Financial Inclusion and its determinants in India

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Abstract: Using the state level data for the time period 2009-2019, this paper analyses how financial inclusion is determined by some macro-level variables like secondary school enrolment, GSDP per capita, telecom density, urbanization rate,etc. This study used factor analysis to create an index of financial inclusion for different states and then it compares this index with the index of Financial Inclusion made by Sarma (2012), which is widely accepted in literature, to check the robustness of the result. Two sets of regression is carried out on two different sets of variables- socio-economic variables and physical infrastructure related variables. We find evidence that secondary school enrolment ratio, telecom density, internet density, road infrastructure, GSDP per capita, social expenditure as percentage of GSDP, capital expenditure as percentage of GSDP have positive significant impact on level of financial inclusion across India.

Keywords: financial inclusion, determinants, factor analysis

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1. Introduction

Financial Inclusion is receiving great attention, in recent times, both in India and world.

Financial Inclusion refers to a process that ensures the ease of access, availability and usage of the formal financial system. Financial inclusion is mainly defined in terms of exclusion of certain section of the population.

Rangarajan Committee(2008) defined financial inclusion as the process of ensuring access to financial services and timely and adequate credit where needed by vulnerable groups such as the weaker sections and low income groups at an affordable cost.

In spite of financial inclusion initiatives, some sections of our population remain excluded. This exclusion further increases the divide among haves and have-nots. Achieving financial inclusion is one of the top policy priority for inclusive growth and the launch of flagship scheme – PM Jan Dhan Yojana in 2014 is a step towards that direction.

In India, nationalisation of banks in 1969 started the process of financial inclusion. After that India adopted many strategies like lead bank scheme, mandatory priority sector lending, kisan credit cards, linking self-help groups with banks, doorstep delivery of banking services through business correspondents, etc. to promote financial inclusion.

Every government pays great attention to financial inclusion because delivery of public services like direct benefit transfers depends on it. Thereby, financial inclusion plays a great role in economic development by bringing a part of population within its formal channel. It reduces fluctuations in their income and inculcates a saving habit and also it saves then from greedy money lenders.

Literature Review

However in spite of many financial inclusion initiatives in last decades, those initiatives are accessible to few. Subhbarao points out in his study that only 30,000 centres are covered by commercial banks out of the 600,000 inhabitations in India. There is a massive rural urban divide in terms of financial access indicators, as two thirds of the population resides in rural areas, it is therefore deprived of financial services and products. Empirical studies show that financial inclusion helps poor households- a majority of whom are employed in informal sector- to improve their standard of living and paves the way for higher economic growth (Rajan and Zinbgales 1998; Burges and Pande 2005; Bruhn and Love 2009; Bittencourt 2012)

World Bank study for rural India found that about 40 per cent of households have deposit accounts, 20 per cent have outstanding loans and only 15 per cent have any insurance (Basu,2006).

Financial exclusion may be caused by (1)geographic limitations due to under provision of banking services in remote and scarcely populated areas, (2)socio-economic limitations when financial services appear inaccessible to specific income, socio or ethnic groups, or (3) limitations of opportunity when new or small firms with profitable projects are credit rationed because of lack of information and collateral (Beck/de la Torre 2006, Anderloni/Carluccio 2007, pp. 9).

Some studies had attempted to find level of financial inclusion through surveys measuring proportion of households having access to bank accounts. However major difficulties of these type of studies is that these surveys are not regularly conducted and it become difficult to measure financial inclusion over time. Another problem with these surveys is that their methodologies varies and thus leading to inconsistencies in measure. Honohan (2008) has attempted to combine survey based information and secondary data on the number of bank accounts to econometrically estimate the proportion of households/adults having access to financial services for as many as 160 countries .

Many existing literature uses financial indices computed solely on the basis of supply side information(like number of bank branches) and hence they fail to capture demand side dynamics(Dev,2006). Focussing only on supply side leads to two issues- Overestimation of financial

inclusion because one person can own multiple accounts. Secondly, merely owing account does not necessarily means usage of that account (Beck et al 2007).

Also Kamath et al 2010 empirically showed that correlation between supply of institutional finance and demand for the same is low in India. Therefore there is a need to study financial inclusion both from supply side and demand side to reflect ground situation on access and use of financial services(Beck et al 2009)

Another interesting study points out that women are less likely to access formal borrowing than their male counterparts indicating gender bias (Jyoti,2016). Also he pointed out that people with higher level of education are more likely to borrow from formal sources. This increase chances of vulnerable sections falling prey to informal agencies.

As per Census2011, 58.7% households avail banking services in India. Documentary proofs required to meet KYC requirements as mandated by RBI pose serious impediments to access to banking services especially for poor migrants from rural India(Demirguckant and Klapper 2012).Even no frills account fail to reduce their woes as these account mostly remain dormant (Thyagarajan and Venkatesan 2008). High transaction costs in terms of account opening, account closing charges, minimum balance requirements, transportation charges,high opportunity cost of visiting bank branches, etc. also deters access to bank accounts in India (Beck et al 2009; Mowl and Boudot 2014).

CRISIL(2015) also develops similar index called Inclusix(for 2013) for India.It is a composite index consisits of the indicators that measures the progress of financial inclusion in India, These include bank penetration, deposit penetration and credit penetration which are all combined together in one single metric. The CRISIL Inclusix indicate that there is an overall improvement in the financial inclusion in India. According to the study, deposit penetration is the main drive to attaining financial inclusion in India. The southern region is the most financially included with highest credit penetration while the eastern region is the least financially included. A plausible reason could be the higher literacy rate in the southern region as compared to the eastern and the north-eastern regions.

However, it captured only supply side information and thus suffers from limitations.

Sarma(2012) had constructed a multidimensional index of financial inclusion. This index is constructed similarly to that used by UNDP for constructing well known human development index(HDI),Human poverty index(HPI), Gender development index(GDI),etc.

Our study follows the methodology of Sarma (2012) because the composite financial inclusion index is methodologically improved, as it follows the distance based approach, unlike the UNDP's methodology of average of dimension indices. The distance based approach is suitable because it satisfies most of the properties like boundedness, monotonicity, etc. Also this method captures financial inclusion from both demand side and supply side angles. For e.g. availability of bank branches captures the supply side story and usage of deposit and credit accounts captures the demand side story.

The main objective of the paper is to find out the determinants of Financial Inclusion in India.

The paper is organised as follows. In section 2, we describe our data. In section3, we briefly describe the methodology of Financial inclusion index(Sarma,2012) and give illustration of the Financial Inclusion Index created. In section 4, we constructed an alternative financial inclusion index by factor analysis using Principal component analysis and tested its robustness. In section 5, two different sets of regression is conducted to find out determinants of financial inclusion in India. In section 6, some limitations of the present study is pointed out. Section 7 concludes the paper with some policy implications.

2. Data Description

The study comprises of state-wise balanced panel from the year 2009-2019.Annual data of 33 states were taken including data from few union territories. Due to unavailability of data on telecom density, internet coverage, etc, on several variables, many states were not considered in econometric analysis. While constructing the index we have 352 data points of 32 states, but regression analysis has lesser number of data points i.e. 231.Main sources of data are RBI, EPWRF, India Stat.

3. Methodology for designing Index of Financial Inclusion

We begin our analysis by explaining the methodology of creating Index of Financial Inclusion by Sarma(2012). Inclusiveness of a Financial system has been analysed through different dimensions. Construction of index is same as many of the indices of UNDP like HDI, GDI,etc. Dimension index d_i is weighted by w_i , which shows the relative importance of the dimension index.

$$d_i = w_i \frac{A_i - m_i}{M_i - m_i} \qquad (1)$$

Where,

w_i = weight assigned to the dimension, $0 \leq w_i \leq 1$.

A_i= actual value of dimension i.

m_i = lower limit, fixed by assigning zero

M_i= upper limit

M_i is set to be equal to 94th percentile value of the dimension. M_i is not set to the maximum value of the dimension because it might represent outliers and distort our analysis.

Formula (1) ensures $0 \leq d_i \leq w_i$. Also larger is the value of di, better is the state in terms of that dimension.

If n dimensions are considered then a state's achievement is measured in n-dimensional space. In the n-dimensional space the point O=(0,0,….,0) represents worst position and the point W=(w_i,w_i,….,w_i) represents the ideal position.

Distance based approach is considered to make this index because it satisfies most of the mathematical properties like boundedness, unit-free, homogeneity and monotonicity.

Finally, Index of Financial Inclusion is computed based on the notion of distance of the achievement point X from the worst point O(0,0,…0) and ideal point W(w_i,w_i,….w_i)

Larger the distance between O and X, implies higher financial inclusion and smaller the distance between X and W indicates higher financial inclusion. It may be possible that two economies have same distance from O, but the economy which will have smaller distance from W will be considered better placed in terms of financial inclusion. Similarly, two economies may have the same distance from W, but they will differ in terms of financial inclusion if their distance from O differs. That is why, two distances are considered to construct the index.

In the index, we have taken Euclidian distance between X and O and inverse Euclidian distance between X and W. Both of the distances are normalized by the distance between O and W, to make their value lie between 0 and 1(index is well within bounds). So we calculated X_1 and X_2 and took their average to compute final FII (index of financial inclusion).

$$X_1 = \frac{\sqrt{d_1^2+d_2^2+\cdots+d_n^2}}{\sqrt{(w_1^2+w_2^2+\cdots+w_n^2)}} \qquad (2)$$

$$X_2 = 1 - \frac{\sqrt{(w_1-d_1)^2+(w_2-d_2)^2+..+(w_n-d_n)}\Big)^2}{\sqrt{(w_1^2+w_2^2+\cdots+w_n^2)}} \qquad (3)$$

$$\text{FII} = \frac{1}{2}\,[X_1 + X_2] \qquad (5)$$

$$FII = \frac{1}{2}\left[\frac{\sqrt{d_1^2+d_2^2+\cdots+d_n^2}}{\sqrt{n}} + \left(1 - \frac{\sqrt{(1-d_1)^2+(1-d_2)^2+..+(1-d_n)^2}}{\sqrt{n}}\right)\right] \qquad (4)$$

Sarma(2012) has shown how FII satisfies boundedness, unit free, homogeneity and monotonocity

3.1 Illustration of FII:

We computed FII for different states using three basic dimension of inclusive financial inclusion – Banking penetration, Availability of Banking services and Usage of banking system.

Banking penetration (dimension 1) – It is one of the most important dimension of financial inclusion. Ideally, an inclusive financial system should penetrate widely among its population. Size of banked population i.e. number of adult population having bank account should be an indicator of banking penetration. But due to data unavailability on the size of banked population, we use total number of accounts as a proportion of total population of the state. We used both deposit accounts and credit accounts here.

Availability of banking services (dimension 2)- In an inclusive financial system, banking services must be easily available to people. Number of bank branches (per 1000 population) and number of ATM's per 1000 population indicates ease in accessibility of banking services. Also, increase in number of banking correspondents indicates higher financial inclusion. However, due to data unavailability, we used only number of scheduled commercial bank branches per 1000 population as an indicator of banking services unavailability.

Usage (dimension 3) – Not only having bank accounts matters, usage of the account also count in the representing how an economy is financially inclusive. Many cannot access their accounts because of remoteness of banking outlets, unaffordable conditions attached to financial services or simply due to negative experiences with the service provider. We consider two basic services of banking system- volume of credit and deposit. Volume of outstanding credit and deposit as percentage of state GSDP is taken as an indicator of the usage dimension.

Assigning weights to these dimensions is a difficult task. All the three dimensions are equally important however due to lack of data, lesser weight is given to availability index and usage index. Nowadays, number of bank branches does not capture the whole picture of availability of banking services because of presence of internet banking, which reduces the need for physical outlets. Also in usage dimension, only deposit and credit volume are considered, whereas there are more parameters like payments, transfers, etc. But due to data unavailability, we considered only deposit and credit volume. That is why weights to availability index and usage index has been set to 0.5 and assigned penetration dimension a weight of 1.

A weight w_i indicating the relative importance of the dimension i in quantifying the inclusiveness of a financial system. If a country has a dimension value higher than these upper bounds, then it is set equal to the upper bound. By setting the upper limits as above, we avoid comparing states against excessively high benchmarks and thus remove outliers and smoothen the value of the index at the upper level.

Given these weights, a state economy K is represented by a point (p_k,a_k,u_k) in the three-dimensional space such that $0 \leq a_k \leq 0.5$, $0 \leq u_k \leq 0.5$, $0 \leq p_k \leq 1$, where a_k,u_k,p_k are the dimension indices calculated. Finally FII is calculated as simple average of the two distances of the point (p_k,a_k,u_k) from the worst point O=(0,0,0) and from the ideal point W=(1,0.5,0.5)

$$FII_k = \frac{1}{2}\left[\frac{\sqrt{p_k^2 + a_k^2 + u_k^2}}{\sqrt{1.5}} + \left(1 - \frac{\sqrt{(1-p_k)^2 + (0.5-a_k)^2 + (0.5-u_k)^2}}{\sqrt{1.5}}\right)\right]$$

Many researchers have referred to Sarma's(2012) methodology of creating a multidimensional Financial inclusion index. Here also same methodology have been followed to calculate Financial inclusion index for 33 states of India.

3.2 Status of Financial Inclusion across States

Table 1: Comparison across states

Top scoring states on Financial Inclusion,2010	
Large States	**Small States/UT**
Punjab	Chandigarh
Kerala	Goa
Himachal Pradesh	Puducherry
Top scoring states on Financial Inclusion,2019	
Large States	**Small States/UT**
Maharashtra	Chandigarh
Punjab	Goa
Kerala	Delhi

Table 2: Comparison across states

Bottom scoring states on Financial Inclusion, 2010	
Large States	**Small States/UT**
Bihar	Manipur
Chhattisgarh	Nagaland
Assam	Meghalaya
Bottom scoring states on Financial Inclusion, 2019	
Large States	**Small States/UT**
Assam	Manipur
Chhattisgarh	Nagaland
Bihar	Meghalaya

In bottom top 5, we have north-eastern states and eastern states like Bihar, Assam. Though the values of Financial Inclusion have remained increased over time, but the bottom three remained same over a decade. MH has improved its rank from 14th position to 4th position within a decade.Andhra Pradesh has

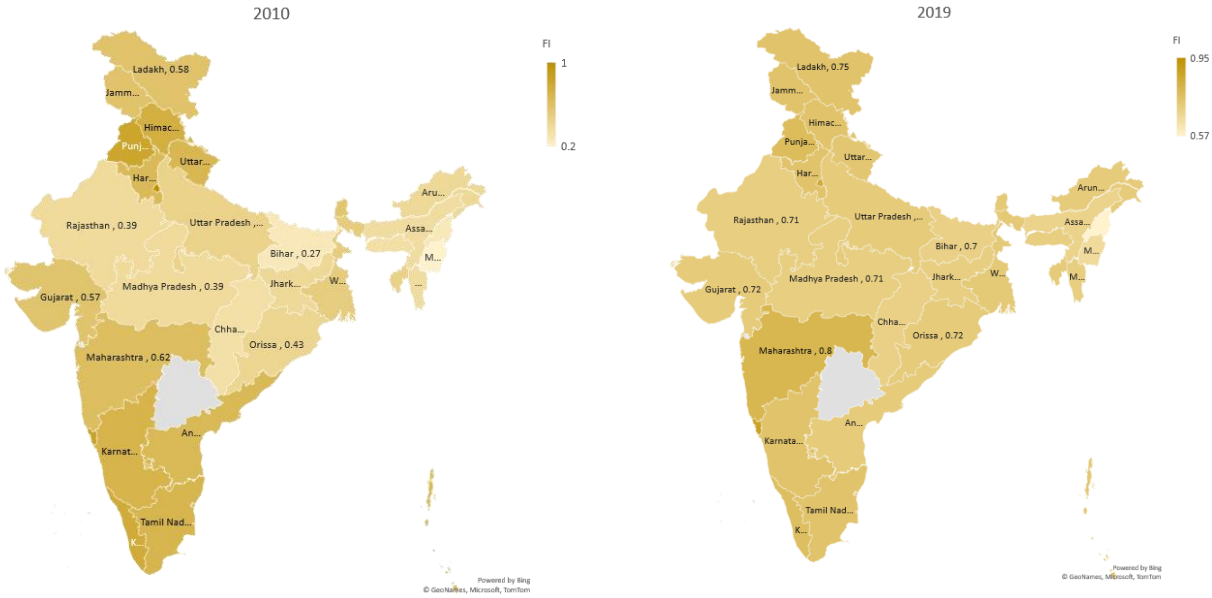
significantly downgraded in terms of Financial inclusion from 11th position to 18th position post bifurcation.

However, if we see the picture across all states, Financial inclusion index has increased across states.(see Figure 1)

Figure 1:Financial Inclusion Index across states over time

To get a much better picture, we compared India's situation across two time points i.e. 2010 and 2019.(see map below). From the map it was evident that **Central India, Eastern India and North East** was lacking behind in terms of Financial Inclusion while **North India, West India and South India** performed better. This is in line with **Crisil's Inclusix**.
Central India states and north-eastern states have improved in terms of financial inclusion. Western India, Southern India states are performing better than rest of India.

Figure 2: Comparing Financial Inclusion between 2010 and 2019 situations

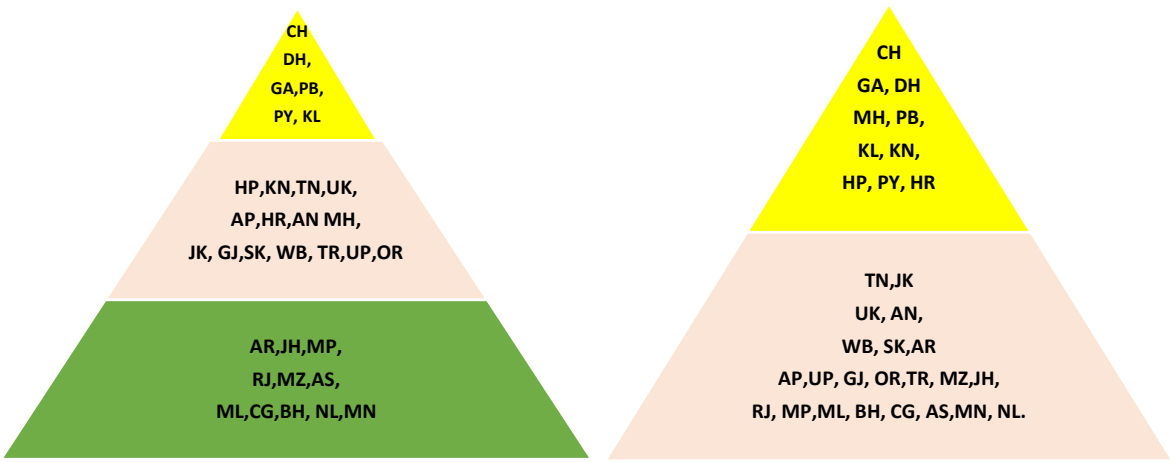


We divide states according to their performance in financial inclusion

Table 3: Different stages of Financial inlcusion

States	Range
High Financial Inclusion	0.75 < FII < 1.0
Medium Financial Inclusion	0.4 < FII < 0.75
Low Financial Inclusion	0.0 < FII < 0.4

Figure 3: Performance of States over time



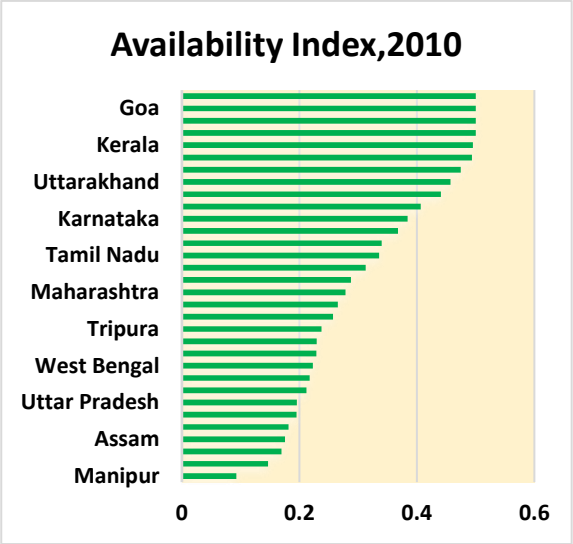
'2010' '2019'

From figure 3, we observe that in 2010, there were some states in low financial inclusion zone. But they all have improved and now is placed in medium financial inclusion zone.

Now we analysed different states' performance according to different indices. Availability index

shows the number of scheduled commercial banks available per 1000 population. In terms of **Availability Index**, we can see that inequality has widened. This is mainly because lesser number of commercial bank branches are opened across states. Reasons of lesser number of bank branches can be poor balance sheet of public sector banks, higher operation costs in managing bank branches, etc. Also commercial banks deviated from their main agenda and started looking for profitability and thus even in backward states, opening of new bank branches slowed down and thereby increased inequity.

Figure 4: Availability Index



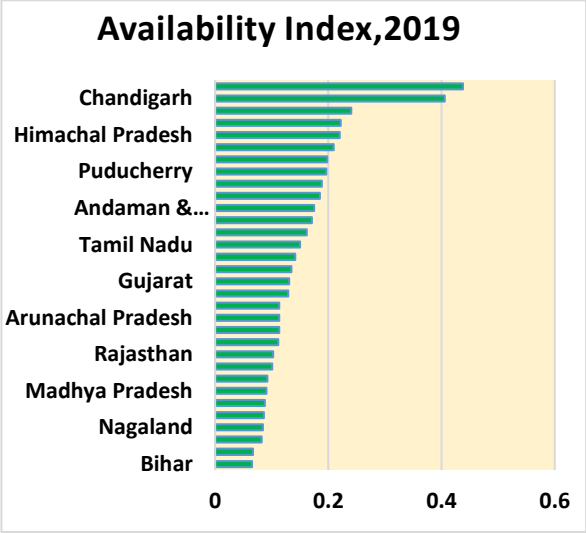
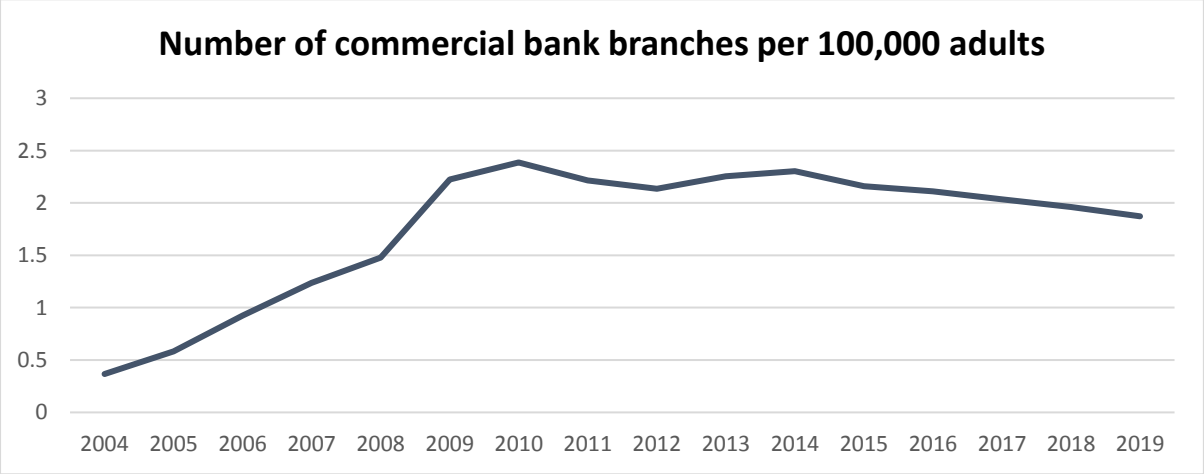


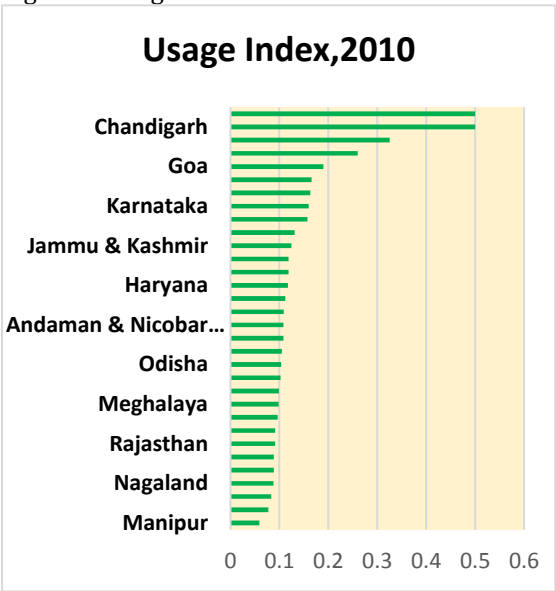
Figure 5: Decline in number of commercial bank branches per lakh population.

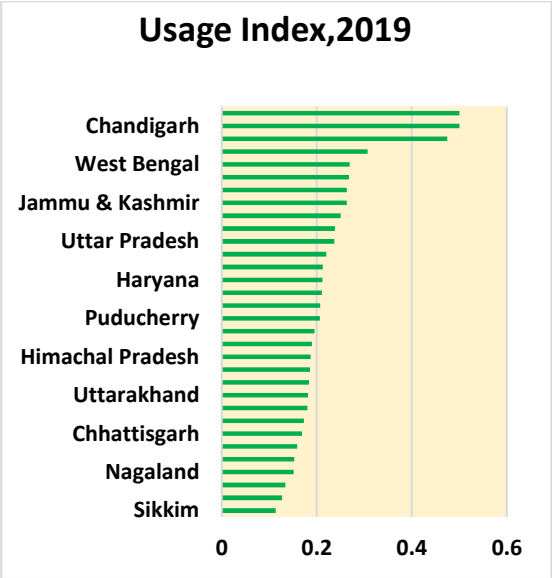


Source- IMF

Usage Index shows how banking services are used. It shows that many poor performing states are catching up the better performing states. Post Digital India, a flagship scheme of Government of India, a lot of people started using their bank accounts. Many schemes of Government of India provides for direct benefit transfers(DBT) like PAHAL(LPG subsidy), PM Kisan(transfers to farmers). These also promoted usage of deposit accounts. Also schemes like PM Fasal Bima Yojna, Mudra Yojna, Stand up India (credit to vulnerable population to boost their entrepreneurship spirit),etc eased credit availability to new businesses and young entrepreneurs. This has increased opening of credit accounts and their usage in terms of volume. This may have decreased inequality across states in usage index.

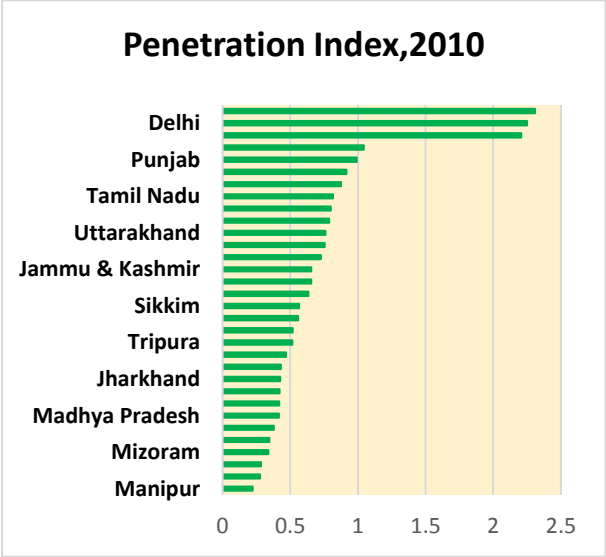
Figure 6: Usage Index

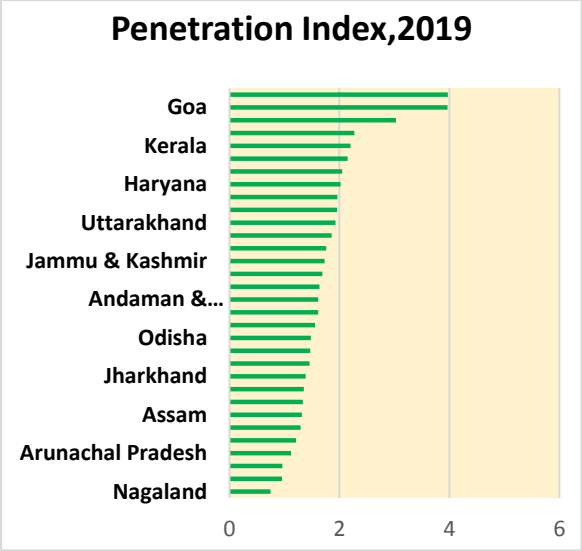




Penetration Index indicates that size of banked population has increased significantly from 2010 to 2019.Governtment ran a flagship scheme PM Jan Dhan Yojna, which strives to end Financial untouchability by ensuring that the economically weaker sections have access to bank accounts. Our data also validates the success of the government programme because there was overall increase in the value of the index across all states and noteworthy, poor performing states were also catching up.

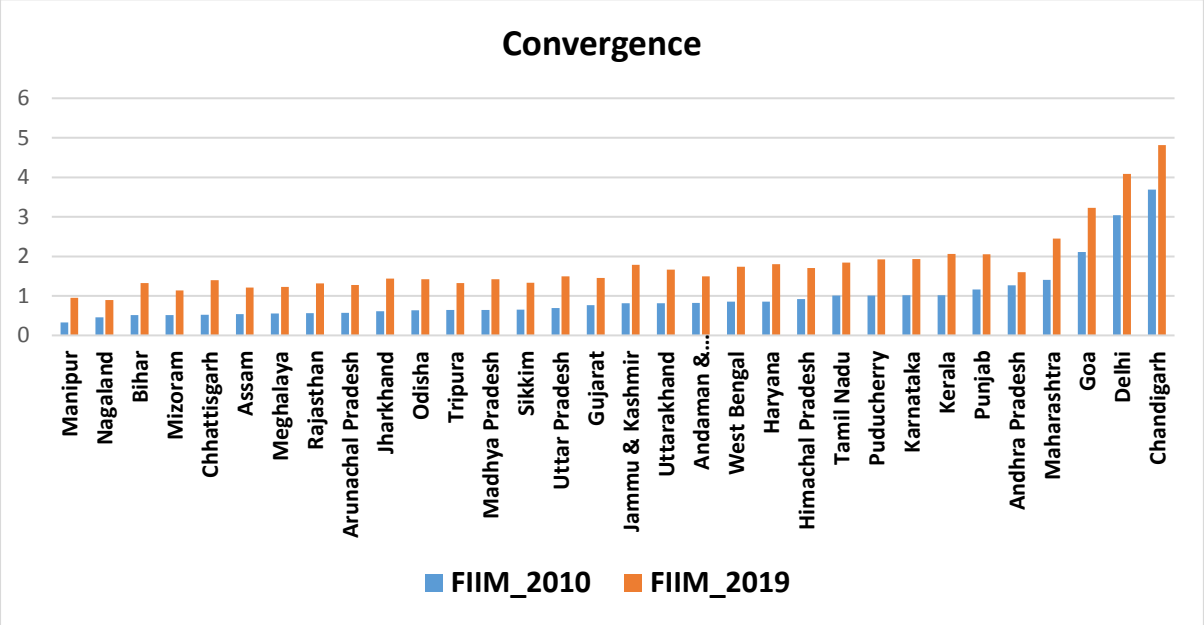
Figure 7: Penetration Index





Convergence of states in terms of reducing of inequality is observed between 2010 and 2019. Backward states are performing well. (see figure 8.)

Figure 8: Convergence of performance across states



4. Alternative method of quantifying financial inclusion :Factor Analysis

Instead of assigning on a subjective basis, factor analysis has been carried out on the variables and then used factor loadings as weights to create a single index of financial inclusion

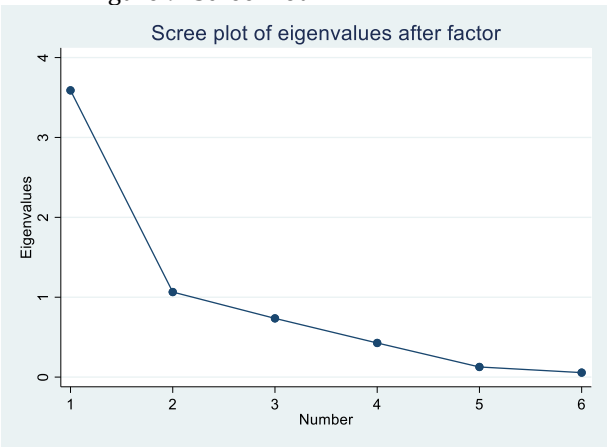
This index of financial inclusion, created by factor analysis, is compared with the index created above using distance based approach, to check the robustness of our index.

Based on Pearson's rank correlation result, rank correlation between the two index came out to be 0.93 which shows that our index created using factor analysis is a quite robust estimate. Moreover, we have also included number of life insurance offices per capita in measuring the index of financial inclusion.

For Factor Analysis following variables were considered:

1. Number of Deposit account per capita
2. Number of Credit account per capita
3. Number of Scheduled Commercial Bank branches per 1000 population
4. Aggregate credit as proportion of GSDP
5. Aggregate deposit as proportion of GSDP
6. Number of Life insurance offices per capita

Figure 9: Scree Plot



From the scree plot of eigen value, we can see that two factors are statistically significant.

Table 4: Factor loadings

Factor analysis/correlation Number of obs = 352
Method: principal-component factors Retained factors = 2
Rotation: orthogonal varimax (Kaiser off) Number of params = 11

	Variance	Difference	Proportion	Cumulative
Factor1	2.941	1.227	0.490	0.490
Factor2	1.714	.	0.286	**0.776**

LR test: independent vs. saturated: chi2(15) = 1662.49 Prob>chi2 = 0.0000
Rotated factor loadings (pattern matrix) and unique variances

Variable	Factor1	Factor2	Uniqueness
deposit_a/c_per capita	**0.817**	0.347	0.212
Credit_a/c_per capita	**0.690**	0.129	0.507
Bank_Branches_1000	0.048	**0.947**	0.100
Credit % GSDP	**0.873**	0.156	0.214
Deposit % GSDP	**0.886**	0.176	0.183
insurance_per capita	0.498	**0.790**	0.128

Source: RBI, India Stat, EPWRF

Factor 1 and Factor 2 are the two groups that are statistically significant and corresponding to these factors the variables which have significant factor loadings also have the right signs indicating the fact that movement in the set of variables representing financial inclusion at the state level unravel consistent relationship. Positive sign would have meant that as the magnitude of a variable increases, financial inclusion also rises. None of the factor loading has negative sign. Sign being negative tends to be counter intuitive in this case. In both factor 1 and factor 2, all the variables have positive sign.

A loading is the correlation between observed variables and factors: higher loading means that the indicator is more relevant in defining the factor.

Factor 1 and factor 2 are statistically significant because each of the two has eigen value greater than 1. Since there are two factors which are statistically significant, two set of indices have been generated and both are combined using the eigenvalue of each of the factor as weights. After rotation, Factor 1 explains 49% of the variation and Factor2 explains 29% of the variation. Cumulatively they explains 78% of the variation of the dataset.

Calculation:

Factor_1=(0.8170* **deposit_a/c_per capita**)+(0.6899* **Credit_a/c_per capita**)+(0.0479* **Bank_Branches_1000**)+(0.8727* **Credit % GSDP**)+(0.8863* **Deposit % GSDP**)+(0.4978* **insurance_per capita**)

Factor_2=(0.3470* **deposit_a/c_per capita**)+(0.1287* **Credit_a/c_per capita**)+(0.9473* **Bank_Branches_1000**)+(0.1561* **Credit % GSDP**)+(0.1760* **Deposit % GSDP**)+(0.7898* **insurance_per capita**)

FIIM=((3.58953* Factor_1)+(1.06483*Factor_2))/6

Table 5: Comparison between FII and FIIM(2019)

	FII	FIIM	Rank as per FII	Rank as per FIIM
Chandigarh	0.947	4.815	1	1
Goa	0.880	3.224	2	3
Delhi	0.846	4.087	3	2
Maharashtra	0.796	2.448	4	4
Punjab	0.784	2.054	5	6
Kerala	0.768	2.060	6	5
Karnataka	0.754	1.930	7	7
Himachal Pradesh	0.754	1.704	8	13
Puducherry	0.752	1.925	9	8
Haryana	0.751	1.804	10	10
Tamil Nadu	0.746	1.839	11	9
Jammu & Kashmir	0.746	1.788	12	11
Uttarakhand	0.744	1.664	13	14
Andaman & Nicobar	0.737	1.498	14	16
West Bengal	0.733	1.737	15	12
Sikkim	0.732	1.332	16	23
Arunachal Pradesh	0.721	1.279	17	27
Andhra Pradesh	0.720	1.603	18	15
Uttar Pradesh	0.719	1.491	19	17
Gujarat	0.716	1.457	20	18
Odisha	0.716	1.424	21	20
Tripura	0.715	1.326	22	25
Mizoram	0.714	1.139	23	30
Jharkhand	0.714	1.435	24	19
Rajasthan	0.710	1.319	25	26
Madhya Pradesh	0.709	1.419	26	21
Meghalaya	0.708	1.230	27	28
Bihar	0.705	1.328	28	24
Chhattisgarh	0.704	1.396	29	22
Assam	0.694	1.212	30	29
Manipur	0.665	0.954	31	31
Nagaland	0.569	0.896	32	32

The table above shows that the two rankings are almost in perfect agreement with each other. Spearman's rank correlation coefficient between two rankings is 0.93.

Few interesting results from this comparative exercise is observed. Himachal Pradesh ranked 8th as per FII, while its rank falls to 13 as per FIIM. Drastic fall is also observed in Sikkim's rank as well as Arunachal Pradesh' rank when we account for insurance dimension. Whereas there was improvement in the ranks of Jharkhand and Chhattisgarh. Ranks may have changed due to the fact that there was mild increase in per capita availability of insurance offices in Jharkhand and Chhattisgarh and a mild decrease in observed in Himachal Pradesh and Sikkim.

5. Factors associated with Financial Inclusion

Factors that affect financial inclusion are many. In this section we try to find out some of those factors by carrying out two sets of regression of the index of Financial Inclusion (by PCA) on two different sets of variables.

Data description and Methodology:

The analysis is carried out for 22 states for the time period 2009-10 to 2019-20. The dependent variable is the Index of Financial Inclusion(FIIM). Secondary school enrolment, internet penetration, are the regressors.

Ours is a balanced panel, so we proceed with pooled OLS regression for the first set of variables. However, to test whether Generalized Least Squares is essential or simple OLS would suffice, further assessment is required. After obtaining the estimates of the OLS model, we contrast between the OLS and random effect by utilizing Breusch and Pagan Lagrangian Multiplier test. We find out that random effects model is better fit than pooled OLS model.

Since the calculated value exceeds the tabulated chi-squared value, we conclude that the random effects are appropriate than the pooled OLS model. Moreover, it also depicts there are state-specific effects in our data. If the state-specific effects are uncorrelated with the regressors, a consistent estimator will be delivered by the random effect estimator which is also efficient.

To check for heterogeneity in our data or individuality among the states we use the fixed effects model that allows the states to have their own intercept value. However, to verify whether fixed effects model is the appropriate model or we stick to random effects model, we make use of the Hausman test which detects the best suitable method to be applied.

Hausman test specifications:

Ho: $cov(\alpha_i, x_{it}) = 0$ (Random effects)

H1: $cov(\alpha_i, x_{it}) \neq 0$ (fixed Effects)

So after the Hausman test, we do not reject the null hypothesis and random effects model is our chosen model. The reason why random effect model came out to be best fit because state specific effects got captured in the error term instead of state intercept.

Same method is applied for second set of variables and random effetc model is our best fit.

Regression 1			Regression 2		
	Chi Sq	pvalue		Chi Sq	pvalue
Bruesh Pagan test	605.5	0.00	Bruesh Pagan test	502.9	0.00
Hausman test	1.6	0.67	Hausman test	4.9	2.99

5.1 Econometric model for finding socio-economic determinants of Financial inclusion:

$FIIM_{it} = \alpha_i + \beta_1 F\_literacy_{it} + \beta_2 Secondary\_en_{it} + \beta_3 GSDP\_per_{it} + \beta_4 Social\_exp_{it} + \beta_5 Factory_{it} + \varepsilon_{it}$

Where, t represents time point, i represents, states of India, ε is the error of the model, α_i is the intercept for each state which captures state specific effects.

FIIM = Financial Inclusion Index created by factor analysis [author's calculation]

F_literacy= female literacy (women who have completed class X) [source- EPWRF]

Secondary_en= secondary enrolment(class XI-XII) [source-India Stat]

GSDP_per= State GDSP per capita [source- EPWRF]

Social_exp= Social expenditure as percent of GSDP. [Source-RBI]

Factory= Number of Factories per square Km. [Source-RBI]

Rationale for including **State GDP** as a determinant of Financial Inclusion is more money people have in their pockets which they can save for future and this increase inclusion. Also with its increase in state GSDP , state can increase its expenditure towards better financial infrastructure .**Higher the secondary school enrolment**, people get more job opportunities and this job security increases financial inclusion as well . Also educated youth takes credit to start own business. **Female literacy** is also expected to have positive impact on financial inclusion because it not only increases their employment opportunities but also creates awareness among women in a gender biased society. The impact on **industrialisation** on financial inclusion is evident from literature. Thus we have taken number of factories as proxy for industrialisation for our analysis. Basically, industrialisation represents how secure people are in terms of their employment and thus they tend to be more financially aware. **Social expenditure** consists of expenditure on health, education and other social safety nets. Government expenditure on health facilities save people from out of pocket expenditure and promotes saving behaviour. Also nowadays many government cash transfers through direct account transfers promotes financial inclusion.

Table 6 : Results

	FIIM
F_literacy	-0.00185
	(0.00139)
Secondary_en	0.000000144***
	(4.19e-08)
GSDP_per	0.00000954***
	(0.000000824)
Social_exp	4.743***
	(0.579)
Factory	0.421***
	(0.0362)
_cons	-0.273***
	(0.0657)
N	231
R^2 within	0.894
R^2 between	0.861
Prob > chi2	0.000

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

From the above table, it is observed that secondary enrolment, Social expenditure as percentage of GSDP, industrialisation and GSDP per capita are statistically significant at 1% level of significance and they all are positively associated with financial inclusion. However, female literacy have no significant impact on financial inclusion.

5.2 Econometric model for finding physical infrastructure determinants of financial inclusion:

$FIIM_{it} = \alpha_i + \beta_1\ GSDP\_per_{it} + \beta_2\ Telecom_{it} + \beta_3\ Internet_{it} + \beta_4\ Road_{it} + \beta_5\ Capex_{it} + \varepsilon_{it}$

Where,

Telecom= telecom density(telecom users per 100 population)[source: India Stat]

Internet= internet users per 100 population[source: India Stat]

Road network= road density(total paved roads per square km) [Source: RBI]

Capex= capital expenditure as percent of GSDP[source: RBI]**:**

Table 7: Pairwise correlations

Variables	(FIIM)	(2)	(3)	(4)	(5)	(6)
(1) FIIM	1.000					
(2) telecom	0.811*	1.000				
(3) internet	0.676*	0.473*	1.000			
(4) road network	0.703*	0.670*	0.282*	1.000		
(5) capex_GSDP	-0.116	-0.152*	-0.012	-0.257*	1.000	
(6) GSDP_per	0.820*	0.762*	0.634*	0.544*	-0.360*	1.000

**** p<0.01, ** p<0.05, * p<0.1*

Table 7 shows pairwise correlation for key variables in the regression. We can observe that telecom density, internet usage, road network and GSDP per capita have positive significant association with FIIM(financial inclusion index).

Table 8: Results

	FIIM
GSDP_per	0.00000526***
	(0.00000129)
telecom	0.00465***
	(0.00106)
internet	0.305***
	(0.0754)
Road network	0.0318**
	(0.0103)
Capex	4.259***
	(0.823)
_cons	0.102
	(0.0793)
N	231
R^2*overall*	0.842
R^2 within	0.847
R^2 between	0.840
Prob>Chi2	0.000

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Physical infrastructure is an important determinant of financial inclusion. **Telecom and Internet density** came out to be statistically significant and positively impacting financial inclusion. Also **road networks** positively impacting financial inclusion, which is logically valid as well because better road networks promotes economic activity. **Capital expenditure** generates huge multiplier effect on the

economy and creates long-term assets which improves overall productivity in the economy and labour productivity also improves. In line with our theoretical knowledge, we can see that capex positive and significantly related with better financial infrastructure.

6. Limitations of the present study:

Both the index calculated in this paper suffer from limitations. Due to data unavailability, many variables could not be included in our analysis. For e.g. income inequality and unemployment is expected to have negative impact on financial inclusion. But those variables cannot be incorporated in our study because to calculate income inequality we need consumption expenditure surveys and unemployment rate is computed from PLFS surveys and the main issue is that both of these surveys are periodic in nature. Also due to technological improvements, conventional banking services are taking a backseat and more developed regions are more involved in digital transactions and this dimension is not captured in our analysis due to lack of data.

7. Conclusion

The extent of financial exclusion in India is found to be higher as compared with many developed and some of the major emerging economies. The wide extent of financial exclusion in India is visible in the form of high population per bank branch and low proportion of the population having access to basic financial services like savings accounts, credit facilities, credit and debit cards,etc.

In literature, financial exclusion has been identified as a major reason of social exclusion. That is why this study empirically tried to examine the determinants of financial inclusion in India. We first try to analyse status of financial inclusion across states of India using the index developed by Sarma(2012). It is observed that every state has improved its performance over time. It is noteworthy the Government of India took a major initiative in this regard and the success of the initiative can be observed in terms of increased financial inclusion.

We find out that social- economic factors and physical infrastructure plays a vital role in enhancing financial inclusion. In our empirical analysis, GSDP per capita came out to be an important determinant. Also literacy and industrialisation have significant positive impact on financial inclusion. The significant impact of internet access on financial inclusion indicates that with providing internet access to the remotest corners of our country we can fulfil the gap of lack of access to physical bank branches. Internet has abridged the cost of transactions by reducing the need of regular bank visits and increased credit deliveries in remote areas of our country.

Different initiatives are being launched both by banks themselves and by RBI and Government. Trust is the main confidence building block between banks and its customers. RBI through its supervisory role is trying to keep that trust intact

Government has already taken various initiatives like launching exclusive bank account in the name of girl child e.g. Sukanya Samriddhi Yojana. Some banks even offer concessional rate of interest for housing and education loans availed of by women. About 37 crore countrymen have protection cover under the PM Jeevan Jyoti Bima Yojana and the PM Suraksha Bima Yojana. In a way, now the financial sector, the banking sector of the country, has been democratized in the true sense. Through Kisan credit cards, not only small farmers can access credit , also fishermen, livestock farmers can access credit. People are today getting loans under the SVANidhi scheme .Mudra Yojana is helping those families with self-employment who had never even thought of it.

However to fulfil the mantra of 'Sabka Saath, Sabka Vikas, Sabka Vishwas', we need to remove some impediments. In India, a large portion of women are estimated to be financially excluded. The main reason behind this low literacy among women. So improving women's literacy levels must be the first priority for enhancing their financial inclusion. Awareness plays a huge role here. Women have to be made aware of their rights to access financial services. There must be greater awareness and

enlightenment among men too to bring about greater gender equality. Banks should hold special campaigns for opening accounts for women.

Reserve Bank of India's Internal Working Group (IWG) — has raised several concerns on the farm front as lakhs of small and marginal farmers (SMF) are yet to be covered by the banking system. It said that despite so many initiatives and schemes aimed at financial inclusion, only 40.90 per cent of SMF could be covered by the scheduled commercial banks. Probable reasons could be that their credit demand could be for consumption purposes or they could be tenant farmers, sharecroppers and landless labourers who are not able to offer collateral security to avail institutional credit, or they are involved in unviable subsistence agriculture or banks do not find them credit worthy. As a result, these farmers find it convenient to borrow money from non-institutional sources due to easy accessibility.

Regional disparity observed- Tamil Nadu has come out as an outlier, having only 6 per cent share in the total number of SMF, although it is the leading state in terms of share in total number of loan accounts (17 per cent) and the highest share in amount outstanding (13 per cent).

Though at the aggregate level banks, have been able to achieve the overall PSL target of 40 per cent, so far they have failed to achieve the agriculture target of 18 per cent at system-wide level, the report said.

Given the increasing reliance on technology to deliver banking services to customers, it is essential to that adequate attention is paid to security, especially IT security. But cumbersome security procedures would deter customers from using the product and carrying out electronic transactions. Accordingly, a proper balance need to be maintained.

Power supply and network connectivity are issues in most parts of the country, especially, so in the rural/ remote areas. While banking transactions are enabled on a real-time basis in urban centres, it often takes more time to complete a transaction in remote areas due to poor internet connectivity and frequent power failures.

Limited number of technology service providers to cover the unbanked villages of all banks as well as limited service centres for servicing devices has resulted in banking operations coming to a halt in many villages. So we need to address all of these issues to make India more financially inclusive.

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