (in India) in terms of level of financial penetration based on the secondary data on some of the available influencing factors. The main objective of the study is to provide a statistically justified weighing method for assignment of appropriate weights to the factors according to their importance and give a proper method to obtain individual dimension indices. Instead of one, four methods have been discussed extensively and a comparative study has been carried out.

Key Words: commercial banks, financial development, GDP, principal component analysis.

Introduction

Close relationship between financial development and economic growth is well explained in the literatures (King and Levine, 1993; Beck *et al*., 2000; Demirgüç-Kunt and Maksimovic, 1998; Beck *et al*., 2004; Levine, 2005; Klapper *et al*., 2006; Demirgüç-Kunt *et al*., 2008). For firms, especially Small and Medium Enterprises (SMEs), access to finance is often the main obstacle to growth (Schiffer and Weder, 2001; Cressy, 2002; IADB, 2004; Beck *et al*., 2005, 2006, and Demirguc-Kunt *et al.*2008). Access to public services and systems is a prime role of an open and efficient society. Mostly low income segments of any economy mainly excluded from such services and therefore the poor are mainly focused for compete FI. It can be observed that although in the well developed countries the financial system is enriched, still it is not all-inclusive. The importance of an all-inclusive financial system is very much essential for any economy either developing or developed and it is desired for many more reasons. In this study we focused global definition of FI which states ease of availability, accessibility and usage of the formally formed financial system to all the members of an economy.

Chakraborty S. R. and Rupayan P. (2010) demonstrated an axiomatic measurement approach to measure FI. They referred their proposed index to be suitable for policy making point of view from the other indices proposed earlier. Their index can be broken down to obtain into dimension wise components that indicate the individual percentage contributions. They employed their measure to make a cross-country comparison of FI and as well as to analyze FI across sub-natural regions of India. Mehrotra *et. at.* (2009) obtained an individual dimension index by the same method and then taking a weighted average of those indices to get index of FI. They assumed the factors to be equally important for FI and hence assigned equal weights to them. According to Chattopadyay S. K. (2011) all the factors were given equal weights and Kolkata⊘s FII came out to be 1, i.e. complete FI, which leads to said that every person in Kolkata have a proper account in a formal financial institution and the credit facilities are equal for each individual. In latest all four World Bank working papers (Beck *et al.* 2004, Beck *et al.* 2008, Demirguc-Kunt *et al.* 2008, O. P. Ardic *et al.* 2011, Demirguc- Kunt A. and Klapper L., 2012) on FI they have not provided any particular methodology for obtaining the index.

Data
There are two entities one is bank and another is common person / citizen. Accessibility of the banks depends on the easily availability of them as and when required. FI scenario may be considered in demand and supply way so as to make it easy to understand as well to form appropriate policies. In FI banks may be considered as a supplier of the services and access the services may be considered as demand in the economy. We considered appropriate leading effecting factors on both the sides. Bank establishment is one of the foremost supplies therefore number of bank branches has been considered into the study. We have taken its per capita figure to make it comparable. Only deposit accounts may solve unavailability of number of transactions with the understanding that people, who are opening deposit account with their willingness, are properly maintaining their accounts. Other affecting factors are number of ATMs, number of banking staff (male and female) and number of Banking Correspondences (BC). Number of branches is used as proxy of these parameters because of unavailability of corresponding data. Any economic activity starts from soundness of the society and therefore we may consider per capita income of the district. People put their saving with the banks for various purposes and simultaneous updating the value of their money as well. Credit plays an important role for the development of any economic activity and therefore per capita credit may be considered. Deposit and credit accounts and total amounts in deposit accounts are considered separately for male and female. Demand will rise only when people are aware about the facility and that will happen with the literacy. Hence literacy rate among male and female will also contribute. In all total ten parameters (i.e. per-capita number of offices, per-capita female deposit accounts, per-capita male deposit accounts, per-capita deposit amounts, per-capita male literacy, per-capita female literacy, per-capita credit accounts, per-capita amount outstanding, per-capita credit amounts and per-capita GSDP) taken into consideration. In the study readily available secondary data on all 71 districts (as per census 2001) of Uttar-Pradesh (UP) a state of India, were considered. The population figures and the literacy rates are taken from census of India, 2011, district wise GSDP figures are obtained from Department of Economic Analysis and Research of UP and the bank related data as on 31st March, 2010 are obtained from RBI publications.

Methodology
In this methodology Principal Component Analysis (PCA) defined by Lindsay I. Smith (2002) and R. A. Johnson and D. W. Wichern (2007) has been used to obtain weights of corresponding factors. Firstly, correlation coefficient matrix for the whole set of variables

is obtained. Then the corresponding eigen values of the matrix and the eigen vector of each of the eigen values are obtained. Based on the eigen vectors, principal components are calculated. The main idea behind this method is to transform the set of variables to a set of uncorrelated variables using an orthogonal transformation. The methodology is statistically justified method for obtaining FII with a proper weighing technique so as to make use of it to compare FI further among the states and thereafter across the countries. This methodology is sensitive to the data changes. First principal component (FPC) has been considered to reduce the dimension from 9 to 1, assuming that the variables are linearly related to the measurement of FI and the FPC explains maximum variability. Following four methods have been discussed and a comparative study has been carried out to obtain the individual factor index for each of the district.

Method I: Mandira Sharma (2010) considered i[th] dimension index for the jth district as

$$D_{ij} = \frac{Actual\,Value - Minimum\,value}{Maximum - Minimum}$$

The index lied between 0 and 1, where 0 represents complete financial exclusion and 1 represents complete FI. Complete FI cannot be achieved practically therefore the index should not be bounded above. Besides this, range overestimates the measure of dispersion. Further arbitrary weights were considered. Moreover, the index was obtained by using normalized inverse euclidean distance between the observed point and the ideal point which was done precisely keeping non-statistical view.

Method II: To deal with the problems in the first method, a method has been proposed in the study. The ith dimension index for the jth district may be obtained as

$$D_{ij} = \frac{Actual\,Value - Mean}{Standard\,Deviation}$$

The index will be lying between $-\hat{O}$ to $+\hat{O}$. In this method standard deviation is used. Using this method, it can also be checked out whether it is normally distributed. In this method relative judgment may be given. The negative index may be interpreted as low value rather than a negative value in true sense. No value will be treated as optimum.

Method III: Another method may be defined taking modulus sign in the numerator of method II. Then the index will lie between 0 and $+\hat{O}$. This method overcomes with the difficulty in interpreting the negative index and contains all the advantages of method II. But it has serious drawback as all negative values will be converted into positive. Similar kind of measure can be defined by squaring the numerator.

Method IV: All above three methods have some drawbacks. To overcome those drawbacks, another methodology has been proposed. Under which i[th] dimension index for the jth district may be obtained as

$$D_{ij} = \frac{Actual\,Value - Minimum\,value}{Standard\,Deviation}$$

In this method minimum value of the data set is used rather than its mean. Here it is assumed that the minimum value is the worst situation. This index will lie between 0 to $+\hat{O}$.

After getting individual dimension indices for each district, corresponding weights were obtained using PCA. Weighted arithmetic mean is used to obtain indices that will reflect the status of FI of respective district. Hence IFI for a particular district j is given by

$$IFI_j = [(D_{1j}* W_1) + (D_{2j}* W_2) + ... + (D_{9j}* W_9)] / (W_1 + W_2 + ... + W_9)$$ where D_{1j}, D_{2j}... D_{9j}

are dimension indexes and W_1, W_2... W_9 are corresponding weights. In this case the sum of the weights is unity, therefore exact formula is

$$IFI_j = \sum_{i=1}^{9} (D_{ij} * W_i)$$

Results

From the correlation matrix it is noted that male accounts will be higher than female accounts as any branch opens. This may be because in the Indian context, which is male dominating society, male only holds account for the entire family, People have accounts irrespective of the amount they are depositing, which leads to say that without potential of demand banks may not mop up additional money, as number of offices increases amount credited increases but credit account does not increase with the same pace or banks provides credit only to few customers with higher credit amount and therefore the poor are deprived of getting credit facilities. There is no significant relationship between the number of offices and the literacy rates which is apparent because banks only opens its branch at the potential places, which are related with the economic activities rather than literacy. In the similar way there is not much reasonable correlation between number of offices and per-capita GSDP. Even rich people may not attract banks to open branch at their place unless economic activities increases as desired by the banks. High female literacy rate will increase female deposit account. Very high correlation between deposit amount and credit amount reflects that if the banks are able to mop up large amount of deposits they are providing higher credits. The correlation of GSDP with and deposit amount and credit amount is moderately high, which is also quite obvious.

After standardizing all the factors using proposed method IV, FPC for each factor is obtained. Table 1 shows FPC of all considered factors.

Table 1: Eigen vector corresponding to the first eigen vector

Standardized variables	First principal component
Per-capita number of offices	0.433443
per-capita female deposit accounts	0.375409
per-capita male deposit accounts	0.078011
per-capita deposit amount	0.422582
per-capita male literacy	0.005883
per-capita female literacy	0.253703
per-capita credit accounts	0.279721
per-capita credit amount	0.432399
per-capita GSDP	0.396134

Weights corresponding to each of the variables are obtained by taking proportion of each of the components of corresponding FPC. FII is obtained by taking weighted mean of the

standardized figure of the variables correspond to each district. Ranks are also assigned to each district according to respective FIIs. From the calculations ‒Gautam Buddha Nagarø is having highest FII and therefore ranked 1 and ‒Lucknowø being second highest FII ranked 2 while ‒Balrampurø district comes last with least FII. The results may provide proper indications to the policy maker for further improvement in FI in each of the districts of UP based on each of the factors.

Conclusion

It may be concluded that the proposed methodology is simple and comprehensive and the index will lie between zero to infinity, where zero represents complete financial exclusion and infinity indicates that improvement is always possible. Using proposed methodology FII can be calculated at any point of time and further updating the index. It gives an index of a region for a given time point rather that any relative index with respect to some past time point for which data may be difficult to get or data may be out dated. Moreover, if some more factors are available, it can be easily incorporated in the study. From the results it has come out that more financially included districts are urbanized whereas the lower financially included districts are rural in nature which is quite reasonable. As far as the policy maker point of view we can look into such factors which RBI can take into consideration and make an appropriate policy to improve FI. These factors are surely which affects supply side whereas other factors are mostly pertaining to demand side which may be looked into by state / central government. One of the possible future scope of the study that separate indexing may be undertaken using only the variables concerned with the banks and the variables concerned with the customer so as to make ease to frame appropriate respective policies. It is also concluded that although banking service is one of the most important factor among considered factors but other factors like credit and deposit amount and female accounts are also important and therefore female empowerment will play a vital role in improving situation of FI. The study is mainly based on the secondary data available on some of the factors. But they are not the complete set of factors and therefore it is possible to gather data on the other related variables and further study may be carried out so as to make index more accurate and increase the quality of the results. For this kind of studies the main obstacle is the data availability, therefore, this study may be extended by conducting a proper survey to collect primary data on all the affecting factors.

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