

Multidimensional financial inclusion index for Indian states

Vishal Yadav¹ | Bhanu Pratap Singh²  | Nirmala Velan¹

¹Department of Economics, School of Management, Pondicherry University, Puducherry, India

²Economics Section, Mahila Mahavidyalaya, Banaras Hindu University, Varanasi, India

Correspondence

Bhanu Pratap Singh, Economics Section, Mahila Mahavidyalaya, Banaras Hindu University, Varanasi (U.P.) 221005, India.
Email: bhanuatindia@gmail.com; bpsingheco@bhu.ac.in

The study proposes a multidimensional financial inclusion index (FII) for 27 Indian states. The separate demand and supply FII is constructed across the states for the period 2004–2017. The Human Development Index (HDI) methodology developed by the United Nation Development Programme (UNDP) is adopted in the construction of current FII. After the launch of Pradhan Mantri Jan Dhan Yojna (PMJDY) in 2014, there is no study in the Indian market attempted to examine the status of financial inclusion across the states over a longer period. The current study fills this gap by proposing the demand and supply FII. The major findings of the study show that the level of FII measure tends to indicate marginal improvement in the level of financial inclusion across states during 2004–2017. Most of the northern and north-eastern states were found to be under low financial inclusion. On the other hand, most of the high financially included states were also better in terms of HDI and literacy. Further, PMJDY was unable to augment financial inclusion across the states because of marginal impact of the scheme which helped only a few states to move from low to medium FII states. On the contrary, the rise in the dormant account, low HDI and illiteracy across the majority of the states were the major reason behind the failure of PMJDY. Hence, structural reforms are warranted in the policy framework to provide financial services to poorest among the poor at low or no cost for better economic outcomes.

JEL CLASSIFICATION

G00; G21; O16

1 | INTRODUCTION

In the development debate, Schumpeter (1911) was first to discuss about the importance of financial expansion. There are different views of economists on the role of finance in the success and failure of nations. There are studies which confirm finance promotes economic growth (Singh & Mishra, 2014, 2015). On the contrary, there are studies which find there is no impact of finance on economic growth (Lucas, 1988). Some studies believe real sector development itself creates demand for financial development (Robinson, 1952).

“Financial inclusion” is a word which guarantees access to financial products and services to larger sections of the society at an affordable cost. It is controlled by mainstream institutional players in the economy and plays an important role in the financial development of a country. Financial institutions offer a wide range of

financial services such as savings, loans, credit, insurance, payments, etc. It accepts deposit from the general public and lends out to others. It is the major policy tool of economic development of the current era. Rangarajan (2008) defines financial inclusion as “the process of ensuring access to financial services and timely and adequate credit where needed by vulnerable groups such as weaker sections and low-income groups at an affordable cost”. According to Reddy (2017), the major objective of financial inclusion is to transform the life of vulnerable and poor people by providing them access to financial services.

Lack of financial literacy and low human development is the major obstacle behind access to financial services among rural and weaker section of society. In India, around 67% of people live in rural areas and many of them do not have access to financial services offered by banks and other institutions. The inclusive financial system would help

them by providing access to formal credit. It also reduces the cost of capital by efficiently allocating productive resources.

The Reserve Bank of India (RBI) to achieve higher financial inclusion initiated various banking reforms (Aggarwal, 2014). The Prime Minister of India, Shri Narendra Modi announced the PMJDY scheme on August 15, 2014, with a motive to augment financial inclusion and help larger masses to come out of the poverty trap. It has been a comprehensive plan with a strong focus on technology which provides banking services to all at an affordable cost.

The current study proposes a multidimensional financial inclusion index (FII) for 27 Indian states. The separate demand and supply FII is constructed across the states for the period 2004–2017. Two new dimensions of financial inclusion, namely, number of bank employee per customer and number of small borrowing account per 1,000 population are introduced which were not used in the previous studies. Further, the performance of PMJDY to augment financial inclusion is also examined. The major findings of the study show that the level of FII measure tends to indicate marginal improvement in the level of financial inclusion during 2004–2017. Most of the northern and north-eastern Indian states were under low financial inclusion. On the other side, high financial inclusion states are also found to be better in terms of HDI and literacy. Further, PMJDY is unable to augment financial inclusion across the Indian states because of the marginal impact of the scheme which helped few states to move from low financial inclusion to medium financial inclusion state. Hence, structural reforms are warranted in the policy framework to provide condition as well as financial services to poorest among poor at low or no cost for better economic outcomes.

The study is organized as follows: Section 2 covers the review of the literature. Data and methodology are discussed in Section 3. Section 4 reports result and discussion of the results. The study concludes with Section 5.

2 | SURVEY OF LITERATURE

There is a large number of studies conducted on the construction of FII on the Indian market and across the globe. The studies differ in parameters and time used in the construction and assessment of financial inclusion in the different regions. The studies on financial inclusion can be broadly categorized into studies on the Indian market and the rest of the world. The first part of the survey of literature will cover studies on the Indian market and the latter will discuss the international studies.

Sarma (2008) developed a multidimensional FII including India employing UNDP methodology. The study used three dimensions of financial inclusion, namely, banking penetration, availability and usage of banking services. Charkravarty and Pal (2010) employed a set of financial inclusion indicators from Beck, Demirguc-Kunt, and Martinez Peria (2007) to measure financial inclusion in the Indian market. The major finding of the study was that all banking sector indicator contributed equally to achieving higher financial inclusion. Similarly, Kainth (2011) developed a district-level FII for all the districts of the

Indian state of Punjab. The study utilized UNDP methodology and three-dimension of financial inclusion in the construction of the FII. Jalandhar was found the highly financially included district of Punjab with FII value 0.971. On the other side, Mansa had the lowest FII value (0.006). Again a district-level financial inclusion study on financial inclusion was conducted by Chattopadhyay (2011) in the Indian state of West Bengal. Kuri and Laha (2011) constructed a FII for Indian states and examined its association with modified HDI. The major finding of the study was that Chandigarh had the highest FII value (0.769) and Manipur had the lowest FII value (0.000). Gupte, Venkataramani, and Gupta (2012) computed a FII for India for the years 2008 and 2009 using the same UNDP methodology.

Bagli and Papita (2012) constructed a comprehensive FII for 28 Indian states using principal component analysis. The study used 10 indicators of financial inclusion. The major finding of the study was that Goa had the highest composite FII value (144.25) and Manipur has the lowest composite FII value (−67.6). Similarly, Gupta, Chotia, and Rao (2014) developed an FII for Indian states using Sarma (2012) methodology utilizing three indicators, namely, banking penetration, availability and usage of the banking services. The major finding of the study was that Goa has the highest FII value (0.984) and Manipur had the lowest FII value (0.020). Further, the result also shows that the financial inclusion and human development index were positively related. Laha and Kuri (2014) developed an FII index for the Indian states using Sarma (2008) methodology utilizing demand and supply-side indicators of financial inclusion separately. The demand-side indicators include access to savings, credit, and insurance. On the other hand, supply-side indicators include banking penetration, availability and usage of banking services. The major finding of the study suggests that the western and southern states had better FII compared to other states. Ambarkhane, Singh, and Vekataramani (2016) developed a comprehensive FII for 21 Indian states using data for the year 2011 utilizing Sarma (2008) methodology using 3 dimensions, namely, supply, demand and infrastructure dimension with an index of drag factors that includes population growth. The major finding of the study shows that Kerala had the highest FII and Chhattisgarh had the lowest. Poonam (2016) developed a multidimensional FII for Indian states using UNDP methodology with 3 indicators, namely, availability, penetration and usage of banking services. The FII was calculated using data for the year 2001 and 2014. The result shows that Jammu & Kashmir was ranked first and Manipur was ranked 35th in 2001 among Indian states. In 2014, Goa was ranked first and Manipur was ranked 35th.

Crisil (2018) study constructed FII index at the national and sub-national level in the Indian market. The study used four dimensions of financial inclusion, namely, bank branch penetration, credit penetration, deposit penetration and insurance penetration. The study found that Kerala is highest financially included state with FII value 90.9. On the other side, Manipur was the lowest financially included state with FII value 32.0. Utilizing the same UNDP methodology Sethy (2016) and Goel and Sharma (2017) also proposed FII for Indian states.

Sethy and Goyari (2018) developed a FII for Indian states using again same UNDP methodology. The major finding of the study was

that there were no Indian states under high financial inclusion category whereas 6 states fall under medium financial inclusion and the rest 16 states were under low financial inclusion. Kaur and Abrol (2018) developed a FII for Jammu & Kashmir using Sarma (2008) and Kainth (2011) methodology. The major finding of the study shows that Jammu district had the highest financial inclusion with 0.805 and Kishtwar district had the lowest FII value with 0.116. Deepti and Vaidhyasubramaniam (2018) developed an FII for India using Sarma (2012) methodology. The major finding of the study was that India falls under medium financial inclusion category with an FII value of 0.55 in 2015–2016. Singh and Sarkar (2020) developed a district-wise FII index in Jharkhand state utilizing Sarma (2008) methodology. The major finding of the study was that Ranchi has been ranked first among the 24 districts with highest FII score of 0.5967 and Garhwa has been ranked lowest with FII score of 0.0555.

On the other side, there are a large number of studies conducted on the international market on the construction of FII on a country and as well as at the cross-country level. The most notable cross-country study was conducted by Honohan (2005). Similarly, Sarma (2012) again developed an FII using UNDP methodology utilizing cross-country data. The major finding of the study was that in 2004 out of 47 countries 13 countries had high FII value and 10 countries were under medium FII and 24 were under low FII. Yorulmaz (2013) constructed a regional FII for Turkey using UNDP methodology in line with Sarma (2008) using three indicators of financial inclusion. The major findings of the study were that Istanbul had the highest FII value and Mid-East Anatolia had the lowest FII value. Among the cities, Ankara and İzmir had the highest FII values and Muş had the lowest.

Piñeyro (2013) developed a multidimensional FII for municipalities in the states of Mexico using principal component analysis. The result shows that there were 884 municipalities in Mexico with high financial inclusion, 848 with medium financial inclusion and 724 with low financial inclusion. Camara and David (2014) developed a comprehensive FII using principal component analysis with three indicators, namely, usage, barriers and access for 82 developed and less developed countries, for the year 2011. The result shows that South Korea was ranked first among the 82 countries and the Democratic Republic of the Congo was ranked 82 in terms of FII. Nwidobie (2019) developed a FII for Nigeria using principal component analysis. The index was calculated using data for the period 2012–2017. Pham, Nguyen, and Nguyen (2019) in a cross-country study developed FII in 93 countries for the period 2000–2014. Similarly, Datta and Singh (2019) in the across-country study in 102 countries developed a financial inclusion. Ali and Khan (2020) developed a micro and macro level FII utilizing Sarma (2008) methodology for the years 1995–2017 for 20 Asian countries. Sha'ban, Girardone, and Sarkisyan (2020) constructed an FII index for 95 countries by employing three dimensions of financial inclusion.

The review of literature on financial inclusion shows that there is no study on the Indian market which proposes a comprehensive FII using demand and supply indicators of financial inclusion for a longer period. There is also a lack of a comprehensive study which examines the effectiveness of government schemes in particular PMJDY to

augment financial inclusion over the period. The current study fills this gap by proposing the demand and supply side FII for 27 Indian states for the period 2004–2017. The proposed demand and supply-side FII captures information on numerous dimensions of financial inclusion in a single number lying between 0 and 1, where 0 signifies complete financial exclusion and 1 shows complete financial inclusion.

3 | DATA AND METHODOLOGY FOR DESIGNING A COMPREHENSIVE INDICATOR

This section deals with data and methodology adopted for the construction of demand and supply-side FII for Indian states. In the first part of this section, information related to demand and supply-side financial inclusion indicators used in the study is reported. In the second part methodology adopted in the construction of current FII is explained.

3.1 | Data

To develop FII, the current study utilizes demand and supply-side indicators of financial inclusion and also develops separate demand (FII_D) and supply-side (FII_S) FII.

3.1.1 | Supply side indicators

(i) Banking penetration: The indicator measures the number of people has access to the bank account which includes both credit and deposit accounts. If all the people in the region are associated with a bank and have an account in the bank then the value of the indicator will become one.

- Number of accounts with commercial bank per 1,000 population is taken as a proxy for the indicator (d_1)

(ii) Availability of banking services: It is one of the important indicators of financial inclusion. In the current study, due to the unavailability of comparable data on the number of ATMs following dimensions are used:

- Number of commercial bank branches per 100,000 population (d_2)
- The number of commercial bank branches per 1,000 sq. km (d_3)
- Number of bank employees per customer (d_4)

(iii) Usage of the banking system: It is very important to examine how services provided by the bank is utilized by the customers. Hence, the following variable is used to represent the usage of the banking system:

- The volume of credit and deposit as the proportion of the state's Gross State Domestic Product (d_5).

3.1.2 | Demand-side indicators

(i) Access to saving: It is one of the widely used demand-side indicators in the literature of financial inclusion. Following indicator is used as a proxy for access to saving:

- The proportion of households having access to savings account (d_1)

(ii) Bank risk:

- Number of small borrower account per 1,000 population (d_2)

(iii) Access to credit:

- The proportion of household having access to credit (d_3)

The study utilizes secondary data sourced from EPW Research Foundation, Reserve Bank of India, Census of India for above-considered variables for the period 2004–2017 for 27 Indian states.

Table 1 reports the broad trend of selected financial inclusion variables, namely, deposit accounts, credit accounts, bank branches, small borrowing accounts and saving accounts for the period 1996–2018.

It can be seen from Table 1 that there is a substantial increase in the number of deposit accounts from 392,010 thousand in 1996 to 1,911,503 thousand in 2018. The credit accounts also increased from 56,672 thousand in 1996 to 196,977 thousand in 2018. There is also a significant increase in the number of bank branches from 64.456 thousand in 1996 to 141.909 thousand in 2018. A similar trend can be observed in case of small borrowing and saving accounts which increased from 51,905 and 272,226 thousand in 1996 to 148,550 and 1,596,225 thousand in 2018 respectively. With the expansion of financial services in India, there is also a significant increase in the population. Hence, it is very important to consider the expansion of population with financial services while construction of FII.

3.2 | Methodology

The current study constructs demand and supply-side FII similar to previously used in the construction of HDI by UNDP. For the construction of FII, the current study calculates dimension index for each dimension of financial inclusion. The dimension index can be calculated with the help of formula in Equation (1):

TABLE 1 Trends of financial inclusion indicator 1996–2018

Years	Deposit accounts (thousands)	Credit accounts (thousands)	Bank branches (thousands)	Small borrowing accounts (thousands)	Saving accounts (thousands)
1996	392,010	56,672	64.456	51,905	272,226
1997	396,579	55,618	65.111	50,093	271,371.2
1998	400,032	53,584	65.828	46,828	272,367.5
1999	405,908	52,305	66.677	50,997	273,210.5
2000	412,815	54,370	67.061	52,856	274,376.4
2001	428,029	52,364	67.525	50,456	280,025.7
2002	439,991	56,388	67.897	54,130	283,172.6
2003	446,080	59,491	68.078	56,527	289,210.9
2004	457,158	66,390	68.645	61,900	304,349.5
2005	466,792	77,151	69.969	71,106	319,998.7
2006	485,098	85,435	70.776	77,122	343,418.2
2007	519,199	94,442	73.199	84,347	373,511
2008	581,657	106,990	77.699	94,555	429,135
2009	662,303	110,056	81.802	95,801	492,136.4
2010	734,869	118,648	86.96	102,633	559,510.5
2011	810,130	120,724	92.117	102,155	623,997
2012	903,200	130,881	100.805	109,112	702,741
2013	1,045,104	128,286	109.279	102,305	822,768.9
2014	1,226,710	138,750	120.965	109,225	977,755
2015	1,439,892	144,239	130.482	111,125	1,170,319
2016	1,646,116	162,373	134.858	124,944	1,350,522
2017	1,826,651	172,383	140.216	130,267	1,502,068
2018	1,911,503	196,977	141.909	148,550	1,596,225

Note: Source: Authors' compilation.

$$d_i = w_i^* [(A_i - m_i) / (M_i - m_i)] \quad (1)$$

where, w_i^* is the weight attached to the dimension i , A_i is the actual value of dimension i , m_i is the minimum value of dimension i , M_i is the maximum value of dimension i , d_i is the dimensions of financial inclusion i .

The formula in Equation (1) shows the weight of all the dimensions which lie between 0 and 1. In the current case, equal weight is assigned to each dimension. Higher the value of d_i represents higher achievement in the respective dimension. The n dimensions of financial inclusion can be represented by a point $X = (1, 2, 3, \dots)$. The point $W = (1, 2, 3, \dots)$ indicates best situation while point $O = (0, 0, 0, \dots)$ represents worst situation. In the construction of FII, both best and the worst points are considered. Higher the distance between X and O , and smaller from W implies a higher level of financial inclusion and vice-versa.

To calculate FII, first X_1 and X_2 are computed. The X_1 is the distance between W and O , and X_2 is the inverse distance between X and W . Finally, FII is calculated by taking mean of X_1 and X_2 .

$$X_1 = \frac{\sqrt{d_1^2 + d_2^2 + d_3^2 + \dots + d_n^2}}{\sqrt{w_1^2 + w_2^2 + w_3^2 + \dots + w_n^2}} \quad (2)$$

$$X_2 = 1 - \frac{\sqrt{(w_1 - d_1)^2 + (w_2 - d_2)^2 + \dots + (w_n - d_n)^2}}{\sqrt{w_1^2 + w_2^2 + w_3^2 + \dots + w_n^2}} \quad (3)$$

$$FII = (X_1 + X_2) / 2 \quad (4)$$

Equation (2) and (3) measures X_1 and X_2 . The FII is calculated by the formula in Equation (4). The current index satisfies mathematical properties of monotonicity, boundless and homogeneity. It is also a unit free index. Further, the states can be categorized in the different levels of financial inclusion based on previous studies (Sarma, 2008; Sethy & Goyari, 2018). If the FII value lies in the range $0 \leq FII < 0.3$ then the state represents low financial inclusion. On the other side, if FII value lies in the range $0.3 \leq FII < 0.5$, shows medium financial inclusion. Finally, if the value lies in the range $0.5 < FII \leq 1$ then the state represent high financial inclusion.

4 | RESULT AND DISCUSSION

This section reports results related to the performance of states in terms of FII over the period and across the states. The results related to low, medium and high financial inclusion states are also reported in this section. The trend of convergence and divergence of states for the period 2004–2017 is also reported. Further, results related to the impact of financial inclusion augmented through PMJDY is also reported in this section.

Tables 2 and 3 represents the results of demand and supply-side FII for 27 Indian states for the period 2004–2017.

In 2004, from Table 2 Goa recorded the highest financial inclusion from supply-side indicators with FII value 0.726 and categorized under the highest financially included state. The other states followed by Goa were Kerala (0.481), Maharashtra the weight attached to the dimension (0.410), Punjab (0.395), Karnataka (0.348), Tamil Nadu (0.332), Mizoram (0.329), West Bengal (0.305) and Uttarakhand (0.302) which were also under medium financial inclusion category for the respective year. Remaining all the states (18) were under low financial inclusion category with the least ranks recorded by Rajasthan (0.135), Assam (0.129) and Chhattisgarh (0.117). On the other hand, from demand-side indicators (Table 3), Tamil Nadu recorded highest financial inclusion with FII value 0.681, followed by Goa (0.592) and Kerala (0.587) which were also under high financial inclusion category. Three states namely, Karnataka (0.493), Andhra Pradesh (0.398) and Punjab (0.381) were under medium financial inclusion. The rest of 21 states were under low financial inclusion category with the least ranks recorded by Chhattisgarh (0.071), Manipur (0.011) and Nagaland (0.006).

In 2010 (Table 2) Goa again recorded highest FII (0.759) using supply-side indicators and ranked first followed by Kerala (0.488), Maharashtra (0.455), Punjab (0.434), Karnataka (0.344). Out of 27 states, 10 states were under medium financial inclusion category. Haryana improved its rank from 12th position (low financial inclusion) in 2009 to ninth position (medium financial inclusion) in 2010. The rest of the other 16 states were under low financial inclusion category with the least ranks recorded by Assam (0.136), Chhattisgarh (0.115) and Manipur (0.065). Further, Mizoram rank deteriorated from 10th position (medium financial inclusion) in 2009 to 13th position (low financial inclusion) in 2010 whereas Chhattisgarh improved its rank from 27th position in 2009 to 26th position in 2010. On the other hand, using demand-side indicators of FII (Table 3) Tamil Nadu recorded the highest financial inclusion with FII value 0.739 in 2010 followed by Goa (0.568), Kerala (0.541) which were also categorized under high financial inclusion state. Tamil Nadu rank improved from third position in 2009 to first position in 2010 and Kerala rank also improved from fourth position (medium financial inclusion) in 2009 to third position (high financial inclusion) in 2010. Six states, namely, Maharashtra (0.469), Andhra Pradesh (0.465), Karnataka (0.409), Punjab (0.346), Haryana (0.336), Jammu & Kashmir (0.325) were under medium financial inclusion. Maharashtra rank deteriorated from first position in 2009 to fourth position (medium financial inclusion) in 2010. Similarly, Haryana, Jammu & Kashmir improved their rank from low financial inclusion category in 2009 to medium financial inclusion category in 2010. The rest of other (20) states were under low financial inclusion category with the least ranks recorded by Arunachal Pradesh (0.039), Manipur (0.021) and Nagaland (0.000). Manipur improved its rank from 27th position in 2009 to 26th position in 2010 whereas Chhattisgarh also improved its rank from 25th position in 2009 to 23rd position in 2010.

In 2014, from Table 2 Goa recorded the highest financial inclusion with FII value 0.820 using supply-side indicators and ranked first under high financial inclusion state category followed by eight other states namely, Maharashtra (0.499), Punjab (0.497), Kerala (0.472), Haryana (0.394), Sikkim (0.339), Karnataka (0.326), Tamil Nadu

TABLE 2 Supply side financial inclusion index of Indian states

State/years	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Haryana	0.239	0.244	0.270	0.292	0.299	0.293	0.315	0.324	0.339	0.336	0.394	0.449	0.433	0.448
Himanchal Pradesh	0.268	0.260	0.264	0.285	0.277	0.277	0.293	0.287	0.265	0.261	0.286	0.332	0.332	0.339
Jammu & Kashmir	0.233	0.227	0.223	0.241	0.249	0.229	0.217	0.211	0.197	0.209	0.296	0.357	0.382	0.394
Punjab	0.395	0.396	0.402	0.429	0.407	0.413	0.435	0.444	0.546	0.546	0.497	0.552	0.527	0.54
Rajasthan	0.135	0.139	0.139	0.159	0.160	0.143	0.164	0.155	0.132	0.112	0.177	0.194	0.167	0.177
Arunachal Pradesh	0.161	0.151	0.139	0.143	0.174	0.179	0.141	0.161	0.127	0.168	0.205	0.183	0.168	0.173
Assam	0.129	0.135	0.130	0.145	0.156	0.143	0.137	0.132	0.106	0.100	0.118	0.105	0.116	0.134
Manipur	0.199	0.173	0.207	0.164	0.195	0.148	0.065	0.062	0.052	0.046	0.074	0.021	0.058	0.054
Meghalaya	0.251	0.265	0.300	0.339	0.325	0.332	0.336	0.331	0.242	0.247	0.287	0.304	0.275	0.272
Mizoram	0.330	0.329	0.328	0.328	0.332	0.311	0.288	0.294	0.200	0.192	0.259	0.262	0.241	0.224
Nagaland	0.180	0.194	0.187	0.199	0.241	0.222	0.210	0.217	0.177	0.195	0.293	0.264	0.214	0.203
Chhattisgarh	0.117	0.111	0.125	0.132	0.127	0.129	0.115	0.102	0.092	0.096	0.122	0.103	0.130	0.136
Madhya Pradesh	0.169	0.173	0.188	0.198	0.193	0.191	0.184	0.182	0.146	0.126	0.137	0.139	0.144	0.147
Uttar Pradesh	0.198	0.190	0.180	0.176	0.171	0.170	0.173	0.170	0.177	0.171	0.179	0.188	0.204	0.220
Uttarakhand	0.302	0.285	0.286	0.295	0.313	0.306	0.301	0.293	0.260	0.249	0.303	0.342	0.324	0.335
Andhra Pradesh	0.210	0.207	0.204	0.193	0.193	0.210	0.221	0.222	0.223	0.222	0.242	0.244	0.271	0.282
Karnataka	0.348	0.335	0.334	0.335	0.345	0.343	0.344	0.349	0.301	0.293	0.327	0.350	0.380	0.371
Kerala	0.481	0.459	0.461	0.465	0.472	0.476	0.489	0.512	0.460	0.447	0.472	0.497	0.509	0.521
Tamil Nadu	0.332	0.317	0.314	0.313	0.331	0.336	0.324	0.321	0.311	0.301	0.320	0.330	0.353	0.372
Goa	0.726	0.705	0.720	0.732	0.740	0.734	0.759	0.768	0.721	0.743	0.821	0.829	0.807	0.810
Gujarat	0.232	0.240	0.232	0.248	0.257	0.247	0.268	0.270	0.224	0.214	0.265	0.282	0.273	0.295
Maharashtra	0.410	0.437	0.476	0.480	0.417	0.412	0.456	0.501	0.442	0.438	0.499	0.521	0.499	0.500
Bihar	0.202	0.193	0.192	0.186	0.176	0.162	0.175	0.161	0.144	0.136	0.153	0.157	0.166	0.180
Jharkhand	0.180	0.152	0.154	0.166	0.165	0.174	0.174	0.173	0.148	0.137	0.165	0.164	0.183	0.192
Odisha	0.166	0.169	0.166	0.174	0.183	0.170	0.177	0.240	0.186	0.180	0.177	0.180	0.204	0.204
Sikkim	0.293	0.294	0.248	0.303	0.380	0.325	0.312	0.335	0.253	0.240	0.339	0.362	0.326	0.311
West Bengal	0.305	0.321	0.326	0.349	0.358	0.324	0.330	0.333	0.397	0.373	0.290	0.294	0.291	0.308
All India	0.266	0.263	0.266	0.276	0.282	0.274	0.274	0.279	0.254	0.251	0.285	0.296	0.295	0.301

Note: Source: Authors' calculation.

TABLE 3 Demand side financial inclusion index of Indian states

State/years	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Haryana	0.270	0.260	0.259	0.242	0.246	0.259	0.279	0.305	0.266	0.241	0.260	0.281	0.327	0.331
Himanchal Pradesh	0.285	0.270	0.240	0.226	0.222	0.250	0.224	0.300	0.253	0.222	0.219	0.223	0.233	0.232
Jammu & Kashmir	0.210	0.196	0.198	0.198	0.226	0.195	0.208	0.184	0.202	0.237	0.230	0.275	0.308	0.324
Punjab	0.381	0.370	0.341	0.344	0.324	0.322	0.298	0.327	0.298	0.280	0.278	0.295	0.336	0.340
Rajasthan	0.170	0.171	0.148	0.144	0.151	0.149	0.142	0.147	0.141	0.122	0.125	0.142	0.197	0.196
Arunachal Pradesh	0.078	0.063	0.062	0.060	0.083	0.088	0.085	0.097	0.097	0.074	0.073	0.082	0.093	0.101
Assam	0.086	0.077	0.071	0.067	0.079	0.083	0.091	0.112	0.116	0.102	0.113	0.130	0.226	0.263
Manipur	0.011	0.009	0.005	0.000	0.000	0.000	0.010	0.000	0.000	0.000	0.017	0.041	0.054	0.077
Meghalaya	0.117	0.108	0.121	0.108	0.103	0.078	0.079	0.093	0.101	0.079	0.087	0.091	0.114	0.117
Mizoram	0.110	0.096	0.065	0.068	0.104	0.103	0.121	0.126	0.148	0.123	0.162	0.176	0.218	0.233
Nagaland	0.006	0.000	0.006	0.021	0.043	0.048	0.038	0.071	0.074	0.056	0.042	0.037	0.037	0.038
Chhattisgarh	0.071	0.059	0.045	0.040	0.045	0.049	0.048	0.052	0.056	0.039	0.055	0.091	0.135	0.156
Madhya Pradesh	0.128	0.135	0.111	0.080	0.094	0.101	0.113	0.095	0.109	0.094	0.122	0.144	0.191	0.199
Uttar Pradesh	0.215	0.213	0.174	0.169	0.175	0.187	0.195	0.201	0.200	0.188	0.192	0.206	0.238	0.243
Uttarakhand	0.282	0.276	0.268	0.251	0.251	0.252	0.261	0.267	0.245	0.226	0.222	0.239	0.284	0.283
Andhra Pradesh	0.399	0.449	0.404	0.423	0.420	0.405	0.454	0.531	0.480	0.467	0.482	0.483	0.466	0.453
Karnataka	0.494	0.552	0.499	0.504	0.446	0.446	0.460	0.496	0.416	0.354	0.363	0.393	0.412	0.401
Kerala	0.587	0.619	0.658	0.529	0.525	0.490	0.504	0.624	0.577	0.570	0.587	0.606	0.556	0.530
Tamil Nadu	0.681	0.678	0.685	0.688	0.594	0.502	0.715	0.691	0.712	0.713	0.736	0.739	0.743	0.739
Goa	0.592	0.616	0.629	0.595	0.606	0.551	0.615	0.654	0.615	0.590	0.582	0.591	0.590	0.546
Gujarat	0.179	0.171	0.169	0.163	0.168	0.159	0.160	0.166	0.163	0.143	0.156	0.169	0.192	0.199
Maharashtra	0.291	0.361	0.290	0.457	0.696	0.690	0.638	0.663	0.612	0.403	0.390	0.391	0.448	0.486
Bihar	0.090	0.083	0.055	0.051	0.051	0.069	0.061	0.081	0.082	0.063	0.069	0.081	0.142	0.163
Jharkhand	0.138	0.134	0.121	0.102	0.114	0.098	0.098	0.117	0.122	0.118	0.130	0.139	0.189	0.204
Odisha	0.223	0.217	0.191	0.181	0.181	0.161	0.167	0.234	0.198	0.176	0.161	0.170	0.195	0.203
Sikkim	0.146	0.152	0.154	0.146	0.142	0.112	0.146	0.151	0.156	0.158	0.164	0.168	0.244	0.252
West Bengal	0.167	0.149	0.123	0.101	0.097	0.090	0.083	0.096	0.107	0.089	0.094	0.109	0.198	0.221
All India	0.237	0.240	0.225	0.220	0.229	0.219	0.233	0.254	0.242	0.219	0.226	0.2404	0.272	0.278

Note: Source: Authors' calculation.

TABLE 4 Financial inclusion ranking of Indian states

State/years	2004			2010			2014			2017						
	Fils	Rank	Fild	Fils	Rank	Fild	Fils	Rank	Fild	Fils	Rank	Fild	Rank			
Haryana	0.239	13	0.270	10	0.315	9	0.279	8	0.394	5	0.260	8	0.448	5	0.331	8
Himanchal Pradesh	0.268	11	0.285	8	0.293	12	0.224	10	0.286	14	0.219	11	0.339	9	0.232	15
Jammu & Kashmir	0.233	14	0.210	13	0.217	16	0.208	11	0.296	10	0.230	9	0.394	6	0.324	9
Punjab	0.395	4	0.381	6	0.435	4	0.298	7	0.497	3	0.278	7	0.540	2	0.340	7
Rajasthan	0.135	25	0.170	15	0.164	23	0.142	16	0.177	20	0.125	18	0.177	22	0.196	21
Arunachal Pradesh	0.161	24	0.078	24	0.141	24	0.085	21	0.205	18	0.073	23	0.173	23	0.101	25
Assam	0.129	26	0.086	23	0.137	25	0.091	20	0.118	26	0.113	20	0.134	26	0.263	11
Manipur	0.199	18	0.011	26	0.065	27	0.010	27	0.074	27	0.017	27	0.054	27	0.077	26
Meghalaya	0.251	12	0.117	20	0.336	6	0.079	23	0.287	13	0.087	22	0.272	15	0.117	24
Mizoram	0.330	7	0.110	21	0.288	13	0.121	17	0.259	16	0.162	14	0.224	16	0.233	14
Nagaland	0.180	20	0.006	27	0.210	17	0.038	26	0.293	11	0.042	26	0.203	19	0.038	27
Chhattisgarh	0.117	27	0.071	25	0.115	26	0.048	25	0.122	25	0.055	25	0.136	25	0.156	23
Madhya Pradesh	0.169	22	0.128	19	0.184	18	0.113	18	0.137	24	0.122	19	0.147	24	0.199	19
Uttar Pradesh	0.198	19	0.215	12	0.173	22	0.195	12	0.179	19	0.192	12	0.220	17	0.243	13
Uttarakhand	0.302	9	0.282	9	0.301	11	0.261	9	0.303	9	0.222	10	0.335	10	0.283	10
Andhra Pradesh	0.210	16	0.399	5	0.221	15	0.454	6	0.242	17	0.482	4	0.282	14	0.453	5
Karnataka	0.348	5	0.494	4	0.344	5	0.460	5	0.327	7	0.363	6	0.371	8	0.401	6
Kerala	0.481	2	0.587	3	0.489	2	0.504	4	0.472	4	0.587	2	0.521	3	0.530	3
Tamil Nadu	0.332	6	0.681	1	0.324	8	0.715	1	0.320	8	0.736	1	0.372	7	0.739	1
Goa	0.726	1	0.592	2	0.759	1	0.615	3	0.821	1	0.582	3	0.810	1	0.546	2
Gujarat	0.232	15	0.179	14	0.268	14	0.160	14	0.265	15	0.156	16	0.295	13	0.199	20
Maharashtra	0.410	3	0.291	7	0.456	3	0.638	2	0.499	2	0.390	5	0.500	4	0.486	4
Bihar	0.202	17	0.090	22	0.175	20	0.061	24	0.153	23	0.069	24	0.180	21	0.163	22
Jharkhand	0.180	21	0.138	18	0.174	21	0.098	19	0.165	22	0.130	17	0.192	20	0.204	17
Odisha	0.166	23	0.223	11	0.177	19	0.167	13	0.177	21	0.161	15	0.204	18	0.203	18
Sikkim	0.293	10	0.146	17	0.312	10	0.146	15	0.339	6	0.164	13	0.311	11	0.252	12
West Bengal	0.305	8	0.167	16	0.330	7	0.083	22	0.290	12	0.094	21	0.308	12	0.221	16

Note: Source: Authors' calculation.

(0.320) and Uttarakhand (0.303) which were also under medium financial inclusion category. Punjab rank deteriorated from high financial inclusion state in 2013 to medium financial inclusion state in 2014. Karnataka and Uttarakhand improved their rank from low financial inclusion category in 2013 to medium financial inclusion category in 2014. The rest of the other 18 states were under low financial inclusion category with the least rank recorded by Chhattisgarh (0.122), Assam (0.118) and Manipur (0.074). Chhattisgarh improved its rank from 26th position in 2013 to 25th position in 2014. On the other hand, Table 3 reports demand-side financial inclusion results for 2014. Tamil Nadu consistently maintains the highest financial inclusion state with FII value 0.713 followed by Goa (0.614) and Kerala (0.576) and was also under high financial inclusion category. Three states namely, Andhra Pradesh (0.467), Maharashtra (0.403) and Karnataka (0.353) were under medium financial inclusion. Maharashtra rank deteriorated from high financial inclusion state in 2013 to medium financial inclusion state in 2014 and rest other 21 states were under low financial inclusion category with the least ranks recorded by Nagaland (0.055), Chhattisgarh (0.038) and Manipur (0.000).

In the year 2017, from Table 2, Goa again has recorded the highest financial inclusion (0.809) using supply-side indicators and followed by Punjab (0.539), Kerala (0.521) and Maharashtra (0.500) which were also under high financial inclusion category. Maharashtra improved its rank from medium financial inclusion state in 2016 to high financial inclusion category in 2017. The eight states namely, Haryana (0.447), Jammu & Kashmir (0.394), Tamil Nadu (0.372), Karnataka (0.371), Himachal Pradesh (0.338), Uttarakhand (0.334), Sikkim (0.311) and West Bengal (0.308) were under medium financial inclusion category. West Bengal improved its rank from low financial inclusion category in 2016 to medium financial inclusion category in 2017. The rest of all 15 states were under low financial inclusion category with the least rank recorded by three states, namely, Chhattisgarh (0.135), Assam (0.134) and Manipur (0.053). On the other hand, Table 3 reports FII results using demand-side indicators of financial inclusion of the year 2017. Tamil Nadu again recorded the highest financial inclusion state (0.742) followed by Goa (0.590) and Kerala (0.556). Six states namely, Andhra Pradesh (0.465), Maharashtra (0.447), Karnataka (0.412), Punjab (0.335), Haryana (0.327) and Jammu & Kashmir (0.308) were under medium financial inclusion. Punjab, Haryana, Jammu & Kashmir improved their rank from low financial inclusion category in 2016 to medium financial inclusion category in 2017. The rest of all 21 states were under low financial inclusion with the least ranks recorded by Arunachal Pradesh (0.093), Manipur (0.054) and Nagaland (0.037).

4.1 | High financial inclusion states

From the supply side, it is evident from Tables 2 and 4 that Goa remained as a highly financially included Indian state from 2004 to 2017. Punjab performance improved and ranked under high financial inclusion state from supply-side after 2011 onwards. From the supply-side, Kerala was highly financial included state in 2011 but rank

deteriorated later but again improved rank and fall under high financial inclusion state after 2015 onwards. Maharashtra rank improved 2014 onwards and clubbed into high financial inclusion state.

From the demand side (Tables 3 and 4) Goa, Kerala and Tamil Nadu remained highly financially included state from 2004 to 2017. Maharashtra improved its rank from medium to high financially included state 2008 onwards.

4.2 | Medium financial inclusion states

From the supply side (Tables 2 and 4) Haryana improved its rank from low financial inclusion to medium financial inclusion state (2010 onwards). Himachal and Jammu and Kashmir improved their rank and came into medium financial inclusion state 2015 onwards. Punjab was under medium financial inclusion state between the years 2004–2011 which later became high FII state. Meghalaya was medium FII state between the years 2006–2011 and for the year 2015 and was under low FII state for remaining years. Initially, Mizoram was under medium FII state between the years 2004–2009 which deteriorated to low FII state later. Uttarakhand was under medium FII state in the year 2004 and between the years 2008–2010, 2014–2017. Tamil Nadu was under medium FII state for the whole study period. Maharashtra was medium financial inclusion state in the year 2016 and between the years 2004–2010, 2012–2014. Sikkim was under medium FII state between the years 2007–2011, 2014–2017 whereas West Bengal was medium FII state in the year 2017 and between the years 2004–2013.

From the demand side (Tables 3 and 4), Haryana and Himachal Pradesh were recorded under medium FII state in the year 2011. Jammu and Kashmir became medium FII state from the year 2016 onwards. Punjab was medium FII state between the years 2004–2009 and 2016–17. Andhra Pradesh was medium FII state in the entire study period. Karnataka was also medium FII state in the entire study period except for the years 2005 and 2007. Kerala was under medium FII state in the year 2009 which improved to high FII state for the entire study period. Maharashtra was medium FII state in the years 2005, 2007 and 2013 onwards.

4.3 | Low financial inclusion states

From supply side indicators (Tables 2 and 4) the states with low FII were namely, Rajasthan, Arunachal Pradesh, Assam, Manipur, Nagaland, Chhattisgarh, Madhya Pradesh, Uttar Pradesh, Andhra Pradesh, Gujarat, Bihar, Jharkhand and Odisha. Haryana was under low FII state between the years 2004–2009. Himachal Pradesh and Jammu and Kashmir were under low FII state between the years 2004–2014. Meghalaya was low FII state between the years 2004–2005, 2012–2014 and 2016–2017 respectively. Mizoram position deteriorated from medium to low FII state from the year 2010 onwards. Uttarakhand was low FII state between the years 2005–2007 and 2011–2013. Karnataka was low FII state in 2013 whereas Sikkim was

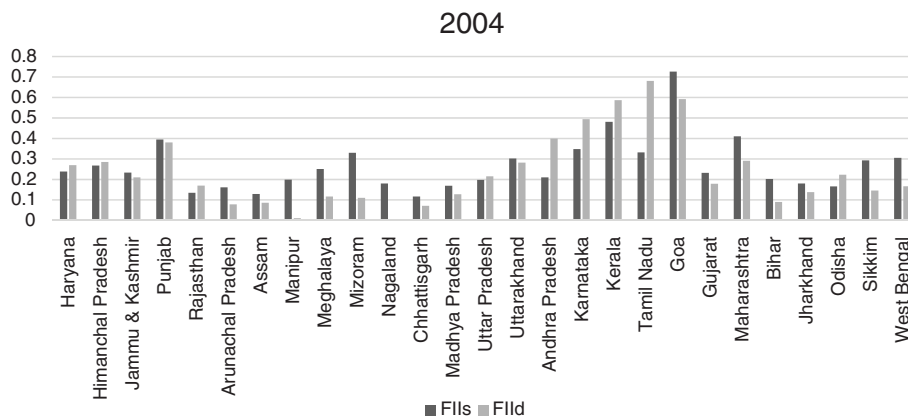


FIGURE 1 Supply and demand side financial inclusion index of Indian states 2004. Source: Authors' analysis

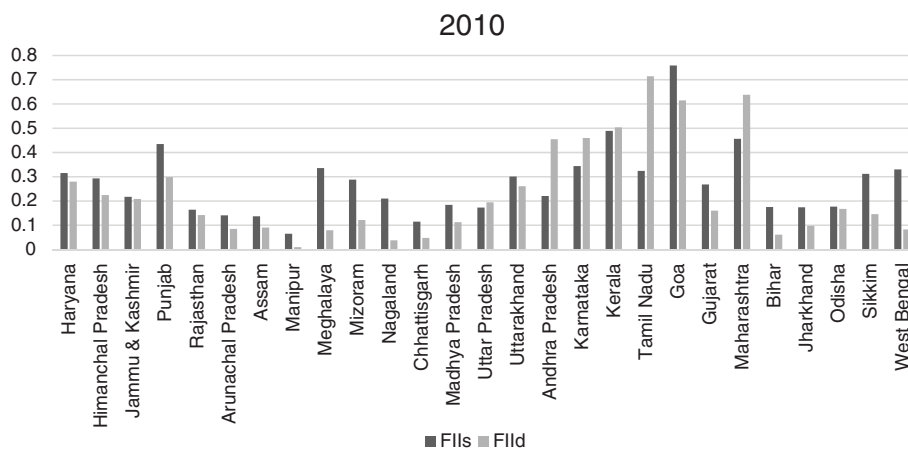


FIGURE 2 Supply and demand side financial inclusion index of Indian states 2010. Source: Authors' analysis

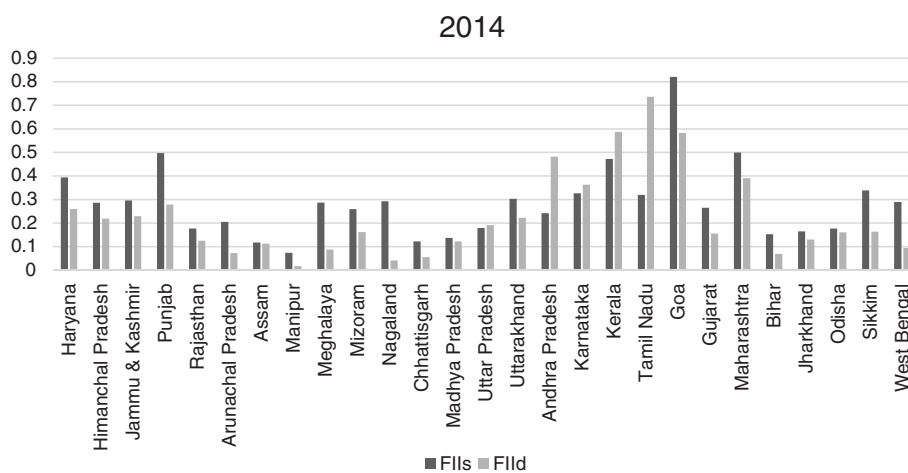


FIGURE 3 Supply and demand side financial inclusion index of Indian states 2014. Source: Authors' analysis

low FII state between the year 2004–2006 and in the year 2013. West Bengal was low FII state between the years 2014–2016.

From the demand side (Tables 3 and 4) the states with low FII were namely, Rajasthan, Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Chhattisgarh, Madhya Pradesh, Uttar Pradesh, Uttarakhand, Gujarat, Bihar, Jharkhand, Odisha, Sikkim and West Bengal. Haryana was under low FII state between the years 2004–2010 and 2012–2015. Himachal Pradesh was under low FII state in the entire study period except for the year 2011. Jammu and

Kashmir were under low FII state between the years 2004–2015. Punjab was under low FII state in the year 2010 and between the years 2012–2015. Maharashtra was under low FII state in the year 2004 and 2006.

The above-mentioned results are also consistent with the study of Charkravarty and Pal (2010). They also ranked Delhi first, followed by Goa and Maharashtra in the year 2007. The similar results are reported in the studies of Kuri and Laha (2011), Chattopadhyay (2011), Gupta et al. (2014), Poonam (2016), Sethy and Goyari (2018).

FIGURE 4 Supply and demand side financial inclusion index of Indian states 2017. Source: Authors' analysis

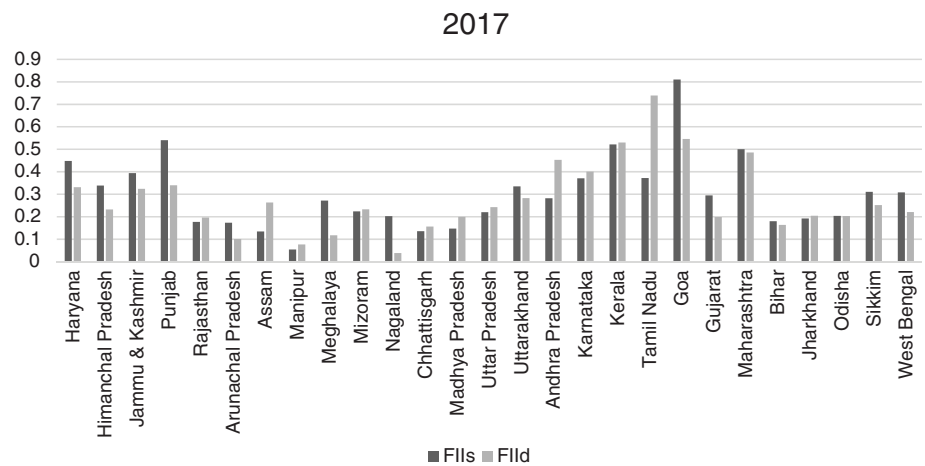


TABLE 5 Descriptive statistics of Indian states based on supply side

Years	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Min.	0.117	0.111	0.125	0.132	0.127	0.129	0.065	0.062	0.052	0.046	0.074	0.021	0.058	0.054
Max.	0.726	0.705	0.720	0.732	0.740	0.734	0.759	0.768	0.721	0.743	0.821	0.829	0.807	0.810
Mean	0.266	0.263	0.266	0.277	0.283	0.274	0.274	0.280	0.254	0.251	0.285	0.296	0.295	0.302
SD	0.130	0.128	0.132	0.134	0.131	0.132	0.143	0.149	0.151	0.153	0.155	0.169	0.161	0.161
CV	0.487	0.486	0.495	0.486	0.464	0.481	0.523	0.533	0.594	0.609	0.545	0.570	0.544	0.536
Total States	27	27	27	27	27	27	27	27	27	27	27	27	27	27
High FII states	1	1	1	1	1	1	1	3	2	2	1	3	3	4
Medium FII states	8	7	8	9	10	10	10	7	6	5	8	9	8	8
Low FII states	18	19	18	17	16	16	16	17	19	20	18	15	16	15

Note: Source: Authors' calculation.

TABLE 6 Descriptive statistics of Indian states based on demand side indicators

Years	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Min.	0.006	0.000	0.005	0.000	0.000	0.000	0.010	0.000	0.000	0.000	0.017	0.037	0.037	0.038
Max.	0.681	0.678	0.685	0.688	0.696	0.690	0.715	0.691	0.712	0.713	0.736	0.739	0.743	0.739
Mean	0.237	0.240	0.226	0.221	0.229	0.220	0.233	0.255	0.242	0.220	0.226	0.240	0.273	0.279
SD	0.180	0.193	0.195	0.191	0.194	0.181	0.200	0.212	0.195	0.184	0.185	0.183	0.169	0.160
CV	0.759	0.803	0.864	0.866	0.845	0.824	0.856	0.830	0.805	0.840	0.815	0.762	0.619	0.575
Total States	27	27	27	27	27	27	27	27	27	27	27	27	27	27
High FII states	3	4	3	4	4	3	4	5	4	3	3	3	3	3
Medium FII states	3	3	3	3	3	4	2	4	2	3	3	3	6	6
Low FII states	21	20	21	20	20	20	21	18	21	21	21	21	18	18

Note: Source: Authors' calculation.

From Tables 2–4 and Figures 1–4 from both demand and supply-side variables of financial inclusion, it is evident that most of the Indian states were under the low FII status. The status of financial inclusion in most of the North Indian states was found to be not satisfactory. In the whole study period, few states improved FII rank from low to medium but very there were very few which succeeded to reach high FII state category.

The study is not focusing on factors driving the demand and supply side FII values for individual Indian states whereas it also looks at some descriptive statistics values at the aggregate level. Tables 5 and 6 reports descriptive statistics of demand and supply-side FII values.

Table 5 reports descriptive statistics of computed supply-side FII values for 27 Indian states for the period 2004–2017. The descriptive

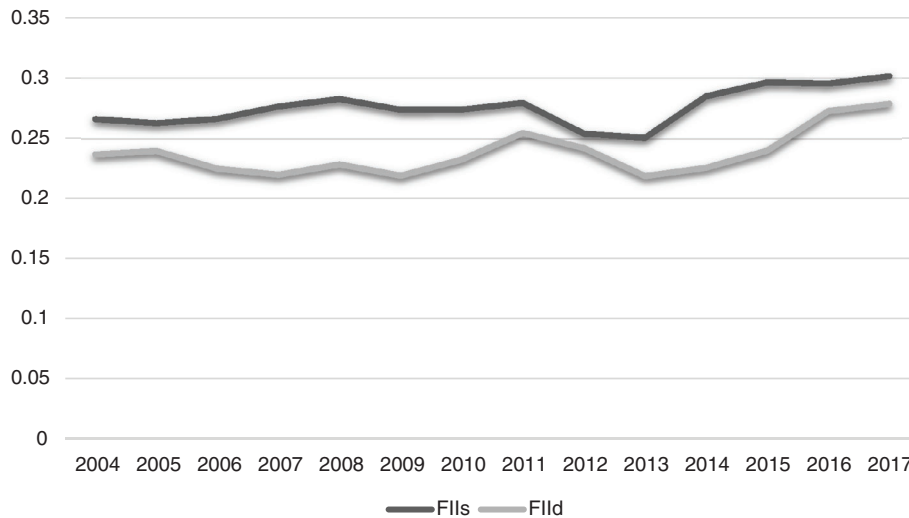


FIGURE 5 Supply and demand side financial inclusion index for India 2004–2017. Source: Authors' analysis

TABLE 7 FII and HDI ranks across the Indian States for 2017

State	FII s Rank	FII d Rank	HDI Rank
Goa	1	2	2
Punjab	2	7	4
Kerala	3	3	1
Maharashtra	4	4	9
Haryana	5	8	7
Jammu & Kashmir	6	9	11
Tamil Nadu	7	1	6
Karnataka	8	6	13
Himanchal Pradesh	9	15	3
Uttarakhand	10	10	12
Sikkim	11	12	5
West Bengal	12	16	19
Gujarat	13	20	15
Andhra Pradesh	14	5	18
Meghalaya	15	24	17
Mizoram	16	14	8
Uttar Pradesh	17	13	26
Odisha	18	18	23
Nagaland	19	27	14
Jharkhand	20	17	25
Bihar	21	22	27
Rajasthan	22	21	20
Arunachal Pradesh	23	25	16
Madhya Pradesh	24	19	24
Chhattisgarh	25	23	22
Assam	26	11	21
Manipur	27	26	10

Note: Source: Authors' calculation & Global Data Lab.

statistics indicate that over the years, there is a marginal improvement in the financial inclusion across the Indian states. The FII value ranges

between 0.117 and 0.726 in 2004 whereas the range was between 0.054 and 0.810 in 2017. Likewise, the mean FII increased from 0.266 in 2004 to 0.302 in 2017. The rising trend of the coefficient of variation (CV) over the years from 0.487 in 2004 to 0.536 in 2017 seems to indicate non-convergence in FII values. There is the only marginal improvement of FII value from 2004 to 2017. In 2004, 18 states were under low FII category which reduced to 15 in 2017.

Similarly, Table 6 reports descriptive statistics of computed demand-side FII values for 27 Indian states for the period 2004 to 2017. The descriptive statistics indicate that over the years, there is again the marginal improvement in the financial inclusion across the Indian states. The FII value ranges between 0.006 and 0.681 in 2004 whereas the range was between 0.038 and 0.739 in 2017. Likewise, the mean FII increased from 0.237 in 2004 to 0.279 in 2017. The declining trend of the coefficient of variation (CV) over the years from 0.759 in 2004 to 0.575 in 2017 seems to indicate convergence in FII values. There is again the marginal improvement in FII from 2004 to 2017. In 2004, 21 states were under low FII category which reduced to 18 in 2017.

The Government of India (GoI) launched the PMJDY scheme in 2014 to augment financial inclusion in the country. It is clear from empirical findings (Tables 4–6) that there were only a few states which improved their rank from low financial inclusion to medium. Overall there is no significant change in financial inclusion across the states from both demand and supply-side indicators of financial inclusion. Figure 5 show after 2014 there is an only marginal change in FII for all India from both demand and supply-side indicators.

Further, supply-side (FII s) and demand-side (FII d) financial inclusion rank and its association with human development index are reported in Table 7. Past empirical literature shows financial inclusion and human development are conversely related to each other (Beck et al., 2007). The results show high financially included states are also better in terms of HDI with few exceptions. The results are consistent with the past empirical studies (Datta & Singh, 2019; Kodan & Chhikara, 2013; Kuri & Laha, 2011; Unnikrishnan & Jagannathan, 2015). The inconsistency in FII and HDI ranks is majorly found in case of north-eastern Indian states.

TABLE 8 Financial inclusion indicators of India

Indicator name	2011	2014	2017
Account (% age 15+)	35.232	53.142	79.875
Borrowed any money in the past year (% age 15+)		47.788	42.391
Borrowed for health or medical purposes (% age 15+)		21.114	13.820
Borrowed from a financial institution (% age 15+)	7.697	6.369	6.617
Coming up with emergency funds: not possible (% age 15+)		49.370	51.856
Credit card ownership (% age 15+)	1.767	4.175	3.004
Debit card ownership (% age 15+)	8.400	22.068	32.722
Financial institution account (% age 15+)	35.232	52.754	79.840
Made or received digital payments in the past year (% age 15+)		19.311	28.693
Main source of emergency funds: family or friends (% able to raise funds, age 15+)		36.481	47.886
Mobile money account (% age 15+)		2.352	1.995
No deposit and no withdrawal from a financial institution account in the past year (% age 15+)		22.037	38.716
Outstanding housing loan (% age 15+)		3.652	4.645
Paid utility bills in the past year (% age 15+)		39.400	41.824
Received digital payments in the past year (% age 15+)		11.612	16.459
Received domestic remittances in the past year (% age 15+)		9.787	15.756
Received government transfers in the past year (% age 15+)		9.822	8.205
Saved any money in the past year (% age 15+)		38.276	33.557
Sent domestic remittances in the past year (% age 15+)		9.944	11.257
Used a debit or credit card to make a purchase in the past year (% age 15+)		11.107	12.335
Withdrawal in the past year (% with a financial institution account, age 15+)		41.702	42.951

Note: Source: The World Bank.

Moreover, it can be concluded that the PMJDY scheme was unable to push the economy into a high financial inclusion status. The inability of PMJDY scheme to promote states from low to high financial inclusion state can be understood with fact that there is a significant rise in the percentage of the bank account with no deposit and no withdrawal from 22.037% in 2014 to 38.716 in 2017 respectively (Table 8).

5 | CONCLUSION

This study proposed a multidimensional FII similar to UNDP indicator HDI. The proposed FII can be used to assess the status of financial inclusion across Indian states to monitor the progress of different states over the period. The FII value is calculated for 27 Indian states for the years 2004 to 2017 indicate that states across India are at various levels of financial inclusion. The proposed FII used two new dimensions of financial inclusion, namely, number of bank employee per customer and number of small borrowing account per 1,000 population which were not used in the previous studies.

The FII value tends to indicate marginal improvement in the level of financial across states during 2004–2017. From the supply side, the mean FII value is increased from 0.266 in 2004 to 0.302 in 2017, whereas from the demand side, the mean FII value increased from 0.237 in 2004 to 0.279 in 2017 respectively. Most of the northern and north-eastern states were found to be under low financial inclusion. On the other side, most of the high financially included states were also better in terms of HDI and literacy. The inability of PMJDY scheme to promote states from low to high financial inclusion state can be understood with fact that there is a significant rise in the percentage of the bank account with no deposit and no withdrawal from 22.037% in 2014 to 38.716% in 2017 respectively. Hence, structural reforms are warranted in the policy framework. Policymakers should focus on human development and financial literacy in low financially included Indian states in the mainland. On the other side, governance and physical infrastructure are vital in the promotion of financial inclusion in north-eastern Indian states.

The non-availability of the data on various demand and supply-side dimensions of financial inclusion is the major limitation of the study which can be further extended after the availability of data in the future. The impact assessment of financial inclusion on poverty

reduction and economic performance can be also analyzed for policy perspective.

ORCID

Bhanu Pratap Singh  <https://orcid.org/0000-0002-1757-9763>

REFERENCES

- Aggarwal, R. (2014). Financial inclusion in India: Challenges and opportunities. *International Journal of Research*, 1(4), 557–567.
- Ali, J., & Khan, M. A. (2020). Micro and Macro financial inclusion and their impacts on economic growth: Evidence from Asian economies with alternative approaches. *International Transaction Journal of Engineering, Management, & Applied Sciences & Technologies*, 11(5), 1–15.
- Ambarkhane, D., Singh, A. S., & Vekataramani, B. (2016). Measuring financial inclusion of Indian states. *International Journal of Rural Management*, 12(1), 72–100.
- Bagli, S., & Papita, D. (2012). A Study of Financial Inclusion in India. *Radix International Journal of Economics and Business Management*, 1(8), 1–18.
- Beck, T., Demirguc-Kunt, A., & Martinez Peria, M. S. (2007). Reaching out: Access to and use of banking services across countries. *Journal of Financial Economics*, 85(1), 234–266.
- Camara, N., & David, T. (2014). *Measuring Financial Inclusion: A Multi-dimensional Index*. (BBVA Working Paper 14/26).
- Charkravarty, S. R., & Pal, R. (2010). *Measuring financial inclusion: An Axiomatic Approach*. (IGIDR Working Paper). Mumbai.
- Chattopadhyay, S. K. (2011). *Financial Inclusion in India: A case Study of West Bengal*. (RBI Working Paper). Mumbai.
- Crisil. (2018). Financial inclusion surges driven by Jan-Dhan Yojana. *Crisil Inclusix*, 4, 1–86.
- Datta, S. K., & Singh, K. (2019). Variation and determinants of financial inclusion and association with human development: A cross country analysis. *IIMB Management Review*, 31, 336–349. <https://doi.org/10.1016/j.iimb.2019.07.013>
- Deepti, N. S., & Vaidhyasubramaniam, S. (2018). Measure of Index on Financial Inclusion in India. *International Journal of Pure and Applied Mathematics*, 119(10), 1447–1454.
- Goel, S., & Sharma, R. (2017). Developing a financial inclusion index for India. *Procedia Computer Science*, 122, 949–956.
- Gupta, A., Chotia, V., & Rao, N. V. M. (2014). Financial inclusion and human development: A State-wise analysis from India. *International Journal of Economics, Commerce and Management*, 2(5), 1–23.
- Gupte, R., Venkataramani, B., & Gupta, D. (2012). Computation of financial inclusion index for India. *Procedia: Social and Behavioral Sciences*, 37, 133–149.
- Honohan, P. (2005). *Measuring micro finance access: building cross country data*. (World Bank Policy Paper No. 3606). Washington, DC.
- Kainth, S. G. (2011). Developing an index of financial inclusion. *Anvesha*, 6(2), 1–10.
- Kaur, P., & Abrol, V. (2018). Measuring financial inclusion in Jammu & Kashmir state: An empirical study. *IOSR Journal of Business and Management*, 20(1), 37–44.
- Kodan, A. S., & Chhikara, K. S. (2013). A theoretical and quantitative analysis of financial inclusion and economic growth. *Management and Labour Studies*, 38(1–2), 103–133.
- Kuri, P. K., & Laha, A. (2011). Financial inclusion and human development in india: An inter-state analysis. *Indian Journal of Human Development*, 5(1), 61–78.
- Laha, A., & Kuri, P. K. (2014). Demand for and supply of financial inclusion in India; an inter-state analysis. *ELK Asia Pacific Journal of Finance and Risk Management*, 5(1), 1–18.
- Lucas, R. E. (1988). On the mechanics of economic development. *Journal of Monetary Economics*, 22(1), 3–42.
- Nwidobie, B. M. (2019). Financial inclusion index in Nigeria: An exploratory analysis. *International Journal of Publication and Social Studies*, 4(1), 26–36.
- Pham, T. T. T., Nguyen, T. V. H., & Nguyen, K. (2019). Does bank competition promote financial inclusion? A cross-country evidence. *Applied Economics Letter*, 26(13), 1133–1137.
- Piñeyro, C. M. Z. (2013). Financial inclusion index: Proposal of multi-dimensional measure for Mexico. *The Mexican Journal of Economics and Finance*, 8(2), 157–180.
- Poonam, A. C. (2016). Financial inclusion in India: A state level study. *SSRG International Journal of Economics and Management Studies*, 3(2), 1–4.
- Rangarajan, C. (2008). Report of the Committee on Financial Inclusion. Ministry of Finance, Government of India.
- Reddy, Y.V. (2017). Financial policy for the poor: Financial inclusion and micro-debt. 11th UNCTAD Debt Management Conference, Geneva. https://unctad.org/meetings/en/Presentation/2017_p3_reddy.pdf
- Robinson, J. (1952). *The rate of interest and other essays*. London: MacMillan.
- Sarma, M. (2008). *Index of financial inclusion*. (ICRIER, Working Paper No. 215). New Delhi.
- Sarma, M. (2012). *Index of financial inclusion—a measure of financial sector inclusiveness*. (Competence Center, Working Paper No. 07). Berlin.
- Schumpeter, J. A. (1911). *The theory of economic development*. Cambridge: Harvard University Press.
- Sethy, S. K. (2016). Developing a financial inclusion index and inclusive growth in India. *Theoretical and Applied Economic*, 23(02), 187–206.
- Sethy, S. K., & Goyari, P. (2018). Measuring financial inclusion of Indian States: An empirical study. *Indian Journal of Economics and Development*, 14(1), 447–454.
- Sha'ban, M., Girardone, C., & Sarkisyan, A. (2020). Cross-country variation in financial inclusion: A global perspective. *The European Journal of Finance*, 26(4–5), 319–340.
- Singh, B. P., & Mishra, A. K. (2014). Nexus of financial development and economic growth in India: revisiting Schumpeter. *Indian Journal of Economics and Development*, 10(3), 246–255.
- Singh, B. P., & Mishra, A. K. (2015). Researching the relationship between Financial and Real sectors in India. *Indian Journal of Economics and Development*, 11(4), 861–868.
- Singh, S., & Sarkar, A. K. (2020). Index of Financial Inclusion (IFI) and banking penetration in Jharkhand. *Purakala*, 31(12), 749–757.
- Unnikrishnan, R., & Jagannathan, L. (2015). Unearthing global financial inclusion levels and analysis of financial inclusion as a mediating factor in global human development. *Serbian Journal of Management*, 10(1), 19–32.
- Yorulmaz, R., (2013). Construction a regional financial inclusion index in Turkey. Retrieved from https://www.bddk.org.tr/ContentBddk/BddkDergiEng/dergi_00013_06.pdf

AUTHOR BIOGRAPHIES

Vishal Yadav is a Research Scholar in the Department of Economics, School of Management, Pondicherry University. He has obtained Master's in Economics from University of Hyderabad. His research interests include; financial inclusion, development economics and agricultural economics.

Bhanu Pratap Singh is an Assistant Professor of Economics at the Economics Section, Mahila Mahavidyalaya, Banaras Hindu University. He has obtained Ph.D. and Master's in Economics from University of Hyderabad, and Bachelor's in Economics from Banaras Hindu University. Prior to Banaras Hindu University he has taught

at Mahatma Gandhi Central University, Bihar. His research interests include; Bankruptcy Prediction, Development Economics, Financial Development, Governance, Institutional Economics, Public Policy and Applied Econometrics. He has published in various refereed journals such as Financial Innovation, Global Business Review, Theoretical and Applied Economics, Indian Journal of Economics and Development etc.

Nirmala Velan is a Professor of Economics at the Department of Economics, School of Management, Pondicherry University. She

has obtained Ph.D. in Economics from Madurai Kamaraj University. Her research interests include; Gender Studies, Labour Market, Microfinance and Agricultural Economics.

How to cite this article: Yadav V, Singh BP, Velan N. Multidimensional financial inclusion index for Indian states. *J Public Affairs*. 2020;e2238. <https://doi.org/10.1002/pa.2238>