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## **Abstract**

*This paper clearly demonstrates that the axiomatic measurement approach developed in the human development literature can be usefully applied to the measurement of financial inclusion. A conceptual framework for aggregating data on financial services in different dimensions is developed. The suggested index of financial inclusion allows calculation of percentage contributions of different dimensions to the overall achievement. This in turn enables us to identify the dimensions of inclusion that are more/less susceptible to overall inclusion and hence to isolate the dimensions that deserve attention from a policy perspective. The paper also illustrates the index using cross-country and sub-national level data.*

## **Keywords:**

Financial inclusion, axioms, index, policy, application.

## **JEL Code:**

O16, G00, G21.

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# Measuring Financial Inclusion: An Axiomatic Approach

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## 1. Introduction

In a broad sense financial inclusion refers to delivery of financial system of an economy to its members. The Government of India's 'Committee on Financial Inclusion in India' defines financial inclusion 'as the process ensuring access to financial services and timely adequate credit where needed by vulnerable groups such as the weaker sections and low income groups at an affordable cost' (Rangarajan Committee, 2008). Since most of the financial services are coordinated through banks, we can approximate financial inclusion by banking inclusion. In fact, Leeladhar (2005) defined financial inclusion as 'delivery of banking services....'. In this paper we follow this suggestion and regard the terms financial inclusion and banking inclusion as synonymous. In the context of banks, financial inclusion concerns spread of banking activities among different sections of the population. The domain of activities can be quite large and it may vary from country to country<sup>1</sup>. For instance, in UK three major dimensions of financial inclusion are access to banking, access to affordable credit and access to face-to-face money advice. While these three dimensions are important for India as well, a significant part of bank credit in countries like India should be directed towards priority sectors such as agriculture and economically backward sections of the country. It is also necessary to ensure that persons belonging to low income groups do not face any difficulty in opening bank accounts because of procedures involved in the process.

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<sup>1</sup> However, for cross-country comparison of financial inclusion the domain should be the same.

It is clear that financial inclusion is a multidimensional phenomenon. From Sen's (1987) capability-functioning perspective we can say that the different activities that a bank may value doing represent the functionings. While the set of realized functionings constitute an important component of a banking performance, more is required to get a complete picture. The capability set of a banking system provides information on the functionings that it could achieve.

The study of financial inclusion is highly important for the society because consequences of financial exclusion may be quite harmful. Financial exclusion may generate lower investment resulting from difficulties in getting access to credit or gaining credit from informal sector at very high interest rates. Particularly, without broad and easy access consequences may be grave for the small business sector and poor sections of the society (Beck et al. 2004, Levine 2005, Galor and Zeira 1993, Honohan 2004). A well-developed financial system is highly important for economic development. It is likely that through entry of new firms financial development will promote economic growth( Klapper et al., 2004). Finally, since well-being of a population depends on many attributes such as income, health, housing etc., access to financial services can as well be regarded as a basic ingredient of human well-being. It is therefore necessary to design appropriate policy for financial inclusion.

In order to get an aggregate picture of banking activities in different dimensions, we need to design an index of financial inclusion. This is because from individual dimensions we get only partial information on banking activities. The position of a country may be quite good in one dimension but not in another. For instance, in 2004 in India the number of bank accounts (per 1000 adults), number of bank branches (per 100,000 adults), domestic credit (as percentage of GDP) and domestic deposit (as percentage of GDP) were respectively 627.1, 9.4, 36.9 and 54.9 (see Sarma, 2008). Thus we note here that although India had a low density of bank branches at that time, the performance in the last two dimensions seems to be reasonably good. Analyzing data from 1981 to 2007, Pal and Vaidya (2010) find that the patterns of changes in different dimensions of banking

services over time are quite diverse. Given this diversified picture of India's banking performance along different dimensions, it becomes necessary to get a comprehensive picture of the situation. This in turn necessitates the construction of an overall index of financial inclusion. This indicator is a measure of the extent of banking performance. A higher value of the index will indicate a better performance since an improvement in the banking activity in a dimension will represent a higher value. Such an index may be referred to as a functioning achievement index.

Evidently, the low contributing activities require attention from policy point of view for improving their levels in order to achieve a higher position in the performance scale. We can isolate such dimensions if the financial inclusion index enables us to calculate the percentage contributions made by different functionings to the overall level of financial inclusion. In other words, this type of breakdown enables us to identify the causal factors for low global performance. In this paper we suggest an index of financial inclusion that fulfills this property. Our index relies on the axiomatic approach developed in the realms of human development<sup>2</sup>. The axiomatic approach entails formal definitions of important postulates of an index (that is, the axioms) and then identifies the index making use of such postulates. Our objective is to use the axiomatic structure for more efficient utilization of available data on banking services. Our index can be used to monitor progress in performance and can make recommendations on what more is required to be done for better performance. This demonstrates an important policy application of our index. Clearly, this is a non-welfarist approach to policy application and it relies on values of the inclusion index. Following Sen (1985) this notion of policy application has become quite popular. In many situations of this type policy is evaluated by using particular forms of indices.

In a recent paper Sarma (2008) suggested an index of financial inclusion using the UNDP approach. But our index deviates from her index in at least two ways. First, her index lacks axiomatic structure. Second, the overall index cannot be broken down into

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<sup>2</sup> See, for example, Kakwani(1993) , Chakravarty and Majumder(1996), Tsui(1996), Chakravarty and Mukherjee( 1999) and Chakravarty(2003).

dimension-wise components for calculating the individual percentage contributions. This in turn makes her index unsuitable for identifying the dimensions that are more/less susceptible to global financial inclusion.

The paper is organized as follows. In the next section we present our framework. Section 3 contains empirical applications of our new methodology using data. Finally, Section 4 concludes. All Tables are relegated to the Appendix.

## 2. Formal Framework

We begin by assuming that the banking system has  $k \geq 1$  dimensional activities. Each dimension represents a functioning. As stated in the earlier section, these functionings may be quantum of deposit accounts per 1000 adults, domestic credit as a percentage of GDP and so on. Let  $x_i$  be the attainment level or the value of functioning  $i$ . The lower and upper bounds of  $x_i$  are denoted by  $m_i$  and  $M_i$  respectively. We assume that  $m_i < M_i$ . This implies that the open set  $(m_i, M_i)$  is a non-singleton set. Assuming that the bounds  $m_i$  and  $M_i$  are attainable, we have  $x_i \in [m_i, M_i]$ . For empirical applications sample minimum and maximum can be chosen as values of  $m_i$  and  $M_i$  respectively.

An indicator for functioning  $i$  is a real valued function  $A$  that associates a value  $A(x_i, m_i, M_i)$  to each  $x_i \in [m_i, M_i]$ . We will assume that  $A$  is continuous in its arguments. Continuity ensures that minor observational errors on  $x_i, m_i$  and  $M_i$  will generate minor changes in the value of  $A$ .

There are numerous ways in which we can specify  $A$  explicitly. We will focus here on one which is intuitively reasonable and has a relation with the UNDP indicator for an attribute. This form of  $A$  is given by

$$A_r(x_i, m_i, M_i) = \left( \frac{x_i - m_i}{M_i - m_i} \right)^r, \quad (1)$$

where  $0 < r < 1$  is a constant. The parameter  $r$  can be interpreted as an inclusion sensitivity parameter in the sense that given  $x_i, m_i$  and  $M_i$ , as the value of  $r$  decreases  $A_r(x_i, m_i, M_i)$  increases.

We now state the following four basic axioms for an arbitrary indicator  $A$  of an individual functioning and analyze the index given by (1) in terms of these axioms.

$$\text{Normalization: } A(x, m_i, M_i) = \begin{cases} 1 & \text{if and only if } x_i = M_i, \\ 0 & \text{if and only if } x_i = m_i. \end{cases}$$

*Monotonicity:* Given  $m_i$  and  $M_i$ , for any  $\delta > 0$  such that  $x_i + \delta \in [m_i, M_i]$ ,  $A(x_i + \delta, m_i, M_i) - A(x_i, m_i, M_i) > 0$ .

*Homogeneity:* For any  $c > 0$ ,  $A(x_i, m_i, M_i) = A(cx_i, cm_i, cM_i)$ .

*Lower difference in gain at higher levels of attainment difference:* Let  $x_i \in [m_i, M_i]$  be any attainment level for functioning  $i$ . Then for any  $\delta > 0$  such that  $x_i + \delta \in [m_i, M_i]$  the magnitude of gain in the indicator of functioning  $i$ ,  $A(x_i + \delta, m_i, M_i) - A(x_i, m_i, M_i)$  is a decreasing function of  $x_i$ .

Normalization ensures that the indicator levels for functioning  $i$  are one and zero in the extreme cases when the functioning assumes its maximum and minimum values,  $M_i$  and  $m_i$ , respectively. The converse is also true. That is, when the values of the indicator are one and zero, then the functioning attainment levels are one and zero respectively. Monotonicity says that an increase the attainment level of functioning  $i$  increases the value of the indicator. For instance, financial inclusion should increase if there is an increase in the number of bank branches per 100, 000 adults. The homogeneity condition makes sure that the indicator becomes independent of any unit of measurement. This in turn becomes helpful for aggregating the indicators across functionings. For instance, we cannot add the number of bank accounts per 1000 adults with number of bank branches per 100,000 adults. However, if these figures are converted into unit free real numbers, then we can add them up. Homogeneity takes care of this. The fourth

axiom parallels the law of diminishing marginal utility. According to this axiom, the value of the increase in the indicator resulting from an increase in the level of functioning is greater at lower levels than an equivalent increase in the functioning level at higher levels. For instance, an increase in the number of bank branches per 100,000 adults from 10 to 15 indicates a greater gain in the functioning indicator than when the number increases from 1000 to 1005.

It is straightforward to verify that our index fulfills the four basic axioms for all values of  $0 < r < 1$ . However if  $r = 1$ ,  $A_r$  satisfies the first three axioms but not LI. This particular case of  $A_r$  was suggested as an indicator of functioning  $i$  by Sarma (2008).

UNDP considered three functionings of well-being, life expectancy at birth, educational attainment and real GDP per capita. In this case  $A_r$  becomes functioning  $i$ 's indicator of well-being, which has been characterized by Chakravarty(2003). Since the difference  $(1 - A_r)$  represents the shortfall of the actual value of the index from its maximum attainable value, it can be regarded as a deprivation function for functioning  $i$ . If  $r = 1$ , the deprivation function coincides with the one suggested by UNDP.

By averaging the individual indicators in (1) across functionings we get our desired financial inclusion index:

$$I_r(A_r(x_1, m_1, M_1), \dots, A_r(x_k, m_k, M_k)) = \frac{1}{k} \sum_{i=1}^k \left( \frac{x_i - m_i}{M_i - m_i} \right)^r. \quad (2)$$

Like the individual indicator, the global index is a decreasing function of  $r$  for a given  $x_i, m_i$  and  $M_i$ . For any  $0 < r < 1$ , the marginal rate of substitution between functionings  $i$  and  $j$  along an iso-financial contour is given by  $\left( \frac{M_j - m_j}{M_i - m_i} \right)^r \left( \frac{x_i - m_i}{x_j - m_j} \right)^{r-1}$ , which is independent of the level of attainment of a third functioning. Clearly, it is non-constant. As we go down along the contour more and more units of the quantity of the functioning plotted on the horizontal axis are required for substitution of each additional unit of the other to keep the level of



inclusion unchanged and the substitution becomes increasingly difficult. As the value of  $r$  reduces the contours become more convex to the origin.

If we consider the three UNDP functionings and choose  $r = 1$ , then the resulting index in (2) becomes the human development index. Note that in this case any two functionings are perfect substitutes because of constancy of the marginal rate of substitution between them. From this perspective in the general case of  $0 < r \leq 1$ , for the UNDP functionings,  $I_r$  may be regarded as a generalized human development index (Chakravarty, 2003).

We now consider the following basic axioms for an arbitrary financial inclusion index,  $I$  which is defined as a real valued function of the individual indicators  $A(x, m_i, M_i)$ <sup>3</sup>, where  $1 \leq i \leq k$ .

(1) *Boundedness* :  $0 \leq I(A(x_1, m_1, M_1), \dots, A(x_k, m_k, M_k)) \leq 1$ , where the lower bound zero and the upper bound one are achieved if and only if for all  $i \in \{1, 2, \dots, k\}$ ,  $x_i = m_i$  and  $x_i = M_i$  respectively.

(2) *Global monotonicity*: If  $(x_1, \dots, x_k)$  and  $(y_1, \dots, y_k)$  are two functioning attainment vectors where  $x_i \geq y_i$  with  $>$  for at least one  $i$  and  $x_i, y_i \in [m_i, M_i]$ ,  $1 \leq i \leq k$ , then  $I(A(x_1, m_1, M_1), \dots, A(x_k, m_k, M_k)) > I(A(y_1, m_1, M_1), \dots, A(y_k, m_k, M_k))$ .

(3) *Global homogeneity*:

$$I(A(x_1, m_1, M_1), \dots, A(x_k, m_k, M_k)) = I(A(c_1 x_1, c_1 m_1, c_1 M_1), \dots, A(c_k x_k, c_k m_k, c_k M_k)),$$

where  $c_i > 0$ ,  $i \in \{1, 2, \dots, k\}$ , is a scalar.

(4) *Global lower difference in gain at higher levels of attainment difference*: For any  $x_i \in [m_i, M_i]$  and for any  $\delta_i \geq 0$ , with  $>$  for at least one  $i$ , such that  $x_i + \delta_i \in [m_i, M_i]$ ,  $i \in \{1, 2, \dots, k\}$ , the magnitude of the gain

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<sup>3</sup>Dependence of the financial inclusion index on the individual indicators only may be interpreted as 'independence of irrelevant information.' An assumption of this type is frequently made in the literature, for instance, social welfare is regarded as a function of individual welfare levels.

$$I(A(x_1 + \delta_1, m_1, M_1), \dots, A(x_k + \delta_k, m_k, M_k)) - I(A(x_1, m_1, M_1), \dots, A(x_k, m_k, M_k))$$

is a decreasing function of  $x_i$ 's for which  $\delta_i$ 's are positive.

(5) *Symmetry*:

$$I((A(x_1, m_1, M_1), \dots, A(x_1, m_1, M_1))^P) = I(A(x_1, m_1, M_1), \dots, A(x_k, m_k, M_k)),$$

where  $P$  is a  $k \times k$  permutation matrix<sup>4</sup>.

Clearly, axioms (1)-(4) are the global counterparts to the corresponding axioms we have specified for an individual indicator. Note that in specifying axiom (3) we did not assume constancy of the multiplicative factor  $c_i$  across functionings. The same remark applies to the  $\delta_i$  values in axiom (4). In axiom (2) equality of values of the non-negative differences  $x_i - y_i$  across dimensions is not demanded. Therefore, formulation of axioms (2)-(4) is quite general. Axiom 2 parallels the Strong Pareto Principle employed for evaluating improvement in social states. Axiom 5 is an anonymity condition. It says that any reordering of individual indicators does not alter the value of the financial inclusion index. Thus, any characteristic other than individual indicator levels are irrelevant to the measurement of financial inclusion<sup>5</sup>. If  $k = 1$ , then the global index  $I_r$  coincides with the individual indicator. If the values of the individual indicators are the same, then  $I_r$  takes on this common value. This is a reasonable property because in the particular case of equality of the indicators we do not make any distinction among the individual indicators in terms of performance.

It is easy to verify that for all values of  $0 < r < 1$  the global index satisfies all the five axioms we have introduced above. Since  $I_r$  is the arithmetic mean of dimension-wise indicators, we can use it to make quantitative assessment of individual functionings. The quantity  $T_i = A_r(x_i, m_i, M_i)/k$  may be regarded as the contribution of functioning  $i$  to

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<sup>4</sup> A non-negative square matrix of order  $k$  with entries 0 and 1 is called a  $k \times k$  permutation matrix if each of rows and columns sums to unity.

<sup>5</sup> If the indicator levels are required to be treated differently, then we can use weighted indices which violate symmetry.

financial inclusion. The percentage contribution of functioning  $i$  then becomes  $A_r(x_i, m_i, M_i)100/(kI_r)$ . This kind of breakdown becomes helpful for identifying the dimensions that are more /less sensitive to financial inclusion. The less sensitive functionings require attention from a policy perspective to reach higher level of financial inclusion.

The index suggested by Sarma (2008) is given by

$$S = 1 - \frac{\sqrt{\sum_{i=1}^k ((M_i - x_i)/(M_i - m_i))^2}}{\sqrt{k}}. \quad (3)$$

This index first averages, in a particular way, the shortfalls of individual attainments from their maximal attainable values, namely  $(M_i - x_i)$ , as fractions of the ranges  $(M_i - m_i)$  across different functioning. Since the attainable upper bound of the average is one, its difference from one gives us the financial inclusion index. It satisfies all of our axioms for a financial inclusion index, except axiom (4). In fact, it attaches equal weight to attainment difference at all levels of attainment. Furthermore, because of its non-linear formulation it cannot be employed to determine the percentage contributions made by different functionings to the overall level of financial inclusion.

### 3. Empirical Illustration

In this section we illustrate the financial inclusion index  $I_r$  numerically using cross-country data as well as state-level data from India on various attributes of financial inclusion. It, thus, helps us to examine the variations in terms of financial inclusion across countries as well as across sub-national regions, and to assess the contributions made by individual attributes to overall achievement across geographical regions.

#### 3.1 Cross-Country Analysis

As argued before, there is a wide range of financial services, such as deposit, credit, insurance, money transfer, etc., that appears to be important for economic growth and

development. Moreover, unlike as in case of HDI, there is no consensus in the literature on which set of attributes/variables are important to measure financial inclusion. In this study we consider some selected indicators of access to and use of banking services for our purpose.<sup>6</sup> We use cross-country data from Beck et al. (2007) and Sarma (2008), separately, for the illustration.

Let us first consider the data from Beck et al. (2007), which report data on following eight indicators of financial inclusion corresponding to the year 2003-2004:

1. Geographic branch penetration (GPEN\_BRNCH): number of bank branches per 1,000 sqkm.
2. Demographic branch penetration (DPEN\_BRNCH): number of bank branches per 100,000 people
3. Geographic ATM penetration (GPEN\_ATM): number of bank ATMs per 1,000 sqkm
4. Demographic ATM penetration (DPEN\_ATM): number of bank ATMs per 100,000 people
5. Credit accounts per capita (CAC\_PC): number of loans per 1,000 people
6. Credit-income ratio (CI\_RATIO): average size of loans to GDP per capita
7. Deposit accounts per capita (DAC\_PC): number of deposits per 1,000 people
8. Deposit-income ratio (DI\_RATIO): average size of deposits to GDP per capita

“Indicators (1) through (4) measure the outreach of the financial sector in terms of access to banks’ physical outlets. ... Indicators (5) through (8) measure the use of banking services” (Beck et al. 2007). Table 16A reports the pair-wise correlation coefficients of these indicators. It reveals that CI\_RATIO and DI\_RATIO are negatively correlated with other variables.<sup>7</sup> We, therefore, omit these two variables for this analysis. In order to

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<sup>6</sup> We note here that there are multiple financial institutions, other than banks, in a country. But, banks are the dominant institutions in the financial sector (Demirgüç-Kunt et al., 2008). The set of indicators chosen for the illustration is restricted due to scarcity of reliable data on other possible dimensions of financial inclusion.

<sup>7</sup> Beck et al (2007) also reports negative correlation of these two variables with other variables. High values of CI\_RATIO and DI\_RATIO seems to indicate higher uses of credit and deposit services, it is difficult to interpret their negative correlations with other indicators of uses and/or access. Nonetheless, we must take into account the observed negative correlations and drop these two variables in order to construct any

gauge the importance of remaining six variables, we perform principal component analysis. It shows that the eigenvector corresponding to the leading eigenvalue (which explains 60% of total variance) puts comparable weights on the six variables (see Table 16B). Table 16C reports summary statistics of the variables used for the empirical illustration. For the construction of the index  $I_r$ , we choose the sample minimum and maximum as values of  $m_i$  and  $M_i$  respectively. We calculate  $I_r$  for  $r = 0.25, 0.5$  and  $1$ , and look at the individual contributions as well as percentage contributions of each of the six attributes to overall achievement. To economize on space, we report these estimates for 21 countries<sup>8</sup>: Argentina, Armenia, Bangladesh, Belgium, Bolivia, Brazil, Bulgaria, Chile, Denmark, Honduras, India, Italy, Lebanon, Madagascar, Malaysia, Mauritius, Pakistan, Saudi Arabia, Singapore, Thailand and Uganda. These countries are located across various continents of the world (see Table 1 – 3). The number of countries, out of these 21 countries, in the high-income group, upper-middle-income group, lower-middle-income group and low-income group are five, seven, five and four, respectively, as defined by the World Bank.

In Table 1, the first column gives the names of the countries. Columns 2 and 3 report the region and income group of each country, respectively. Columns 4 – 9 present, for each country, the individual contributions of the six indicators of financial inclusion for  $r = 0.25$ . Column 10 presents the overall achievement of countries in terms of financial inclusion, and column 11 reports the rank of each country (out of 21). Finally, columns 11-16 provide, for each country, the percentage contributions of the indicators to overall achievement.

Table 1 reveals several interesting features. First, there is wide variation in terms of financial inclusion across countries. Singapore ranks first, followed by Belgium, Italy and Denmark, while Madagascar, Uganda, Bolivia, Pakistan and Armenia have the lowest level of financial inclusion. However, the degree of variation is relatively low among

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meaningful index. Interestingly, as observed in Section 3.2, we find that these variables are also positively correlated with other attributes of financial inclusion when we consider state-level data from India.

<sup>8</sup> We carryout this analysis using data from 42 countries, which are common in both the data sets.

countries that belong to the same income group. All countries in the high-income group, except Saudi Arabia, are placed in the top rank category in terms financial inclusion; and countries with relatively low per capita income, except Thailand, have relatively low level of financial inclusion. Surprisingly, in spite of having high per capita income, Saudi Arabia is at the 14<sup>th</sup> position out of 21 countries in the sample. On the contrary, Thailand being in the lower-middle income group fares better than Bulgaria, Chile, Brazil and Argentina, which are in the upper-middle-income group. India, a lower-middle-income group country, is placed in the 13<sup>th</sup> position, which is better than that of other countries in the lower-middle income group, except Thailand, and low income group countries in the sample. Second, we observe that for the first six countries the standard deviation (SD) among the variables in relation to their contributions to overall achievement is relatively low compared to that for other countries. For Singapore the SD is 3.44 while for Madagascar, Uganda and Bangladesh the SD is as high as 18.83, 10.15 and 10.93, respectively. It largely indicates that, for the countries with higher levels of financial inclusion the six indicators contribute more equally to overall achievement than that for countries with lower levels of financial inclusion. Next, in Saudi Arabia demographic penetration of bank branches and ATMs together contributes only about 13.4% to overall achievement while each of the other four indicators contributes more than 20% to overall achievement. In all the countries, except in Singapore, percentage contribution of demographic penetration of ATMs to overall achievement is either the least or the second lowest. Needless to mention that the magnitudes of contributions to overall achievement of relatively low-contributing attributes are higher for countries that secure better positions in terms of financial inclusion. In Singapore, the geographic penetration of bank branches and of ATMs contributes the lowest and second lowest, respectively, to overall achievement. On the contrary, in all other high-income group countries as well as in all upper-middle-income group countries, except in Belgium and Lebanon, demographic penetration of bank branches and demographic penetration of ATMs are the minor contributors to overall achievement. Demographic and geographic penetrations of ATMs are the minor contributors to overall achievement in India, Armenia, Bangladesh and Pakistan. In India and Bangladesh, these two attributes together contribute less than 15%. From an equal importance point of view this does not appear to be an encouraging

picture. Consequently, for better performance the low contributing attributes deserve attention from policy perspective. Finally, the combined contribution of loan account per capita and deposit account per capita to overall achievement is less than that of demographic and geographic penetration of bank branches and ATMs in all the countries, except in Honduras where the contribution of the former set of attributes is 14.13% higher than that of the later set.

Tables 2 and 3 present similar figures for  $r = 0.5$  and 1, and these tables can be analyzed in a similar manner. They show that the index values as well as percentage contributions are sensitive to the value of  $r$ . Also note that  $I_{0.25} > I_{0.5} > I_1$  for each country, that is it is confirmed that the index value is a decreasing function of  $r$ . Evidently, the ranks of the countries might also change with the change in value of  $r$ . For example, if we move from  $r = 0.25$  to  $r = 0.5$ , we observe that ranks of (a) Honduras and Pakistan, (b) Denmark and Italy, (c) Armenia and Bangladesh, and (d) Chile and Lebanon swap. Even so, it is easy to observe from Table 1 – 3 that the relative position of contribution of each of the attributes to overall achievement in any country remains the same, if we consider alternative values of  $r$ .

Now, we illustrate the financial inclusion index  $I_r$  using data from Sarma (2008), which report data on three attributes of banking services, (a) the number of deposit accounts per capita, (b) demographic penetration of bank branches, and (c) the ratio of the size of deposit plus credit to GDP for 55 countries corresponding to the year 2004.<sup>9</sup> There exists high correlation among these variables (see Table 17A). But, principal component analysis reveals that the eigenvector corresponding to the leading eigenvalue (which explains 71.79% of the total variance) puts quite similar weights on the three variables (see Table 17B). So, we consider all the three variables to compute the index value. Since, Sarma (2008) provides data on each of these attributes after standardization, we directly use that to compute  $I_r$  for each country, corresponding to  $r = 0.25, 0.5$  and 1. We find that the ranks of countries in terms of computed  $I_r$  are perfectly correlated with the

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<sup>9</sup> Sarma (2008) provides data after standardization.

countries' ranks based on  $S$ , which is given by equation (3). We also compute individual contribution as well as percentage contribution of each of these three variables to overall achievement in each country. We report the computed values for the same set of 21 countries as before (see Table 4 – 6). Table 4 – 6 can also be analyzed in similar manner as Table 1 – 3. The only difference is, in this case, we have less number of attributes. Interestingly, it is easy to observe that in this case also the standard deviation of percentage contribution of the attributes increases with the decrease in overall achievement. Comparison between (a) Table 1 and Table 4, (b) Table 2 and table 5, and (c) Table 3 and Table 6 reveals that the ranks of countries based on two alternative datasets are highly correlated. Nonetheless, there are some countries whose relative positions have altered, which reflects the influence of different set of attributes considered in this case. Also, in contrast to findings based on data from Beck et al (2008), note that the contribution of deposit account per capita is more than the contribution of demographic penetration of bank branches in large number of countries. It is due to consideration of different set of attributes to measure financial inclusion in this case. Observe that Sarma (2008) doesn't provide information on geographic penetration, credit accounts, and ATMs. Also, credit-income ratio and deposit-income ratio provide information about the use of two completely different types of financial services. However, in Sarma (2008), information on size of credit and deposit are clubbed together. The above discussion clearly indicates that it is absolutely necessary to choose the set of attributes appropriately, while defining financial inclusion, in order to assess their contributions to overall achievement and, thus, to design appropriate policy.

### **3.2 Financial Inclusion across states in India**

Now, we turn to illustrate our financial inclusion index  $I$ , using data on banking services across states in India. The analysis of financial inclusion across sub-national regions of India assumes importance because of the following reason. Democratically elected governments and partial policy autonomy of federal states of countries, like India, might add additional dimensions to differential pattern of financial development, particularly in the post-liberalization period since liberalization has empowered states with greater freedom and autonomy (Ahluwalia 2000).



Following Beck et al. (2007), we consider the following six attributes of financial inclusion: (a) demographic penetration, defined as the number of bank branches per 10 lakh people, (b) geographic penetration, defined as the number of bank branches per 1000 square-kilometer land area, (c) number of deposit accounts per 1000 people, (d) number of credit accounts per 1000 people, (e) deposits-income ratio, and (f) credit-income ratio. We use data on these attributes for 24 (27) states corresponding to the year 1991, 2001 and 2007 from various sources.<sup>10</sup> First, data on banking have been compiled from various issues of Basic Statistical Returns of Scheduled Commercial Banks, Reserve Bank of India. Second, data on per-capita net state domestic product (PCNSDP) were taken from Central Statistical Organization (CSO). Third, data of state-wise population and land-area have been collected from Census of India.<sup>11</sup> To transform nominal variables into real, we used Gross Domestic Product (GDP) deflator (base year 1993-94), based on GDP data provided by the CSO.<sup>12</sup> We present the summary statistics of these variables corresponding to the year 2007 in Table 18C.

Unlike as in case of Beck et al. (2008), we find that all six variables, as mentioned above, are positively correlated and the correlation coefficients are all significant at 5% level (see Table 18A). Therefore, in this case we are able to keep deposit-income ratio and credit-income ratio also for the computation of the index. Significant correlation among

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<sup>10</sup> The states are Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chattishgarh, Delhi, Goa, Gujarat, Haryana, Himachal Pradesh, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Nagaland, Orissa, Punjab, Rajasthan, Sikkim, Tamilnadu, Tripura, Uttar Pradesh, Uttaranchal and West Bengal. Remaining states and union territories (J&K, Chandigarh, Mizoram, Daman & Diu, Dadra & Nagar Haveli, Lakshadweep, Pondichery, and Andaman & Nicobar) are excluded from this analysis because of unavailability of required data. Note that Bihar, Madhya Pradesh and Uttar Pradesh were bifurcated in 2000. Jharkhand, Chattishgarh and Uttaranchal were separated from that Bihar, Madhya Pradesh and Uttar Pradesh, respectively, and got the status of federal states of India.

<sup>11</sup> We interpolate (extrapolate) population data to get population estimates for non-census years and match these estimates with that as provided by [www.indiastat.com](http://www.indiastat.com).

<sup>12</sup> We note here that financial services can be concentrated within particular regions of a state and/or within a particular section of the population in any region due to various factors such as affordability, social norms, differential treatment offered by service providers to relatively weaker section of the society, etc. This indicates that it may not be possible to properly assess the level of financial inclusion from state-level data. However, more disaggregated level data is not available. Moreover, we don't have information on many other attributes of financial services, such as ATM services, provided by banks. Reliable data on financial services provided by other financial institutions in India is also not available. Therefore, the results of this analysis should be used with caution. Nonetheless, the illustration of the financial inclusion index using state-level data highlights the method of analysis as well as offers some useful insights.

variables seems to indicate that the use of all six variables simultaneously may lead to redundancy in explanatory power. However, the principal component analysis reveals that the eigenvector corresponding to the leading eigenvalue (which explains 66.35% of the total variance) puts very similar weights on the six variables (see Table 18B), which indicates that omission of a variable is not desirable. For the construction of  $I_r$ , we choose the sample minimum and maximum values of each of the variables, considering data for all the three years, and standardize them accordingly. Therefore, computed values of the index, for a given  $r$ , are comparable across states and over time. We calculate  $I_r$  for  $r = 0.25, 0.5$ , and  $1$ , separately for each state as well as for India for the year 1991, 2001 and 2007, and report these along with the ranks of states and individual as well as percentage contributions of each of the attributes to overall achievement (see Table 7 – 15).

The computed values for  $r = 0.25$  for the year 1991, 2001 and 2007 are presented in Table 7, Table 8 and Table 9, respectively. It is shown that there is wide variation in terms of financial inclusion across states in India. Surprisingly, the range of the index increased from 0.38 in 1991 to 0.43 in 2001, and further to 0.46 in 2007. This upward trend in variation in terms of financial inclusion across states in India is even more prominent, if we assume higher values of  $r$  (see Tables 10 – 12, which correspond to  $r = 0.5$ , and Tables 13 – 16, which correspond to  $r = 1$ ). Comparing the computed financial index for 1991 and 2001, we find that the levels of financial inclusion in India have declined from the year 1991 to 2001. The same is true also in most of the states.<sup>13</sup> However, in India as well as in each of its states the levels of financial inclusion have increased during 2001-2007. These observations are consistent with the findings of Pal and Vaidya (2010).

Delhi and Goa have consistently maintained their first and second ranks, respectively, in all the three years. Nonetheless, relative positions of most of the states, that is, the ranks of states, have changed over time. For example, if we consider  $r = 1$ , Chattishgarh,

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<sup>13</sup> The value of  $I_{0.25}$  in 2001 is less than its value in 1991 in as many as 17 states. This number increases to 21, if we consider  $r=0.5$  or  $1$ .

Karnataka, Maharashtra, Nagaland, Orissa, Rajasthan, Sikkim, Tamil Nadu and Tripura have secured better ranks, while the relative positions of the remaining states, except Andhra Pradesh, Arunachal Pradesh, Delhi, Goa and Jharkhand, have deteriorated in 2007 compared to that in 2001. A notable feature is that in all states, except Delhi, the contribution of geographical penetration of bank branches to overall achievement is the least.

#### **4. Conclusions**

This paper presents an analysis of banking financial inclusion using an axiomatic approach. Our methods of constructing financial inclusion measure and specifying axioms are readily implemented using appropriate data. We have also shown how our financial inclusion measure can be employed for a policy purpose. These features make our measure quite attractive. We have employed our measure to make a cross-country comparison of financial inclusion as well as to analyze financial inclusion across sub-national regions of India. However, to check whether a given comparison is statically significant, a set of statistical tools will have to be developed. We leave this as a future research program.

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## Appendix:

**Table 1: Attribute-Wise Breakdown of the Index  $I_{0.25}$  : Cross Country Analysis based on Beck *et al.* (2007)**

Country	Region	Income group	Individual contribution:						$I_{0.25}$	Rank	Percentage contribution:					
			GPEN_BRNCH	DPEN_BRNCH	GPEN_ATM	DPEN_ATM	CAC_PC	DAC_PC			DPEN_BRNCH	GPEN_BRNCH	DPEN_ATM	GPEN_ATM	LAC_PC	DAC_PC
Singapore	South East Asia	High	0.0354	0.0936	0.0277	0.0975	0.1106	0.0969	0.4618	12	7.6663	20.2696	6.0055	21.1259	23.9558	20.9769
Belgium	Europe	High	0.0560	0.0870	0.0254	0.0532	0.0779	0.0701	0.3696	15	15.1587	23.5300	6.8713	14.4048	21.0797	18.9553
Italy	Europe	High	0.0871	0.0752	0.0199	0.0000	0.0842	0.0854	0.3518	16	24.7450	21.3696	5.6679	0.0000	23.9384	24.2790
Denmark	Europe	High	0.1218	0.1437	0.0904	0.1422	0.0861	0.1661	0.7504	2	16.2349	19.1442	12.0536	18.9483	11.4794	22.1396
Mauritius	Africa	Upper middle	0.0120	0.0533	0.0176	0.0733	0.0476	0.0505	0.2544	19	4.7104	20.9614	6.9365	28.8232	18.7210	19.8476
Lebanon	Middle East	Upper middle	0.0434	0.1033	0.0321	0.1020	0.0820	0.1112	0.4741	11	9.1638	21.7843	6.7796	21.5167	17.2926	23.4630
Malaysia	East Asia	Upper middle	0.0586	0.1019	0.0498	0.1160	0.0913	0.1350	0.5526	9	10.6004	18.4460	9.0070	20.9985	16.5183	24.4298
Thailand	East Asia	Lower middle	0.0388	0.0920	0.0348	0.1100	0.1426	0.1265	0.5446	10	7.1251	16.8984	6.3816	20.1899	26.1782	23.2269
Bulgaria	Europe	Upper middle	0.0872	0.1316	0.0664	0.1337	0.1453	0.1608	0.7250	4	12.0278	18.1561	9.1539	18.4342	20.0476	22.1804
Chile	South America	Upper middle	0.0255	0.0359	0.0282	0.0680	0.0890	0.0907	0.3373	18	7.5495	10.6497	8.3467	20.1537	26.3985	26.9019
Brazil	South America	Upper middle	0.0722	0.0827	0.0333	0.0258	0.0869	0.1004	0.4013	13	18.0029	20.6048	8.2916	6.4274	21.6571	25.0163
Argentina	South America	Upper middle	0.1055	0.1429	0.0787	0.1422	0.1341	0.1243	0.7278	3	14.4903	19.6362	10.8191	19.5451	18.4283	17.0810
India	South Asia	Lower middle	0.0990	0.1091	0.0681	0.1005	0.0971	0.0978	0.5716	6	17.3137	19.0795	11.9208	17.5870	16.9911	17.1079
Saudi Arabia	Middle East	High	0.0177	0.0321	0.0002	0.0318	0.0005	0.0005	0.0828	21	21.4359	38.7692	0.2024	38.4283	0.6061	0.5581
Armenia	Europe	Lower middle	0.0545	0.0931	0.0436	0.1000	0.1342	0.1324	0.5577	7	9.7744	16.6879	7.8113	17.9275	24.0639	23.7350
Bangladesh	South Asia	Low	0.0966	0.0980	0.0789	0.1076	0.1193	0.1406	0.6410	5	15.0720	15.2865	12.3137	16.7860	18.6124	21.9294
Pakistan	South Asia	Lower middle	0.0575	0.0764	0.0230	0.0412	0.0647	0.0815	0.3442	17	16.6977	22.1844	6.6752	11.9687	18.8016	23.6725
Honduras	North America	Lower middle	0.0272	0.0791	0.0256	0.0972	0.0810	0.0839	0.3941	14	6.9079	20.0711	6.5012	24.6679	20.5549	21.2970
Bolivia	South America	Lower middle	0.1667	0.0913	0.1667	0.1233	0.1502	0.1424	0.8406	1	19.8282	10.8674	19.8282	14.6658	17.8654	16.9451
Uganda	Africa	Low	0.0568	0.0857	0.0495	0.1009	0.1249	0.1368	0.5546	8	10.2493	15.4451	8.9325	18.1910	22.5199	24.6622
Madagascar	Africa	Low	0.0288	0.0000	0.0222	0.0446	0.0345	0.0532	0.1832	20	15.7076	0.0000	12.1378	24.3227	18.8091	29.0229

Notes: Geographic penetration of bank branches (GPEN\_BRNCH) is the number of bank branches per 1,000 sq km area; Demographic penetration of bank branches (DPEN\_BRNCH) is the number of bank branches per 100,000 people; Geographic penetration of ATM (GPEN\_ATM) is the number of ATMs per 1,000 sq km area; Demographic penetration of ATM (DPEN\_ATM) is the number of ATMs per 100,000 people; CAC\_PC is the number of credit accounts per 1000 people; DAC\_PC is the number of deposit accounts per 1000 people.

**Table 2: Attribute-Wise Breakdown of the Index  $I_{0.5}$  :Cross Country Analysis based on Beck *et al.* (2007)**

Country	Region	Income group	Individual contribution:						$I_{0.5}$	Rank	Percentage contribution:					
			GPEN_BRNCH	DPEN_BRNCH	GPEN_ATM	DPEN_ATM	CAC_PC	DAC_PC			DPEN_BRNCH	GPEN_BRNCH	DPEN_ATM	GPEN_ATM	LAC_PC	DAC_PC
Singapore	South East Asia	High	0.1667	0.0501	0.1667	0.0912	0.1353	0.1217	0.7316	1	22.7811	6.8432	22.7811	12.4629	18.4940	16.6377
Belgium	Europe	High	0.0890	0.1238	0.0491	0.1213	0.0445	0.1656	0.5934	2	15.0070	20.8672	8.2723	20.4425	7.5030	27.9081
Denmark	Europe	High	0.0456	0.1040	0.0264	0.1072	0.1268	0.1552	0.5651	3	8.0739	18.3973	4.6765	18.9653	22.4303	27.4567
Italy	Europe	High	0.0667	0.1225	0.0372	0.1214	0.1079	0.0927	0.5485	4	12.1651	22.3398	6.7819	22.1330	19.6760	16.9041
Mauritius	Africa	Upper middle	0.0560	0.0576	0.0374	0.0695	0.0854	0.1186	0.4244	5	13.1954	13.5735	8.8075	16.3671	20.1226	27.9340
Chile	South America	Upper middle	0.0090	0.0508	0.0072	0.0725	0.1219	0.0960	0.3576	6	2.5264	14.2105	2.0266	20.2856	34.1034	26.8474
Malaysia	East Asia	Upper middle	0.0178	0.0520	0.0114	0.0600	0.1081	0.1051	0.3544	7	5.0314	14.6659	3.2133	16.9257	30.4958	29.6679
Thailand	East Asia	Lower middle	0.0194	0.0440	0.0147	0.0611	0.0936	0.1123	0.3451	8	5.6185	12.7590	4.2675	17.6990	27.1249	32.5310
Bulgaria	Europe	Upper middle	0.0206	0.0623	0.0149	0.0808	0.0500	0.1094	0.3379	9	6.0925	18.4485	4.3986	23.9074	14.7941	32.3589
Lebanon	Middle East	Upper middle	0.0588	0.0714	0.0279	0.0606	0.0566	0.0574	0.3326	10	17.6688	21.4566	8.3760	18.2310	17.0165	17.2512
Brazil	South America	Upper middle	0.0113	0.0640	0.0062	0.0624	0.0403	0.0743	0.2586	11	4.3806	24.7549	2.3976	24.1507	15.5990	28.7173
Argentina	South America	Upper middle	0.0075	0.0526	0.0046	0.0571	0.0734	0.0563	0.2515	12	2.9895	20.8991	1.8346	22.7021	29.1915	22.3831
India	South Asia	Lower middle	0.0313	0.0410	0.0066	0.0040	0.0453	0.0605	0.1888	13	16.5904	21.7325	3.5192	2.1146	24.0090	32.0344
Saudi Arabia	Middle East	High	0.0044	0.0375	0.0039	0.0567	0.0394	0.0423	0.1842	14	2.4132	20.3726	2.1374	30.7730	21.3666	22.9372
Bangladesh	South Asia	Low	0.0455	0.0339	0.0024	0.0000	0.0426	0.0438	0.1681	15	27.0503	20.1740	1.4192	0.0000	25.3156	26.0409
Armenia	Europe	Lower middle	0.0188	0.0454	0.0039	0.0170	0.0364	0.0294	0.1509	16	12.4761	30.0606	2.5635	11.2660	24.1258	19.5081
Honduras	North America	Lower middle	0.0039	0.0077	0.0048	0.0277	0.0476	0.0494	0.1411	17	2.7576	5.4874	3.3707	19.6518	33.7171	35.0154
Pakistan	South Asia	Lower middle	0.0198	0.0350	0.0032	0.0102	0.0251	0.0398	0.1331	18	14.8886	26.2807	2.3794	7.6495	18.8769	29.9249
Bolivia	South America	Lower middle	0.0009	0.0171	0.0019	0.0323	0.0136	0.0153	0.0810	19	1.0642	21.0749	2.3079	39.8480	16.8104	18.8946
Uganda	Africa	Low	0.0050	0.0000	0.0030	0.0119	0.0071	0.0170	0.0439	20	11.3088	0.0000	6.7526	27.1154	16.2155	38.6078
Madagascar	Africa	Low	0.0019	0.0062	0.0000	0.0061	0.0000	0.0000	0.0141	21	13.3575	43.6932	0.0012	42.9284	0.0107	0.0091

Notes: Geographic penetration of bank branches (GPEN\_BRNCH) is the number of bank branches per 1,000 sq km area; Demographic penetration of bank branches (DPEN\_BRNCH) is the number of bank branches per 100,000 people; Geographic penetration of ATM (GPEN\_ATM) is the number of ATMs per 1,000 sq km area; Demographic penetration of ATM (DPEN\_ATM) is the number of ATMs per 100,000 people; CAC\_PC is the number of credit accounts per 1000 people; DAC\_PC is the number of deposit accounts per 1000 people.

**Table 3: Attribute-Wise Breakdown of the Index  $I_1$  : Cross Country Analysis based on Beck *et al.* (2007)**

Country	Region	Income group	Individual contribution:						$I_1$	Rank	Percentage contribution:					
			GPEN_BRNCH	DPEN_BRNCH	GPEN_ATM	DPEN_ATM	CAC_PC	DAC_PC			DPEN_BRNCH	GPEN_BRNCH	DPEN_ATM	GPEN_ATM	LAC_PC	DAC_PC
Singapore	South East Asia	High	0.1667	0.0150	0.1667	0.0499	0.1098	0.0889	0.5970	1	27.9178	2.5191	27.9178	8.3555	18.3990	14.8909
Belgium	Europe	High	0.0476	0.0920	0.0145	0.0883	0.0119	0.1645	0.4187	2	11.3620	21.9683	3.4524	21.0831	2.8401	39.2941
Denmark	Europe	High	0.0125	0.0649	0.0042	0.0689	0.0964	0.1445	0.3913	3	3.1921	16.5734	1.0709	17.6126	24.6363	36.9147
Italy	Europe	High	0.0267	0.0901	0.0083	0.0884	0.0699	0.0516	0.3350	4	7.9744	26.8920	2.4784	26.3964	20.8612	15.3975
Mauritius	Africa	Upper middle	0.0188	0.0199	0.0084	0.0290	0.0438	0.0843	0.2042	5	9.2173	9.7532	4.1064	14.1808	21.4353	41.3071
Chile	South America	Upper middle	0.0005	0.0155	0.0003	0.0316	0.0892	0.0553	0.1924	6	0.2545	8.0525	0.1638	16.4093	46.3778	28.7420
Malaysia	East Asia	Upper middle	0.0019	0.0162	0.0008	0.0216	0.0701	0.0663	0.1769	7	1.0784	9.1629	0.4399	12.2042	39.6182	37.4964
Thailand	East Asia	Lower middle	0.0023	0.0116	0.0013	0.0224	0.0526	0.0756	0.1657	8	1.3607	7.0173	0.7850	13.5032	31.7158	45.6178
Bulgaria	Europe	Upper middle	0.0025	0.0233	0.0013	0.0392	0.0150	0.0717	0.1531	9	1.6613	15.2326	0.8659	25.5808	9.7955	46.8639
Lebanon	Middle East	Upper middle	0.0207	0.0306	0.0047	0.0221	0.0192	0.0198	0.1170	10	17.7151	26.1247	3.9811	18.8605	16.4312	16.8876
Brazil	South America	Upper middle	0.0008	0.0246	0.0002	0.0234	0.0098	0.0331	0.0918	11	0.8383	26.7716	0.2511	25.4807	10.6303	36.0279
Argentina	South America	Upper middle	0.0003	0.0166	0.0001	0.0196	0.0323	0.0190	0.0880	12	0.3856	18.8458	0.1452	22.2378	36.7683	21.6172
India	South Asia	Lower middle	0.0059	0.0101	0.0003	0.0001	0.0123	0.0219	0.0506	13	11.6281	19.9533	0.5232	0.1889	24.3525	43.3540
Saudi Arabia	Middle East	High	0.0001	0.0085	0.0001	0.0193	0.0093	0.0107	0.0480	14	0.2473	17.6235	0.1940	40.2104	19.3852	22.3397
Bangladesh	South Asia	Low	0.0124	0.0069	0.0000	0.0000	0.0109	0.0115	0.0417	15	29.7480	16.5461	0.0819	0.0000	26.0549	27.5692
Honduras	North America	Lower middle	0.0001	0.0004	0.0001	0.0046	0.0136	0.0146	0.0334	16	0.2718	1.0761	0.4060	13.8015	40.6278	43.8168
Armenia	Europe	Lower middle	0.0021	0.0124	0.0001	0.0017	0.0080	0.0052	0.0295	17	7.2215	41.9243	0.3049	5.8886	27.0044	17.6564
Pakistan	South Asia	Lower middle	0.0024	0.0073	0.0001	0.0006	0.0038	0.0095	0.0237	18	9.9477	30.9947	0.2541	2.6259	15.9911	40.1865
Bolivia	South America	Lower middle	0.0000	0.0017	0.0000	0.0062	0.0011	0.0014	0.0105	19	0.0423	16.5847	0.1989	59.2913	10.5520	13.3307
Uganda	Africa	Low	0.0001	0.0000	0.0001	0.0009	0.0003	0.0017	0.0031	20	4.8038	0.0000	1.7128	27.6176	9.8767	55.9892
Madagascar	Africa	Low	0.0000	0.0002	0.0000	0.0002	0.0000	0.0000	0.0005	21	4.5396	48.5730	0.0000	46.8874	0.0000	0.0000

Notes: Geographic penetration of bank branches (GPEN\_BRNCH) is the number of bank branches per 1,000 sq km area; Demographic penetration of bank branches (DPEN\_BRNCH) is the number of bank branches per 100,000 people; Geographic penetration of ATM (GPEN\_ATM) is the number of ATMs per 1,000 sq km area; Demographic penetration of ATM (DPEN\_ATM) is the number of ATMs per 100,000 people; CAC\_PC is the number of credit accounts per 1000 people; DAC\_PC is the number of deposit accounts per 1000 people.

**Table 4: Attribute-Wise Breakdown of the Index  $I_{0.25}$  : Cross Country Analysis based on Sharma (2008)**

Country	Region	Income group	Individual contribution:			$I_{0.5}$	Rank	Percentage contribution:		
			DAC_PC	DPEN_BRNCH	SCD_GDP			DAC_PC	DPEN_BRNCH	SCD_GDP
Belgium	Europe	High	0.333	0.289	0.286	0.909	1	36.681	31.83	31.488
Denmark	Europe	High income	0.325	0.267	0.305	0.896	2	36.236	29.753	34.011
Italy	Europe	High income	0.247	0.285	0.27	0.802	3	30.772	35.547	33.681
Malaysia	East Asia	Upper middle	0.28	0.197	0.316	0.793	4	35.329	24.843	39.828
Mauritius	Africa	Upper middle	0.289	0.201	0.298	0.789	5	36.664	25.527	37.808
Singapore	South East Asia	High	0.289	0.185	0.304	0.777	6	37.197	23.746	39.057
Lebanon	Middle East	Upper middle	0.204	0.228	0.329	0.761	7	26.784	29.988	43.228
Thailand	East Asia	Lower middle	0.281	0.175	0.299	0.754	8	37.214	23.201	39.585
Chile	South America	Upper middle	0.261	0.189	0.257	0.707	9	36.875	26.778	36.347
Bulgaria	Europe	Upper middle	0.269	0.202	0.226	0.697	10	38.546	29.06	32.394
Brazil	South America	Upper middle	0.231	0.215	0.233	0.679	11	34.061	31.697	34.243
India	South Asia	Lower middle	0.212	0.174	0.24	0.627	12	33.852	27.838	38.31
Saudi Arabia	Middle East	High	0.184	0.173	0.229	0.586	13	31.346	29.585	39.069
Pakistan	South Asia	Lower middle	0.177	0.166	0.215	0.559	14	31.719	29.761	38.52
Argentina	South America	Upper middle	0.2	0.194	0.165	0.559	15	35.817	34.661	29.522
Bangladesh	South Asia	Low income	0.183	0.151	0.217	0.551	16	33.141	27.392	39.467
Honduras	North America	Lower middle	0.197	0.059	0.233	0.49	17	40.328	12.109	47.563
Bolivia	South America	Lower middle	0.108	0.113	0.231	0.452	18	23.904	24.924	51.172
Armenia	Europe	Lower middle	0.141	0.176	0	0.317	19	44.454	55.546	0
Uganda	Africa	Low	0.124	0	0.133	0.256	20	48.285	0	51.715
Madagascar	Africa	Low	0	0.059	0.146	0.205	21	0	28.849	71.151

Notes: DAC\_PC is the ratio of number of deposit accounts to total population. DPEN\_BRNCH is the number of branches per 1000 population. SCD\_GDP is the ratio of (size of credit plus deposit) to GDP.



**Table 5: Attribute-Wise Breakdown of the Index  $I_{0.5}$  :Cross Country Analysis based on Sharma (2008)**

Country	Region	Income group	Individual contribution:			$I_{0.5}$	Rank	Percentage contribution:		
			DAC_PC	DPEN_BRNC <sub>H</sub>	SCD_GDP			DAC_PC	DPEN_BRNC <sub>H</sub>	SCD_GDP
Belgium	Europe	High	0.333	0.251	0.246	0.83	1	40.163	30.242	29.595
Denmark	Europe	High income	0.317	0.213	0.279	0.809	2	39.137	26.386	34.477
Malaysia	East Asia	Upper middle	0.235	0.116	0.299	0.651	3	36.161	17.88	45.958
Italy	Europe	High income	0.183	0.244	0.219	0.646	4	28.309	37.777	33.914
Mauritius	Africa	Upper middle	0.251	0.122	0.267	0.639	5	39.245	19.024	41.731
Singapore	South East Asia	High	0.251	0.102	0.276	0.629	6	39.84	16.236	43.924
Lebanon	Middle East	Upper middle	0.125	0.156	0.325	0.606	7	20.582	25.801	53.616
Thailand	East Asia	Lower middle	0.236	0.092	0.267	0.596	8	39.679	15.424	44.897
Chile	South America	Upper middle	0.204	0.107	0.198	0.509	9	40.018	21.103	38.879
Bulgaria	Europe	Upper middle	0.216	0.123	0.153	0.492	10	43.963	24.987	31.05
Brazil	South America	Upper middle	0.161	0.139	0.162	0.462	11	34.762	30.104	35.134
India	South Asia	Lower middle	0.135	0.091	0.173	0.399	12	33.818	22.87	43.312
Saudi Arabia	Middle East	High	0.101	0.09	0.157	0.348	13	29.035	25.863	45.102
Pakistan	South Asia	Lower middle	0.094	0.083	0.139	0.316	14	29.805	26.239	43.956
Argentina	South America	Upper middle	0.12	0.113	0.082	0.314	15	38.229	35.799	25.972
Bangladesh	South Asia	Low income	0.1	0.068	0.142	0.31	16	32.245	22.027	45.728
Honduras	North America	Lower middle	0.117	0.011	0.163	0.29	17	40.303	3.634	56.063
Bolivia	South America	Lower middle	0.035	0.038	0.16	0.233	18	14.993	16.299	68.707
Armenia	Europe	Lower middle	0.06	0.093	0	0.153	19	39.043	60.957	0
Uganda	Africa	Low	0.046	0	0.053	0.099	20	46.575	0	53.425
Madagascar	Africa	Low	0	0.011	0.064	0.075	21	0	14.119	85.881

Notes: DAC\_PC is the ratio of number of deposit accounts to total population. DPEN\_BRNC<sub>H</sub> is the number of branches per 1000 population. SCD\_GDP is the ratio of (size of credit plus deposit) to GDP.

**Table 6: Attribute-Wise Breakdown of the Index  $I_1$  : Cross Country Analysis based on Sharma (2008)**

Country	Region	Income group	Individual contribution:			$I_1$	Rank	Percentage contribution:		
			DAC_PC	DPEN_BR NCH	SCD_GDP			DAC_PC	DPEN_BR NCH	SCD_GDP
Belgium	Europe	High	0.333	0.189	0.181	0.703	1	47.393	26.872	25.735
Denmark	Europe	High income	0.301	0.137	0.233	0.671	2	44.831	20.378	34.791
Malaysia	East Asia	Upper middle	0.166	0.041	0.269	0.476	3	34.968	8.549	56.482
Singapore	South East Asia	High	0.189	0.031	0.229	0.449	4	41.988	6.973	51.039
Mauritius	Africa	Upper middle	0.189	0.044	0.213	0.446	5	42.27	9.933	47.797
Lebanon	Middle East	Upper middle	0.047	0.073	0.317	0.437	6	10.687	16.794	72.519
Italy	Europe	High income	0.1	0.179	0.144	0.423	7	23.719	42.238	34.043
Thailand	East Asia	Lower middle	0.168	0.025	0.215	0.408	8	41.128	6.214	52.657
Chile	South America	Upper middle	0.125	0.035	0.118	0.277	9	45.006	12.515	42.479
Bulgaria	Europe	Upper middle	0.14	0.045	0.07	0.256	10	54.889	17.731	27.379
Brazil	South America	Upper middle	0.077	0.058	0.079	0.214	11	36.081	27.061	36.858
India	South Asia	Lower middle	0.055	0.025	0.09	0.169	12	32.283	14.764	52.953
Saudi Arabia	Middle East	High	0.031	0.024	0.074	0.129	13	23.773	18.863	57.364
Honduras	North America	Lower middle	0.041	0	0.079	0.121	14	33.978	0.276	65.746
Pakistan	South Asia	Lower middle	0.027	0.021	0.058	0.105	15	25.316	19.62	55.063
Bangladesh	South Asia	Low income	0.03	0.014	0.06	0.104	16	28.754	13.419	57.827
Argentina	South America	Upper middle	0.043	0.038	0.02	0.101	17	42.763	37.5	19.737
Bolivia	South America	Lower middle	0.004	0.004	0.077	0.085	18	4.314	5.098	90.588
Armenia	Europe	Lower middle	0.011	0.026	0	0.037	19	29.091	70.909	0
Uganda	Africa	Low	0.006	0	0.008	0.015	20	43.182	0	56.818
Madagascar	Africa	Low	0	0	0.012	0.013	21	0	2.632	97.368

Notes: DAC\_PC is the ratio of number of deposit accounts to total population. DPEN\_BRNCH is the number of branches per 1000 population. SCD\_GDP is the ratio of (size of credit plus deposit) to GDP.

**Table 7: Attribute-Wise Breakdown of the Index  $I_{0.25}$  : India and her States - 1991**

State	Per-capita Income (NSDP)	Individual contribution:						$I_{0.25}$	Rank	Percentage contribution:					
		Demographic Penetration	Geographic Penetration	Deposit A/C per-capita	Credit A/C per-capita	Deposit-Income ratio	Credit-Income ratio			Demographic Penetration	Geographic Penetration	Deposit A/C per-capita	Credit A/C per-capita	Deposit-Income ratio	Credit-Income ratio
Delhi	15862.49	0.138	0.149	0.157	0.126	0.14	0.127	0.837	1	16.505	17.77	18.739	15.105	16.746	15.137
Goa	14708.52	0.16	0.081	0.157	0.145	0.127	0.104	0.772	2	20.705	10.464	20.288	18.72	16.393	13.431
Kerala	7970.989	0.129	0.082	0.121	0.148	0.097	0.096	0.674	3	19.201	12.151	17.954	21.982	14.445	14.267
Punjab	11775.53	0.132	0.071	0.132	0.128	0.104	0.097	0.664	4	19.861	10.746	19.816	19.318	15.627	14.631
Karnataka	6631.403	0.129	0.061	0.121	0.14	0.097	0.103	0.651	5	19.752	9.337	18.646	21.562	14.84	15.864
Tamil Nadu	7874.346	0.122	0.067	0.118	0.139	0.095	0.107	0.647	6	18.797	10.389	18.219	21.425	14.69	16.481
Maharashtra	10158.82	0.119	0.058	0.116	0.117	0.108	0.109	0.626	7	18.985	9.224	18.476	18.733	17.193	17.389
Himachal Pradesh	7618.432	0.142	0.053	0.121	0.122	0.099	0.089	0.626	8	22.683	8.442	19.26	19.467	15.89	14.258
West Bengal	5990.748	0.114	0.073	0.111	0.119	0.107	0.1	0.625	9	18.279	11.745	17.774	19.113	17.071	16.017
Haryana	11113.84	0.121	0.064	0.115	0.126	0.085	0.092	0.603	10	20.03	10.688	19.033	20.912	14.143	15.193
Andhra Pradesh	6844.516	0.118	0.056	0.106	0.138	0.088	0.096	0.603	11	19.536	9.357	17.632	22.951	14.641	15.882
Gujarat	8787.784	0.123	0.057	0.11	0.114	0.096	0.097	0.597	12	20.665	9.528	18.358	19.148	16.136	16.164
Tripura	5025.9	0.115	0.056	0.098	0.144	0.083	0.085	0.582	13	19.811	9.711	16.835	24.813	14.273	14.558
UttarPradesh	5147.006	0.113	0.065	0.104	0.116	0.093	0.087	0.577	14	19.624	11.191	18.011	20.041	16.058	15.076
Bihar	3567.506	0.111	0.064	0.093	0.117	0.095	0.084	0.564	15	19.64	11.35	16.466	20.805	16.773	14.965
Orissa	4388.313	0.116	0.053	0.09	0.134	0.083	0.088	0.564	16	20.519	9.421	15.901	23.811	14.676	15.672
Meghalaya	7106.228	0.125	0.045	0.105	0.109	0.094	0.075	0.553	17	22.674	8.126	18.921	19.636	17.026	13.617
Sikkim	8389.359	0.118	0.039	0.096	0.116	0.096	0.081	0.547	18	21.594	7.125	17.483	21.307	17.586	14.906
MadhyaPradesh	6366.285	0.116	0.049	0.098	0.116	0.081	0.085	0.545	19	21.269	9.019	18.01	21.337	14.795	15.57
Rajasthan	6759.822	0.118	0.048	0.097	0.114	0.081	0.083	0.541	20	21.764	8.872	18.01	20.992	14.995	15.367
Assam	5574.201	0.11	0.055	0.094	0.105	0.079	0.085	0.528	21	20.811	10.462	17.785	19.836	15.033	16.073
Nagaland	8312.859	0.112	0.039	0.097	0.098	0.085	0.081	0.511	22	21.882	7.716	18.886	19.169	16.552	15.793
Arunachal Pradesh	7024.257	0.121	0.024	0.104	0.083	0.088	0.085	0.504	23	24.05	4.757	20.57	16.373	17.462	16.788
Manipur	5404.675	0.104	0.038	0.08	0.091	0.066	0.075	0.455	24	22.901	8.374	17.648	20.085	14.442	16.55
India	7371.746	0.118	0.058	0.109	0.124	0.109	0.096	0.613	-	19.28	9.431	17.767	20.219	17.713	15.59

Notes: Per-capita income is in 1993-94 prices. Demographic (Geographic) Penetration is measured as the number of bank branches per 10 lakh people (per 1000sqkm). Deposit (Credit) A/C per-capita is measured as the number of deposit (credit) account per 1000 population. Deposit (Credit) Income Ratio is the ratio of deposit (credit) size to income.

**Table 8: Attribute-Wise Breakdown of the Index  $I_{0.25}$  : India and her States - 2001**

State	Per-capita Income (NSDP)	Individual contribution:						$I_{0.25}$	Rank	Percentage contribution:					
		Demographic Penetration	Geographic Penetration	Deposit A/C per-capita	Credit A/C per-capita	Deposit-Income ratio	Credit-Income ratio			Demographic Penetration	Geographic Penetration	Deposit A/C per-capita	Credit A/C per-capita	Deposit-Income ratio	Credit-Income ratio
Delhi	26523	0.132	0.157	0.147	0.143	0.141	0.139	0.86	1	15.336	18.249	17.135	16.634	16.432	16.215
Goa	25710	0.164	0.086	0.16	0.129	0.129	0.101	0.77	2	21.259	11.125	20.848	16.813	16.798	13.158
Kerala	10714	0.131	0.085	0.123	0.14	0.114	0.102	0.696	3	18.863	12.195	17.708	20.118	16.41	14.707
Punjab	15071	0.131	0.074	0.130	0.121	0.112	0.099	0.668	4	19.634	11.129	19.460	18.181	16.755	14.840
Tamil Nadu	12994	0.121	0.069	0.116	0.129	0.099	0.108	0.643	5	18.873	10.725	18.087	20.077	15.382	16.857
Karnataka	11854	0.127	0.062	0.116	0.129	0.102	0.101	0.637	6	19.879	9.798	18.161	20.239	16.063	15.86
Maharashtra	14233	0.116	0.060	0.112	0.110	0.113	0.121	0.632	7	18.380	9.425	17.758	17.402	17.908	19.128
- - Uttaranchal	7256	0.129	0.055	0.122	0.115	0.119	0.089	0.630	8	20.514	8.776	19.343	18.271	18.917	14.178
Himachal Pradesh	11085	0.139	0.054	0.123	0.117	0.109	0.082	0.623	9	22.216	8.621	19.769	18.758	17.51	13.126
Andhra Pradesh	10195	0.117	0.058	0.108	0.128	0.096	0.097	0.605	10	19.354	9.601	17.931	21.219	15.87	16.024
West Bengal	9796	0.111	0.074	0.112	0.109	0.102	0.093	0.601	11	18.432	12.384	18.625	18.079	16.988	15.491
Haryana	13848	0.119	0.067	0.115	0.114	0.095	0.086	0.596	12	19.906	11.317	19.357	19.066	15.974	14.38
Gujarat	12489	0.119	0.058	0.11	0.107	0.102	0.095	0.593	13	20.157	9.812	18.607	18.122	17.239	16.063
Uttar Pradesh - New	5575	0.107	0.067	0.107	0.104	0.104	0.084	0.572	14	18.642	11.749	18.625	18.128	18.153	14.702
Orissa	5549	0.113	0.054	0.096	0.115	0.097	0.087	0.563	15	20.093	9.600	17.043	20.495	17.310	15.460
- - Jharkhand	7238	0.11	0.057	0.101	0.101	0.1	0.081	0.549	16	19.952	10.468	18.309	18.432	18.127	14.712
Tripura	9397	0.111	0.057	0.101	0.123	0.088	0.068	0.546	17	20.330	10.383	18.428	22.437	16.050	12.372
Madhya Pradesh - New	7195	0.112	0.051	0.096	0.104	0.095	0.089	0.546	18	20.459	9.324	17.611	19.023	17.347	16.237
Rajasthan	8175	0.112	0.049	0.098	0.105	0.091	0.086	0.542	19	20.757	9.053	18.165	19.350	16.879	15.797
Sikkim	10119	0.125	0.044	0.094	0.095	0.110	0.074	0.541	20	23.006	8.169	17.338	17.556	20.228	13.703
Bihar - New	3831	0.103	0.069	0.091	0.094	0.101	0.076	0.534	21	19.242	12.966	16.955	17.672	18.967	14.198
Meghalaya	9476	0.121	0.047	0.098	0.101	0.098	0.070	0.534	22	22.665	8.721	18.294	18.902	18.334	13.084
Assam	5943	0.105	0.056	0.099	0.093	0.093	0.078	0.524	23	20.104	10.617	18.805	17.817	17.673	14.984
- - Chhattisgarh	6692	0.107	0.046	0.090	0.096	0.089	0.079	0.507	24	21.159	9.099	17.760	18.856	17.479	15.647
Arunachal Pradesh	9153	0.114	0.024	0.102	0.102	0.092	0.063	0.498	25	22.898	4.842	20.496	20.545	18.504	12.715
Manipur	6851	0.098	0.038	0.075	0.085	0.070	0.067	0.432	26	22.565	8.812	17.259	19.660	16.171	15.533
Nagaland	11473	0.097	0.039	0.079	0.079	0.080	0.053	0.428	27	22.622	9.218	18.468	18.524	18.682	12.486
India	10355	0.115	0.059	0.109	0.113	0.103	0.100	0.600	-	19.237	9.857	18.207	18.923	17.155	16.621

Notes: Per-capita income is in 1993-94 prices. Demographic (Geographic) Penetration is measured as the number of bank branches per 10 lakh people (per 1000sqkm). Deposit (Credit) A/C per-capita is measured as the number of deposit (credit) account per 1000 population. Deposit (Credit) Income Ratio is the ratio of deposit (credit) size to income. Three states (Bihar, Madhya Pr. and Uttar Pr.) were bifurcated in 2000.

**Table 9: Attribute-Wise Breakdown of the Index  $I_{0.25}$  : India and her States - 2007**

State	Per-capita Income (NSDP)	Individual contribution:						$I_{0.25}$	Rank	Percentage contribution:					
		Demographic Penetration	Geographic Penetration	Deposit A/C per-capita	Credit A/C per-capita	Deposit-Income ratio	Credit-Income ratio			Demographic Penetration	Geographic Penetration	Deposit A/C per-capita	Credit A/C per-capita	Deposit-Income ratio	Credit-Income ratio
Delhi	30168.95	0.135	0.167	0.147	0.148	0.167	0.167	0.931	1	14.554	17.911	15.788	15.924	17.911	17.911
Goa	29523.58	0.167	0.088	0.167	0.142	0.146	0.114	0.825	2	20.205	10.698	20.205	17.274	17.75	13.868
Kerala	14749.25	0.133	0.088	0.13	0.15	0.119	0.116	0.736	3	18.129	11.899	17.652	20.389	16.172	15.759
Maharashtra	18007.070	0.115	0.061	0.117	0.146	0.139	0.151	0.728	4	15.819	8.324	16.047	20.078	19.041	20.692
Tamil Nadu	16260.760	0.122	0.070	0.121	0.167	0.111	0.128	0.719	5	16.913	9.773	16.853	23.185	15.492	17.785
Karnataka	13449.55	0.127	0.064	0.122	0.147	0.124	0.127	0.711	6	17.865	8.991	17.107	20.69	17.42	17.926
Punjab	17438.200	0.133	0.077	0.130	0.126	0.118	0.117	0.700	7	19.002	10.998	18.539	18.013	16.777	16.671
- - Uttarakhand	11710.860	0.130	0.057	0.120	0.123	0.130	0.103	0.663	8	19.600	8.594	18.133	18.532	19.657	15.484
Himachal Pradesh	15092.48	0.139	0.055	0.124	0.123	0.115	0.103	0.658	9	21.069	8.354	18.774	18.72	17.474	15.609
Andhra Pradesh	13908.34	0.117	0.059	0.116	0.145	0.105	0.113	0.656	10	17.848	9.062	17.681	22.094	16.03	17.286
Haryana	20593.7	0.122	0.071	0.118	0.119	0.106	0.103	0.639	11	19.032	11.096	18.526	18.701	16.598	16.047
Sikkim	14589.510	0.130	0.047	0.105	0.122	0.117	0.110	0.631	12	20.573	7.501	16.678	19.310	18.515	17.424
West Bengal	11178.360	0.110	0.076	0.110	0.111	0.112	0.111	0.629	13	17.433	12.002	17.439	17.593	17.823	17.710
Gujarat	16663.4	0.119	0.059	0.119	0.116	0.108	0.107	0.628	14	19.008	9.384	18.886	18.419	17.213	17.09
Orissa	8203.013	0.113	0.055	0.101	0.125	0.106	0.106	0.607	15	18.612	9.085	16.658	20.658	17.512	17.475
Uttar Pradesh - New	6533.344	0.106	0.068	0.107	0.110	0.112	0.101	0.605	16	17.485	11.307	17.687	18.242	18.497	16.783
Tripura	10454.950	0.109	0.057	0.103	0.126	0.101	0.087	0.584	17	18.672	9.828	17.708	21.583	17.317	14.892
Rajasthan	9686.328	0.112	0.050	0.102	0.114	0.099	0.106	0.581	18	19.186	8.604	17.516	19.544	16.965	18.185
Madhya Pradesh - New	8376.542	0.11	0.051	0.101	0.109	0.105	0.103	0.580	19	19.008	8.86	17.421	18.837	18.041	17.834
Meghalaya	11663.830	0.119	0.047	0.098	0.112	0.107	0.092	0.575	20	20.725	8.219	17.030	19.548	18.557	15.922
- - Jharkhand	10066.74	0.109	0.058	0.104	0.109	0.106	0.089	0.574	21	18.937	10.188	18.042	18.962	18.405	15.465
Bihar - New	4324.772	0.101	0.07	0.092	0.104	0.11	0.092	0.569	22	17.758	12.229	16.108	18.295	19.411	16.2
Assam	7358.659	0.102	0.056	0.098	0.105	0.103	0.093	0.557	23	18.296	10.071	17.68	18.825	18.473	16.656
- - Chhattisgarh	9489.500	0.105	0.047	0.094	0.105	0.102	0.096	0.550	24	19.121	8.486	17.141	19.179	18.606	17.467
Arunachal Pradesh	11369.62	0.112	0.024	0.1	0.105	0.106	0.085	0.532	25	20.976	4.603	18.731	19.813	19.855	16.022
Nagaland	12300.160	0.095	0.040	0.079	0.100	0.093	0.077	0.485	26	19.644	8.345	16.324	20.728	19.144	15.816
Manipur	10503.670	0.092	0.037	0.077	0.098	0.081	0.081	0.467	27	19.688	7.971	16.516	21.039	17.394	17.391
India	14430.910	0.115	0.060	0.112	0.129	0.113	0.117	0.646		17.788	9.333	17.372	19.924	17.524	18.059

Notes: Per-capita income is in 1993-94 prices. Demographic (Geographic) Penetration is measured as the number of bank branches per 10 lakh people (per 1000sqkm). Deposit (Credit) A/C per-capita is measured as the number of deposit (credit) account per 1000 population. Deposit (Credit) Income Ratio is the ratio of deposit (credit) size to income. Three states (Bihar, Madhya Pr. and Uttar Pr.) were bifurcated in 2000.

**Table 10: Attribute-Wise Breakdown of the Index  $I_{0.5}$  : India and her States - 1991**

State	Per-capita Income (NSDP)	Individual contribution:						$I_{0.5}$	Rank	Percentage contribution:					
		Demographic Penetration	Geographic Penetration	Deposit A/C per-capita	Credit A/C per-capita	Deposit-Income ratio	Credit-Income ratio			Demographic Penetration	Geographic Penetration	Deposit A/C per-capita	Credit A/C per-capita	Deposit-Income ratio	Credit-Income ratio
Delhi	15862.49	0.114	0.133	0.147	0.096	0.118	0.096	0.704	1	16.243	18.83	20.939	13.605	16.721	13.662
Goa	14708.52	0.153	0.039	0.147	0.125	0.096	0.065	0.626	2	24.506	6.26	23.529	20.032	15.362	10.311
Kerala	7970.989	0.1	0.04	0.088	0.132	0.057	0.055	0.472	3	21.261	8.514	18.589	27.866	12.033	11.738
Punjab	11775.53	0.104	0.031	0.104	0.099	0.065	0.057	0.458	4	22.747	6.66	22.644	21.521	14.083	12.345
Karnataka	6631.403	0.099	0.022	0.088	0.118	0.056	0.064	0.448	5	22.145	4.948	19.735	26.388	12.5	14.284
Tamil Nadu	7874.346	0.089	0.027	0.083	0.115	0.054	0.068	0.436	6	20.31	6.204	19.081	26.387	12.405	15.613
Himachal Pradesh	7618.432	0.121	0.017	0.087	0.089	0.059	0.048	0.421	7	28.721	3.978	20.705	21.154	14.094	11.347
Maharashtra	10158.82	0.085	0.02	0.08	0.083	0.07	0.071	0.408	8	20.765	4.902	19.666	20.216	17.03	17.421
West Bengal	5990.748	0.078	0.032	0.074	0.086	0.068	0.06	0.399	9	19.64	8.109	18.57	21.472	17.13	15.079
Andhra Pradesh	6844.516	0.083	0.019	0.068	0.115	0.047	0.055	0.387	10	21.52	4.937	17.53	29.703	12.087	14.224
Haryana	11113.84	0.088	0.025	0.079	0.095	0.044	0.05	0.381	11	22.981	6.543	20.749	25.049	11.456	13.221
Gujarat	8787.784	0.091	0.019	0.072	0.079	0.056	0.056	0.373	12	24.499	5.208	19.334	21.033	14.937	14.988
Tripura	5025.9	0.08	0.019	0.058	0.125	0.041	0.043	0.366	13	21.785	5.234	15.732	34.177	11.308	11.764
UttarPradesh	5147.006	0.077	0.025	0.065	0.08	0.052	0.045	0.344	14	22.369	7.276	18.843	23.33	14.979	13.203
Orissa	4388.313	0.08	0.017	0.048	0.108	0.041	0.047	0.342	15	23.514	4.956	14.12	31.664	12.029	13.717
Meghalaya	7106.228	0.094	0.012	0.066	0.071	0.053	0.034	0.33	16	28.578	3.671	19.9	21.432	16.113	10.307
Bihar	3567.506	0.074	0.025	0.052	0.083	0.054	0.043	0.329	17	22.376	7.473	15.729	25.11	16.32	12.99
Sikkim	8389.359	0.084	0.009	0.055	0.081	0.055	0.04	0.324	18	25.789	2.807	16.904	25.108	17.103	12.288
MadhyaPradesh	6366.285	0.081	0.014	0.058	0.081	0.039	0.043	0.316	19	25.49	4.583	18.278	25.654	12.333	13.661
Rajasthan	6759.822	0.083	0.014	0.057	0.077	0.039	0.041	0.312	20	26.634	4.426	18.239	24.778	12.644	13.279
Assam	5574.201	0.072	0.018	0.053	0.066	0.038	0.043	0.291	21	24.939	6.302	18.214	22.656	13.013	14.876
Arunachal Pradesh	7024.257	0.088	0.003	0.064	0.041	0.046	0.043	0.286	22	30.782	1.204	22.519	14.268	16.227	14.999
Nagaland	8312.859	0.075	0.009	0.056	0.058	0.043	0.039	0.28	23	26.811	3.334	19.972	20.576	15.341	13.966
Manipur	5404.675	0.065	0.009	0.039	0.05	0.026	0.034	0.223	24	29.267	3.913	17.381	22.513	11.64	15.286
India	7371.746	0.084	0.02	0.071	0.092	0.071	0.055	0.392		21.34	5.106	18.121	23.468	18.011	13.953

Notes: Per-capita income is in 1993-94 prices. Demographic (Geographic) Penetration is measured as the number of bank branches per 10 lakh people (per 1000sqkm). Deposit (Credit) A/C per-capita is measured as the number of deposit (credit) account per 1000 population. Deposit (Credit) Income Ratio is the ratio of deposit (credit) size to income.

**Table 11: Attribute-Wise Breakdown of the Index  $I_{0.5}$  : India and her States - 2001**

State	Per-capita Income (NSDP)	Individual contribution:						$I_{0.5}$	Rank	Percentage contribution:					
		Demographic Penetration	Geographic Penetration	Deposit A/C per-capita	Credit A/C per-capita	Deposit-Income ratio	Credit-Income ratio			Demographic Penetration	Geographic Penetration	Deposit A/C per-capita	Credit A/C per-capita	Deposit-Income ratio	Credit-Income ratio
Delhi	26523	0.104	0.148	0.13	0.123	0.12	0.117	0.741	1	14.071	19.924	17.566	16.554	16.154	15.731
Goa	25710	0.161	0.044	0.155	0.101	0.1	0.062	0.622	2	25.85	7.08	24.86	16.168	16.14	9.903
Kerala	10714	0.103	0.043	0.091	0.118	0.078	0.063	0.497	3	20.827	8.705	18.355	23.69	15.763	12.661
Punjab	15071	0.103	0.033	0.101	0.089	0.075	0.059	0.460	4	22.418	7.203	22.022	19.223	16.326	12.808
Tamil Nadu	12994	0.088	0.029	0.081	0.100	0.059	0.071	0.428	5	20.683	6.679	18.995	23.406	13.738	16.499
Karnataka	11854	0.096	0.023	0.08	0.1	0.063	0.061	0.423	6	22.709	5.516	18.953	23.539	14.828	14.455
- - Uttaranchal	7256	0.100	0.018	0.089	0.080	0.085	0.048	0.420	7	23.846	4.365	21.202	18.918	20.278	11.391
Himachal Pradesh	11085	0.115	0.017	0.091	0.082	0.072	0.04	0.417	8	27.581	4.154	21.84	19.663	17.133	9.629
Maharashtra	14233	0.081	0.021	0.075	0.072	0.077	0.088	0.414	9	19.511	5.130	18.214	17.491	18.522	21.131
Andhra Pradesh	10195	0.082	0.02	0.071	0.099	0.055	0.056	0.383	10	21.439	5.276	18.403	25.77	14.415	14.696
Haryana	13848	0.084	0.027	0.08	0.077	0.054	0.044	0.367	11	22.978	7.427	21.728	21.08	14.796	11.992
West Bengal	9796	0.074	0.033	0.075	0.071	0.062	0.052	0.367	12	20.038	9.046	20.461	19.278	17.023	14.155
Gujarat	12489	0.086	0.02	0.073	0.069	0.063	0.054	0.365	13	23.454	5.557	19.984	18.957	17.155	14.893
Uttar Pradesh - New	5575	0.068	0.027	0.068	0.065	0.065	0.043	0.336	14	20.362	8.088	20.325	19.254	19.306	12.665
Orissa	5549	0.077	0.018	0.055	0.080	0.057	0.045	0.332	15	23.135	5.281	16.645	24.070	17.170	13.698
Tripura	9397	0.074	0.019	0.061	0.090	0.046	0.027	0.318	16	23.288	6.074	19.134	28.365	14.514	8.624
Sikkim	10119	0.093	0.012	0.053	0.054	0.072	0.033	0.317	17	29.375	3.703	16.684	17.107	22.709	10.422
- - Jharkhand	7238	0.072	0.02	0.061	0.061	0.059	0.039	0.313	18	23.042	6.342	19.404	19.665	19.018	12.528
Madhya Pradesh - New	7195	0.075	0.016	0.055	0.065	0.054	0.047	0.312	19	24.026	4.991	17.803	20.773	17.273	15.134
Rajasthan	8175	0.076	0.014	0.058	0.066	0.050	0.044	0.308	20	24.597	4.679	18.838	21.376	16.264	14.247
Meghalaya	9476	0.088	0.013	0.057	0.061	0.057	0.029	0.306	21	28.715	4.251	18.707	19.970	18.789	9.568
Bihar - New	3831	0.063	0.029	0.049	0.053	0.062	0.034	0.291	22	21.787	9.892	16.915	18.377	21.168	11.862
Assam	5943	0.067	0.019	0.058	0.052	0.051	0.037	0.284	23	23.433	6.535	20.503	18.404	18.108	13.017
Arunachal Pradesh	9153	0.078	0.003	0.062	0.063	0.051	0.024	0.282	24	27.683	1.238	22.179	22.287	18.077	8.536
- - Chhattisgarh	6692	0.069	0.013	0.049	0.055	0.047	0.038	0.271	25	25.556	4.726	18.006	20.296	17.440	13.976
Manipur	6851	0.057	0.009	0.033	0.043	0.029	0.027	0.199	26	28.703	4.378	16.791	21.788	14.741	13.600
Nagaland	11473	0.056	0.009	0.037	0.038	0.038	0.017	0.196	27	28.656	4.759	19.098	19.214	19.543	8.730
India	10355	0.080	0.021	0.072	0.077	0.063	0.060	0.373		21.423	5.625	19.190	20.731	17.038	15.993

Notes: Per-capita income is in 1993-94 prices. Demographic (Geographic) Penetration is measured as the number of bank branches per 10 lakh people (per 1000sqkm). Deposit (Credit) A/C per-capita is measured as the number of deposit (credit) account per 1000 population. Deposit (Credit) Income Ratio is the ratio of deposit (credit) size to income. Three states ((Bihar, Madhya Pr. and Uttar Pr.)) were bifurcated in 2000.

**Table 12: Attribute-Wise Breakdown of the Index  $I_{0.5}$  : India and her States - 2007**

State	Per-capita Income (NSDP)	Individual contribution:						$I_{0.5}$	Rank	Percentage contribution:					
		Demographic Penetration	Geographic Penetration	Deposit A/C per-capita	Credit A/C per-capita	Deposit-Income ratio	Credit-Income ratio			Demographic Penetration	Geographic Penetration	Deposit A/C per-capita	Credit A/C per-capita	Deposit-Income ratio	Credit-Income ratio
Delhi	30168.95	0.11	0.167	0.13	0.132	0.167	0.167	0.871	1	12.63	19.129	14.863	15.12	19.129	19.129
Goa	29523.58	0.167	0.047	0.167	0.122	0.129	0.079	0.709	2	23.507	6.59	23.507	17.181	18.141	11.074
Maharashtra	18007.070	0.080	0.022	0.082	0.128	0.115	0.136	0.563	3	14.132	3.912	14.541	22.764	20.473	24.178
Kerala	14749.25	0.107	0.046	0.101	0.135	0.085	0.081	0.555	4	19.25	8.293	18.249	24.346	15.317	14.545
Tamil Nadu	16260.760	0.089	0.030	0.088	0.167	0.074	0.098	0.546	5	16.259	5.428	16.142	30.551	13.641	17.978
Karnataka	13449.55	0.097	0.024	0.089	0.13	0.092	0.097	0.529	6	18.285	4.631	16.766	24.523	17.384	18.41
Punjab	17438.200	0.106	0.036	0.101	0.096	0.083	0.082	0.503	7	21.120	7.076	20.105	18.979	16.463	16.256
- - Uttaranchal	11710.860	0.101	0.019	0.087	0.090	0.102	0.063	0.463	8	21.873	4.205	18.721	19.553	21.998	13.651
Himachal Pradesh	15092.48	0.115	0.018	0.092	0.091	0.079	0.063	0.459	9	25.142	3.953	19.964	19.848	17.294	13.799
Andhra Pradesh	13908.34	0.082	0.021	0.081	0.126	0.066	0.077	0.453	10	18.129	4.673	17.791	27.779	14.624	17.004
Sikkim	14589.510	0.101	0.013	0.066	0.089	0.082	0.072	0.424	11	23.819	3.167	15.653	20.985	19.291	17.085
Haryana	20593.7	0.089	0.03	0.084	0.086	0.067	0.063	0.419	12	21.167	7.195	20.055	20.437	16.098	15.047
Gujarat	16663.4	0.085	0.021	0.084	0.08	0.07	0.069	0.41	13	20.84	5.079	20.574	19.568	17.091	16.848
West Bengal	11178.360	0.072	0.034	0.072	0.074	0.075	0.074	0.402	14	17.953	8.509	17.964	18.282	18.764	18.528
Orissa	8203.013	0.077	0.018	0.061	0.094	0.068	0.067	0.386	15	19.849	4.729	15.900	24.453	17.572	17.497
Uttar Pradesh - New	6533.344	0.067	0.028	0.069	0.073	0.075	0.062	0.373	16	17.952	7.507	18.370	19.541	20.091	16.539
Tripura	10454.950	0.071	0.020	0.064	0.095	0.061	0.045	0.357	17	19.965	5.531	17.956	26.676	17.173	12.699
Rajasthan	9686.328	0.075	0.015	0.062	0.077	0.058	0.067	0.355	18	21.042	4.231	17.538	21.835	16.451	18.903
Madhya Pradesh - New	8376.542	0.073	0.016	0.061	0.072	0.066	0.064	0.351	19	20.745	4.507	17.425	20.373	18.688	18.262
Meghalaya	11663.830	0.085	0.013	0.058	0.076	0.068	0.050	0.351	20	24.307	3.823	16.412	21.624	19.487	14.347
- - Jharkhand	10066.74	0.071	0.021	0.064	0.071	0.067	0.047	0.341	21	20.785	6.016	18.866	20.838	19.633	13.862
Bihar - New	4324.772	0.061	0.029	0.05	0.065	0.073	0.051	0.33	22	18.569	8.805	15.278	19.708	22.187	15.453
Assam	7358.659	0.062	0.019	0.058	0.066	0.063	0.052	0.32	23	19.443	5.891	18.154	20.581	19.819	16.112
- - Chhattisgarh	9489.500	0.066	0.013	0.053	0.067	0.063	0.055	0.317	24	20.886	4.113	16.784	21.013	19.776	17.428
Arunachal Pradesh	11369.62	0.075	0.004	0.06	0.067	0.067	0.044	0.315	25	23.712	1.142	18.91	21.155	21.246	13.836
Nagaland	12300.160	0.054	0.010	0.038	0.061	0.052	0.035	0.249	26	21.823	3.938	15.069	24.298	20.725	14.147
Manipur	10503.670	0.051	0.008	0.036	0.058	0.040	0.040	0.232	27	21.880	3.587	15.398	24.985	17.078	17.071
India	14430.910	0.079	0.022	0.076	0.099	0.077	0.082	0.435		18.231	5.019	17.389	22.873	17.695	18.793

Notes: Per-capita income is in 1993-94 prices. Demographic (Geographic) Penetration is measured as the number of bank branches per 10 lakh people (per 1000sqkm). Deposit (Credit) A/C per-capita is measured as the number of deposit (credit) account per 1000 population. Deposit (Credit) Income Ratio is the ratio of deposit (credit) size to income. Three states (Bihar, Madhya Pr. and Uttar Pr.) were bifurcated in 2000.



**Table 13: Attribute-Wise Breakdown of the Index  $I_1$  : India and her States - 1991**

State	Per-capita Income (NSDP)	Individual contribution:						$I_1$	Rank	Percentage contribution:					
		Demographic Penetration	Geographic Penetration	Deposit A/C per-capita	Credit A/C per-capita	Deposit-Income ratio	Credit-Income ratio			Demographic Penetration	Geographic Penetration	Deposit A/C per-capita	Credit A/C per-capita	Deposit-Income ratio	Credit-Income ratio
Delhi	15862.49	0.079	0.105	0.13	0.055	0.083	0.056	0.508	1	15.446	20.756	25.667	10.835	16.368	10.927
Goa	14708.52	0.141	0.009	0.13	0.094	0.055	0.025	0.455	2	31.004	2.023	28.582	20.717	12.184	5.489
Kerala	7970.989	0.061	0.01	0.046	0.104	0.019	0.018	0.258	3	23.431	3.758	17.912	40.251	7.506	7.142
Punjab	11775.53	0.065	0.006	0.065	0.058	0.025	0.019	0.238	4	27.4	2.349	27.152	24.527	10.502	8.07
Karnataka	6631.403	0.059	0.003	0.047	0.084	0.019	0.025	0.236	5	25.008	1.249	19.861	35.511	7.968	10.405
Tamil Nadu	7874.346	0.047	0.004	0.042	0.08	0.018	0.028	0.218	6	21.608	2.016	19.072	36.474	8.061	12.77
Himachal Pradesh	7618.432	0.088	0.002	0.046	0.048	0.021	0.014	0.218	7	40.35	0.774	20.971	21.889	9.717	6.299
Maharashtra	10158.82	0.043	0.002	0.039	0.041	0.029	0.03	0.185	8	23.381	1.303	20.972	22.162	15.725	16.456
Andhra Pradesh	6844.516	0.042	0.002	0.028	0.079	0.013	0.018	0.182	9	22.864	1.204	15.171	43.559	7.213	9.989
Tripura	5025.9	0.038	0.002	0.02	0.094	0.01	0.011	0.175	10	21.732	1.255	11.333	53.488	5.856	6.337
West Bengal	5990.748	0.037	0.006	0.033	0.044	0.028	0.022	0.169	11	21.692	3.698	19.393	25.927	16.502	12.788
Haryana	11113.84	0.046	0.004	0.037	0.055	0.011	0.015	0.169	12	27.294	2.213	22.25	32.427	6.783	9.034
Gujarat	8787.784	0.05	0.002	0.031	0.037	0.019	0.019	0.158	13	31.735	1.434	19.764	23.391	11.797	11.878
Orissa	4388.313	0.039	0.002	0.014	0.07	0.01	0.013	0.148	14	26.175	1.163	9.439	47.465	6.85	8.907
Meghalaya	7106.228	0.053	0.001	0.026	0.03	0.017	0.007	0.134	15	39.812	0.657	19.304	22.392	12.656	5.179
UttarPradesh	5147.006	0.036	0.004	0.025	0.039	0.016	0.012	0.131	16	27.028	2.859	19.178	29.4	12.12	9.416
Sikkim	8389.359	0.042	0	0.018	0.04	0.018	0.01	0.128	17	32.72	0.388	14.058	31.015	14.391	7.428
Bihar	3567.506	0.033	0.004	0.016	0.041	0.017	0.011	0.122	18	26.782	2.987	13.233	33.726	14.247	9.026
MadhyaPradesh	6366.285	0.039	0.001	0.02	0.039	0.009	0.011	0.12	19	32.46	1.049	16.691	32.877	7.599	9.323
Rajasthan	6759.822	0.041	0.001	0.019	0.036	0.009	0.01	0.118	20	35.261	0.974	16.535	30.519	7.947	8.764
Arunachal Pradesh	7024.257	0.047	0	0.025	0.01	0.013	0.011	0.106	21	44.114	0.068	23.608	9.477	12.259	10.474
Assam	5574.201	0.032	0.002	0.017	0.026	0.009	0.011	0.096	22	32.78	2.093	17.484	27.054	8.924	11.664
Nagaland	8312.859	0.034	0.001	0.019	0.02	0.011	0.009	0.093	23	36.257	0.561	20.12	21.354	11.871	9.838
Manipur	5404.675	0.025	0	0.009	0.015	0.004	0.007	0.061	24	41.784	0.747	14.737	24.724	6.61	11.398
India	7371.746	0.042	0.002	0.03	0.051	0.03	0.018	0.174		24.227	1.387	17.47	29.3	17.258	10.358

Notes: Per-capita income is in 1993-94 prices. Demographic (Geographic) Penetration is measured as the number of bank branches per 10 lakh people (per 1000sqkm). Deposit (Credit) A/C per-capita is measured as the number of deposit (credit) account per 1000 population. Deposit (Credit) Income Ratio is the ratio of deposit (credit) size to income.

**Table 14: Attribute-Wise Breakdown of the Index  $I_1$  : India and her States - 2001**

State	Per-capita Income (NSDP)	Individual contribution:						$I_1$	Rank	Percentage contribution:					
		Demographic Penetration	Geographic Penetration	Deposit A/C per-capita	Credit A/C per-capita	Deposit-Income ratio	Credit-Income ratio			Demographic Penetration	Geographic Penetration	Deposit A/C per-capita	Credit A/C per-capita	Deposit-Income ratio	Credit-Income ratio
Delhi	26523	0.065	0.131	0.102	0.09	0.086	0.081	0.555	1	11.744	23.545	18.301	16.254	15.478	14.677
Goa	25710	0.155	0.012	0.143	0.061	0.06	0.023	0.454	2	34.158	2.562	31.59	13.362	13.315	5.013
Kerala	10714	0.064	0.011	0.05	0.083	0.037	0.024	0.269	3	23.88	4.172	18.548	30.898	13.679	8.825
Punjab	15071	0.064	0.007	0.062	0.047	0.034	0.021	0.234	4	27.321	2.821	26.363	20.088	14.490	8.917
Himachal Pradesh	11085	0.08	0.002	0.05	0.04	0.031	0.01	0.212	5	37.513	0.851	23.522	19.067	14.476	4.572
- - Uttaranchal	7256	0.060	0.002	0.048	0.038	0.044	0.014	0.205	6	29.370	0.984	23.219	18.485	21.240	6.702
Karnataka	11854	0.055	0.003	0.039	0.06	0.024	0.022	0.203	7	27.31	1.611	19.024	29.345	11.643	11.066
Tamil Nadu	12994	0.047	0.005	0.040	0.060	0.021	0.030	0.202	8	23.224	2.422	19.588	29.742	10.246	14.779
Maharashtra	14233	0.039	0.003	0.034	0.032	0.035	0.046	0.189	9	20.753	1.435	18.086	16.679	18.703	24.344
Andhra Pradesh	10195	0.041	0.002	0.03	0.059	0.018	0.019	0.169	10	24.015	1.454	17.694	34.696	10.857	11.284
Haryana	13848	0.043	0.004	0.038	0.036	0.018	0.012	0.151	11	28.35	2.962	25.35	23.86	11.756	7.722
Gujarat	12489	0.044	0.002	0.032	0.029	0.024	0.018	0.148	12	29.642	1.664	21.52	19.365	15.857	11.952
West Bengal	9796	0.032	0.007	0.034	0.030	0.023	0.016	0.142	13	22.765	4.640	23.736	21.070	16.429	11.359
Orissa	5549	0.035	0.002	0.018	0.038	0.019	0.012	0.126	14	28.140	1.467	14.567	30.461	15.500	9.865
Sikkim	10119	0.052	0.001	0.017	0.018	0.031	0.007	0.125	15	41.648	0.662	13.435	14.124	24.889	5.242
Tripura	9397	0.033	0.002	0.022	0.049	0.013	0.005	0.123	16	26.650	1.813	17.991	39.538	10.352	3.655
Uttar Pradesh - New	5575	0.028	0.004	0.028	0.025	0.025	0.011	0.121	17	23.072	3.640	22.989	20.631	20.742	8.926
Meghalaya	9476	0.046	0.001	0.020	0.022	0.020	0.005	0.114	18	40.499	0.887	17.189	19.589	17.340	4.497
Madhya Pradesh - New	7195	0.034	0.001	0.018	0.025	0.017	0.013	0.109	19	30.738	1.326	16.876	22.978	15.887	12.195
Rajasthan	8175	0.035	0.001	0.020	0.026	0.015	0.012	0.109	20	31.739	1.148	18.616	23.971	13.878	10.648
- - Jharkhand	7238	0.031	0.002	0.022	0.023	0.021	0.009	0.109	21	28.651	2.171	20.319	20.869	19.519	8.47
Arunachal Pradesh	9153	0.036	0	0.023	0.024	0.016	0.003	0.103	22	35.542	0.071	22.815	23.036	15.156	3.38
Bihar - New	3831	0.024	0.005	0.015	0.017	0.023	0.007	0.091	23	26.59	5.481	16.027	18.919	25.1	7.882
Assam	5943	0.027	0.002	0.02	0.016	0.016	0.008	0.089	24	29.71	2.311	22.745	18.325	17.741	9.168
- - Chhattisgarh	6692	0.029	0.001	0.014	0.018	0.013	0.009	0.084	25	34.176	1.169	16.965	21.555	15.914	10.221
Manipur	6851	0.020	0.000	0.007	0.011	0.005	0.004	0.048	26	41.153	0.957	14.084	23.713	10.854	9.239
Nagaland	11473	0.019	0.001	0.008	0.009	0.009	0.002	0.047	27	40.335	1.112	17.915	18.134	18.760	3.744
India	10355	0.038	0.003	0.031	0.036	0.024	0.021	0.153		25.015	1.724	20.072	23.424	15.822	13.941

Notes: Per-capita income is in 1993-94 prices. Demographic (Geographic) Penetration is measured as the number of bank branches per 10lakh people (per 1000sqkm). Deposit (Credit) A/C per-capita is measured as the number of deposit (credit) account per 1000 population. Deposit (Credit) Income Ratio is the ratio of deposit (credit) size to income. Three states (Bihar, Madhya Pr. and Uttar Pr.) were bifurcated in 2000.

**Table 15: Attribute-Wise Breakdown of the Index  $I_1$  : India and her States – 2007**

State	Per-capita Income (NSDP)	Individual contribution:						$I_1$	Rank	Percentage contribution:					
		Demographic Penetration	Geographic Penetration	Deposit A/C per-capita	Credit A/C per-capita	Deposit-Income ratio	Credit-Income ratio			Demographic Penetration	Geographic Penetration	Deposit A/C per-capita	Credit A/C per-capita	Deposit-Income ratio	Credit-Income ratio
Delhi	30168.95	0.073	0.167	0.101	0.104	0.167	0.167	0.777	1	9.346	21.439	12.944	13.394	21.439	21.439
Goa	29523.58	0.167	0.013	0.167	0.089	0.099	0.037	0.572	2	29.152	2.291	29.152	15.572	17.363	6.47
Maharashtra	18007.070	0.038	0.003	0.040	0.098	0.080	0.111	0.370	3	10.250	0.786	10.852	26.597	21.512	30.003
Tamil Nadu	16260.760	0.047	0.005	0.047	0.167	0.033	0.058	0.357	4	13.237	1.475	13.048	46.738	9.318	16.184
Kerala	14749.25	0.069	0.013	0.062	0.11	0.043	0.039	0.335	5	20.458	3.797	18.387	32.725	12.952	11.68
Karnataka	13449.55	0.056	0.004	0.047	0.101	0.051	0.057	0.315	6	17.79	1.141	14.957	31.999	16.08	18.033
Punjab	17438.200	0.068	0.008	0.061	0.055	0.041	0.040	0.273	7	24.838	2.788	22.508	20.058	15.093	14.716
Himachal Pradesh	15092.48	0.08	0.002	0.05	0.05	0.038	0.024	0.244	8	32.755	0.81	20.653	20.415	15.499	9.868
- - Uttaranchal	11710.860	0.061	0.002	0.045	0.049	0.062	0.024	0.244	9	25.191	0.931	18.454	20.130	25.481	9.812
Andhra Pradesh	13908.34	0.04	0.003	0.039	0.095	0.026	0.036	0.239	10	16.926	1.125	16.301	39.743	11.014	14.891
Sikkim	14589.510	0.061	0.001	0.026	0.048	0.040	0.032	0.208	11	29.444	0.520	12.717	22.855	19.315	15.149
Haryana	20593.7	0.047	0.005	0.042	0.044	0.027	0.024	0.19	12	24.819	2.868	22.28	23.137	14.355	12.542
Gujarat	16663.4	0.044	0.003	0.043	0.039	0.029	0.029	0.186	13	23.574	1.4	22.976	20.786	15.856	15.408
West Bengal	11178.360	0.031	0.007	0.031	0.032	0.034	0.033	0.169	14	18.449	4.144	18.472	19.132	20.154	19.649
Orissa	8203.013	0.035	0.002	0.023	0.053	0.028	0.027	0.168	15	20.934	1.188	13.432	31.772	16.406	16.267
Uttar Pradesh - New	6533.344	0.027	0.005	0.028	0.032	0.034	0.023	0.149	16	18.155	3.175	19.010	21.511	22.739	15.410
Tripura	10454.950	0.031	0.002	0.025	0.055	0.023	0.012	0.147	17	20.767	1.594	16.798	37.075	15.365	8.402
Meghalaya	11663.830	0.044	0.001	0.020	0.035	0.028	0.015	0.142	18	30.645	0.758	13.971	24.254	19.697	10.676
Rajasthan	9686.328	0.033	0.001	0.023	0.036	0.020	0.027	0.141	19	23.640	0.956	16.422	25.454	14.450	19.078
Madhya Pradesh - New	8376.542	0.032	0.002	0.022	0.031	0.026	0.025	0.137	20	23.235	1.097	16.394	22.411	18.857	18.008
- - Jharkhand	10066.74	0.03	0.003	0.025	0.03	0.027	0.013	0.128	21	23.53	1.971	19.386	23.651	20.995	10.466
Arunachal Pradesh	11369.62	0.033	0	0.021	0.027	0.027	0.011	0.12	22	27.953	0.065	17.776	22.249	22.44	9.516
Bihar - New	4324.772	0.022	0.005	0.015	0.025	0.032	0.016	0.116	23	19.423	4.368	13.148	21.879	27.73	13.452
- - Chhattisgarh	9489.500	0.026	0.001	0.017	0.027	0.024	0.018	0.113	24	23.312	0.904	15.054	23.596	20.901	16.232
Assam	7358.659	0.023	0.002	0.02	0.026	0.024	0.016	0.112	25	20.79	1.908	18.126	23.297	21.602	14.277
Nagaland	12300.160	0.018	0.001	0.008	0.022	0.016	0.007	0.072	26	24.562	0.800	11.712	30.451	22.154	10.322
Manipur	10503.670	0.015	0.000	0.008	0.020	0.009	0.009	0.062	27	24.728	0.664	12.246	32.244	15.065	15.053
India	14430.910	0.038	0.003	0.034	0.059	0.036	0.040	0.210		17.972	1.362	16.349	28.290	16.930	19.096

Notes: Per-capita income is in 1993-94 prices. Demographic (Geographic) Penetration is measured as the number of bank branches per 10 lakh people (per 1000sqkm). Deposit (Credit) A/C per-capita is measured as the number of deposit (credit) account per 1000 population. Deposit (Credit) Income Ratio is the ratio of deposit (credit) size to income. Three states (Bihar, Madhya Pr. and Uttar Pr.) were bifurcated in 2000.

## 1. Background Analysis based on data from Beck et al (2007)

**Table 16A: Correlation Matrix**

	GPEN_BRNCH	DPEN_BRNCH	GPEN_ATM	DPEN_ATM	CAC_PC	Loan/Income	DAC_PC	Deposit/Income
GPEN_BRNCH	1							
DPEN_BRNCH	0.2561*	1						
GPEN_ATM	0.9161*	0.0674	1					
DPEN_ATM	0.3323*	0.9547*	0.1970*	1				
CAC_PC	0.4154*	0.6328*	0.3519*	0.7206*	1			
Loan/Income	0.0141	<b>-0.1025</b>	<b>-0.0361</b>	<b>-0.1614*</b>	<b>-0.4068*</b>	1		
DAC_PC	0.4002*	0.6590*	0.2397*	0.7080*	0.6842*	-0.1829*	1	
Deposit/Income	<b>-0.0421</b>	<b>-0.2724*</b>	<b>-0.0237</b>	<b>-0.3415*</b>	<b>-0.3225*</b>	<b>0.6071*</b>	<b>-0.4770*</b>	1

Notes: \* indicates significant at 5% level. Geographic penetration of bank branches (GPEN\_BRNCH) is the number of bank branches per 1,000 sq km area; Demographic penetration of bank branches (DPEN\_BRNCH) is the number of bank branches per 100,000 people; Geographic penetration of ATM (GPEN\_ATM) is the number of ATMs per 1,000 sq km area; Demographic penetration of ATM (DPEN\_ATM) is the number of ATMs per 100,000 people; CAC\_PC is the number of credit accounts per 1000 people; Loan/Income is the ratio of the size of loans to GDP; DAC\_PC is the number of deposit accounts per 1000 people; Deposit/Income is the ratio of the size of deposit to GDP. Reported correlation matrix is based on 42 selected countries.

**Table 16B: Principal Component Analysis**

Variable	Weights to variables corresponding to the eigenvector of the leading eigen value
GPEN_BRNCH	0.34129
DPEN_BRNCH	0.43853
GPEN_ATM	0.27095
DPEN_ATM	0.47307
CAC_PC	0.44844
DAC_PC	0.43922

Notes: Reported weights are based on the PCA considering only six variables for which pair-wise correlation coefficients are positive.

**Table 16C: Summary Statistics**

Variable	Number of Observations	Mean	SD
GPEN_BRNCH	42	44.351	114.068
DPEN_BRNCH	42	13.869	19.072
GPEN_ATM	42	100.254	410.143
DPEN_ATM	42	21.070	26.204
CAC_PC	42	167.028	191.893
DAC_PC	42	943.721	895.830

## 2. Background Analysis based on data from Sharma (2008)

**Table: 17A: Correlation Matrix**

	DAC_PC	DPEN_BRNCH	SCD_GDP
DAC_PC	1		
DPEN_BRNCH	0.6180*	1	
SCD_GDP	0.5594*	0.5524*	1

Notes: \* indicates significant at 5% level. DAC\_PC is the ratio of number of deposit accounts to total population. DPEN\_BRNCH is the number of branches per 1000 population. SCD\_GDP is the ratio of (size of credit plus deposit) to GDP.

**Table 17B: Principal Component Analysis**

Variable	Weights to variables corresponding to the eigenvector of the leading eigen value
DAC_PC	0.58545
DPEN_BRNCH	0.58324
SCD_GDP	0.5631

## 3. Background Analysis: India and her States

**Table 18A: Correlation Matrix – States in India**

	Demographic Penetration	Geographic Penetration	Deposit A/C per-capita	Credit A/C per-capita	Deposit-Income ratio	Credit-Income ratio
Demographic Penetration	1					
Geographic Penetration	0.2871*	1				
Deposit A/C per-capita	0.8869*	0.5465*	1			
Credit A/C per-capita	0.5059*	0.3072*	0.5815*	1		
Deposit-Income ratio	0.5879*	0.7525*	0.7754*	0.4993*	1	
Credit-Income ratio	0.3441*	0.7490*	0.5573*	0.5826*	0.8598*	1

Notes: \* indicates significant at 5% level. Demographic (Geographic) Penetration is measured as the number of bank branches per 10 lakh people (per 1000sqkm). Deposit (Credit) A/C per-capita is measured as the number of deposit (credit) account per 1000 population. Deposit (Credit) Income Ratio is the ratio of deposit (credit) size to income. Correlation coefficients are similar to the reported coefficients, if we consider each year separately.

**Table 18B: Principal Component Analysis**

Variable	Weights to variables corresponding to the eigenvector of the leading eigen value
Demographic Penetration	0.36993
Geographic Penetration	0.37799
Deposit A/C per-capita	0.44808
Credit A/C per-capita	0.35005
Deposit-Income ratio	0.46586
Credit-Income ratio	0.42419

**Table 18C: Summary Statistics: 2007**

Variable	Number of Observations	Mean	SD
Demographic Penetration	27	78.197	46.051
Geographic Penetration	27	74.279	242.814
Deposit A/C per 1000 people	27	517.633	387.785
Credit A/C per 1000 people	27	78.157	50.021
Deposit as percentage of Income	27	87.830	63.541
Credit as percentage pf Income	27	50.474	48.699

\*\*\*