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COMPUTING A COMPOSITE FINANCIAL INCLUSION INDEX FOR THE INDIAN STATES: A PRINCIPAL COMPONENT ANALYSIS

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Abstract:

The current study examines the financial inclusion of Indian states by developing a financial inclusion index (FII). The study develops a composite FII using demand and supply-side indicators of financial inclusion. To measure the level of financial inclusion, principal component analysis (PCA) is used as a tool to develop FII by assigning appropriate weights. The study builds an FII for a more extended period from 2006 to 2019. The study finds that most Eastern and North-Eastern states correspond to low financial inclusion ranks from both supply and demand-side. Further, Western and Southern states perform better in terms of financial inclusion from both supply and demand-side. Also, FII demonstrated a positive relationship with HDI. The examination recommends that financial inclusion related thoroughness needs a sensible technique that joins an essential update of the financial system strengthens and develops financial associations, and simultaneously taking care of digitalized training. Our current FII is easy to calculate and can compare economies in terms of financial inclusion over time. Notably, this approach helps overcome criticism about subjective weight determination.

1. Introduction:

Financial inclusion is becoming a hot topic among financial institutions, politicians, central banks, and the government. In a developing nation, mobilizing domestic savings to meet the demands for investment is necessary. It is essential to have a well-developed financial institution that can pool residents' savings in order to leverage domestic savings successfully. Financial inclusion provides affordable access to financial goods and services for a broader portion of the population. 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), financial inclusion's major objective is to transform the lives of vulnerable and poor people by providing them access to financial services.

In India, several barriers prevent poor and deprived people from receiving financial services, including a lack of financial literacy and a low level of human growth. Sixty-seven percent of Indians lack access to financial institutions, denying them access to structured credit and forcing them to rely on informal moneylenders, exacerbating their problems (Yadav, Singh and Velan, 2020). In 2014 Government of India launched Pradhan Mantri Jan Dhan Yojna (PMJDY) for the financial inclusion of Indians. PMJDY aims to provide access to various financial products especially banking services, at very affordable rates.

The current study contributes to the existing literature by developing a new composite FII, which measures the level of financial inclusion covering 27 Indian states from 2006 to 2019. The study developed a supply and demand-side FII utilizing the principal component analysis (PCA) method. Each dimension of financial inclusion was assigned appropriate weights, thus helps overcome criticism from researchers about subjective weight determination from previous studies. Most of the north-eastern states followed by central locale states are performing low in terms of financial inclusion. Further, the western and southern states are performing better in terms of financial inclusion. This way, many changes are admissible in the institutional setting to provide every citizen easy access to financial institutions at a reasonable cost.

The rest of the study is arranged as follows: Section 2 discusses the literature survey, Section 3 covers data and methodology, Result and analysis are covered in Section 4, and with Section 5 study concludes.

2. Literature Review:

Many studies had been conducted so far regarding index creation with significant contrasts in techniques and time of study at both the Indian and Global level.

Sarma (2008) involved the UNDP technique in index creation at the global level. Further, using data from 21 countries, Chakravarty and Pal (2010) employed Sarma (2008) technique in index creation. Similarly, at the India level, Chattopadhyay (2011) involved the Sarma (2008) technique in index creation with three banking dimensions: penetration, availability, and usage. Maharashtra got the highest rank, and Manipur bagged the last. Kainth (2011) employed the UNDP technique in index creation for India's Punjab state. Three banking dimensions were accounted for in index creation in which Jalandhar district got the highest rank while Mansa district got the least rank. Further, Kuri and Laha (2011) involved Sarma (2008) technique in index creation at the India level. Chandigarh got the highest rank, and Manipur bagged the last.

On the other hand, Bagli and Dutta (2012) employed the PCA technique with ten banking indicators in index creation at the pan India level. Goa got the highest rank, and Manipur bagged the last. Further, Gupte et al. (2012) involved the UNDP technique in FII creation withfour dimensions at the India level. The result portrayed an increase in the inclusion rate in India. Similarly, at the global level involving the UNDP technique Sarma (2012) and Yorulmaz (2013) developed an index.

Pineyro (2013) employed the PCA technique in FII creation for 2456 municipalities in Mexico. The result portrayed 884, 848, and 724 municipalities under the high, medium, and low inclusion category. Further, using data of 82 countries, Camara and David (2014),

involved the PCA technique in FII creation. South Korea bagged the top position in terms of FII. Laha and Kuri (2014) involved Sarma (2008) technique in index creation for Indian states with supply and demand indicators. Similarly, Gupta et al. (2014) employed Sarma (2012) technique in IFI creation for Indian states. Goa secured the top position in terms of IFI.

Poonam and Chaudhry (2016) and Sethy (2016) employed the UNDP technique in index creation with various financial inclusion dimensions at the India level. Further, Ambarkhane et al. (2016) involved the Sarma (2008) technique in index creation at the India level with three dimensions: supply, demand, and infrastructure. Kerala got the highest rank, and Chhattisgarh bagged the last. Similarly, Goel and Sharma (2017) and Sethy and Goyari (2018) employed the UNDP technique in FII creation at the national level. On the other hand, using national-level data, Kaur and Abrol (2018) involved Sarma (2008) technique, and Deepti and Vaidhyasubramaniam (2018) involved Sarma (2012) technique in index creation. Further, Pham et al. (2019) employed Sarma (2008) technique in index creation at the global level.

On the other hand, Datta and Singh (2019) and Nwidobie (2019) involved the PCA technique in FII creation using global level data. Further, with national-level data, Yadav, Singh, and Velan (2020) and Yadav et al. (2020) employed UNDP methodology in FII creation. Similarly, Shaban et al. (2020) involved the UNDP technique in FII creation globally. Spain bagged the top position in terms of FII. Singh and Sarkar (2020) employed Sarma (2008) technique in index creation for India's Jharkhand state. Ranchi district got the highest rank, and Garhwa district bagged the last. Further, at the global level, Ali and Khan (2020) employed Sarma (2008) technique in index creation. Tram et al. (2021) constructed a composite FII using global level data. While constructing the index, the mobile money indicator was added to the basic three dimensions of financial inclusion: penetration, availability, and usage. The study involved a two-stage PCA method for index development.

There is a lack of study involving index creation using principal component analysis (PCA) at the national level. Several studies at the national level developed an index using UNDP's methodology, with certain pre-decided weights. Given the above, our study moved one step forward to fill the gap by assigning appropriate weights using principal component analysis (PCA) and developing a separate index using supply and demand indicators for a much-extended period.

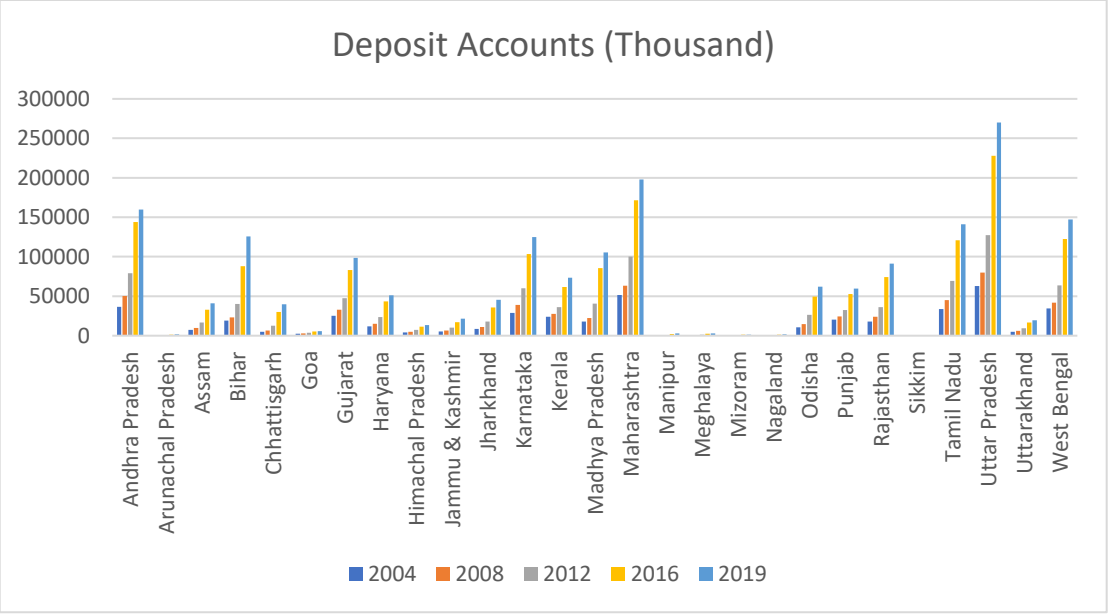
3. Data and Methodology:

3.1. Data:

Following Yadav, Singh and Velan (2020), the study employed five supply and three demand-side indicators for measuring financial inclusion across 27 Indian states for the period 2006 to 2017. Respectively, two indexes representing demand and supply were developed for 27 Indian states. The supply-side financial inclusion variables used in the studyare the number of bank accounts with commercial banks per 1000 population (X_1) measuring penetration, number of commercial bank branches per 100000 population (X_2), number of commercial bank branches per 1,000 sq. km (X_3), number of bank employees per customer (X_4) measuring availability, and the volume of credit and deposit as the proportion of the state's Gross State Domestic Product (X_5) measuring usage of the banking system, respectively. On the other hand, the demand side financial inclusion variables used in the study are the proportion of households having access to a savings account (X_6), the number of small borrower account per 1000 population (X_7) and the proportion of household having access to credit (X_8) which are measures of access to saving, bank risk and access to credit.

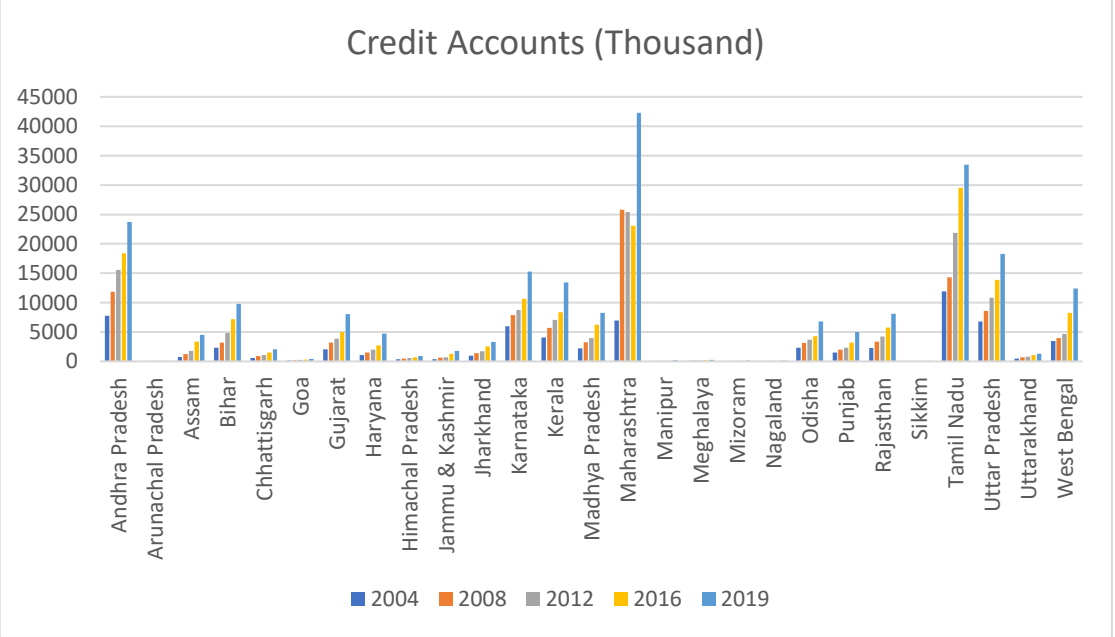
The respective dimensions data used in the analysis were gathered from EPWRF, Census of India, and RBI.

Figure 1: Status of Deposit Accounts of Indian States



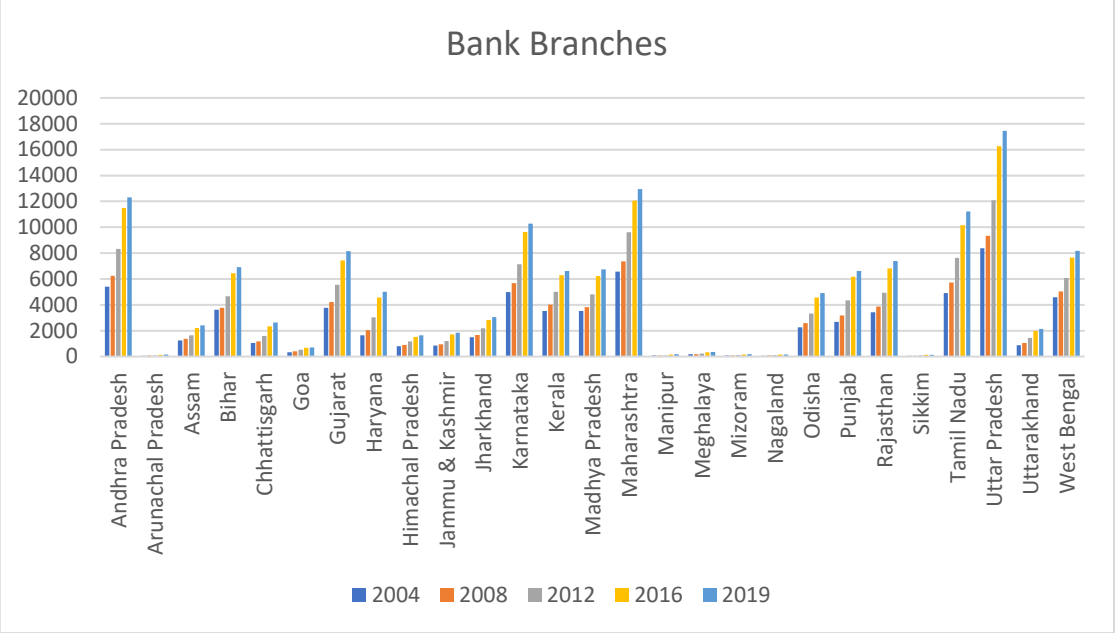
Source: Author's Analysis

Figure 2: Status of Credit Accounts of Indian States



Source: Author's Analysis

Figure 3: Status of Bank Branches of Indian States



Source: Author's Analysis

Figure 1 to Figure 3 shows the trend of financial inclusion indicators, namely, deposit accounts, credit accounts, and bank branches across 27 Indian states. In any case, regarding divisions, the North-Eastern states slack comparative with different states. With the last Census evaluation aggregated in 2011, the record ought to be taken off the ensuing population growthand the development of monetary administrations during FII construction.

3.2. Methodology:

The current composite index was developed in line with Sharma (2008) methodology. The separate FII using supply and demand indicators as mentioned above (Section 3.1) were developed using Equations 1 and 2, respectively.

$$\boldsymbol{FII_{Sj} = W_1 * x_{1j} + W_2 * x_{2j} + W_3 * x_{3j} + W_4 * x_{4j} + W_5 * x_{5j}} \quad \textbf{(1)}$$

$$\boldsymbol{FII_{Dj} = W_6 * x_{6j} + W_7 * x_{7j} + W_8 * x_{8j}} \quad \textbf{(2)}$$

FII_{Sj} refers to the financial inclusion index using supply-side indicators for the jth Indian state, and FII_{Dj} refers to the financial inclusion index using demand-side indicators for the jth Indian state. Further, x_{1j} to x_{8j} represents the standardized value of ith dimension for the jth Indian state, W_1 to W_8 represents the weights attached to each dimension. Instead of pre- decided weights allocation to each dimension, the principal component analysis methodology was embraced to allot weights objectively, as shown in Table 1 (Appendix). The assigned weights maximize the 'sum of squares of correlation' of the dimensions with the current index.The standardized value is obtained using Equation 3, where Xij represents the ith dimension's original value for the jth Indian state. Xm and σ are the mean and standard deviation formed by values of all 27 Indian states' ith dimension.

$$\boldsymbol{x_{ij} = (X_{ij} - X_m)/\sigma} \quad \textbf{(3)}$$

i = 1, 2…., 8 (Dimension No.)

j= 1, 2 ....., 27 (States No.)

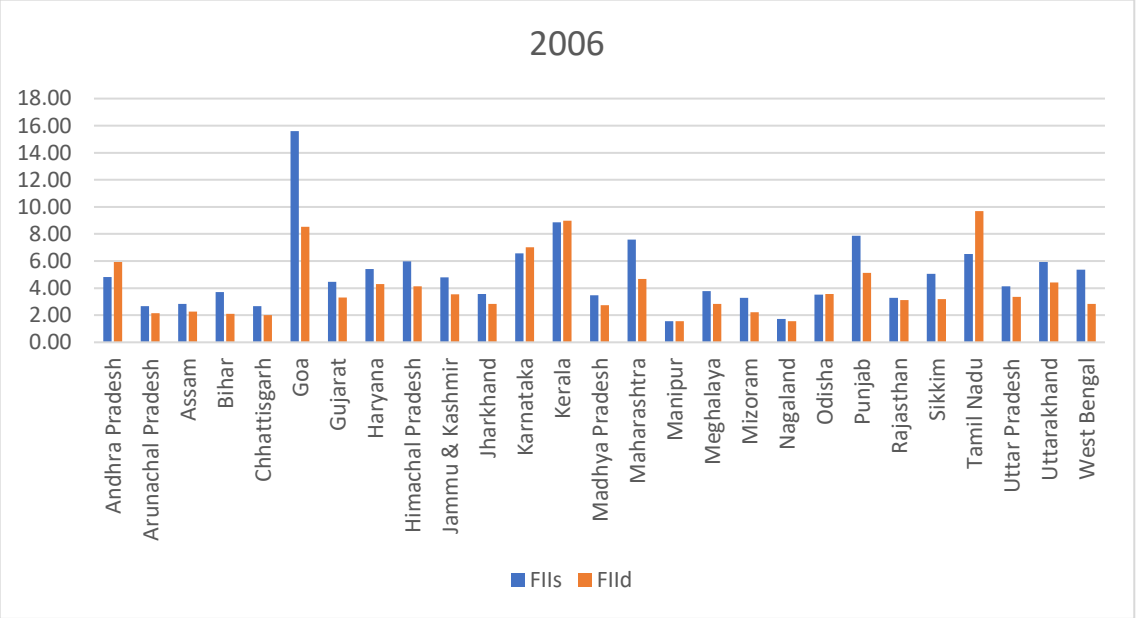
The final index values were additionally standardized to address them on a scale of 0-18.

4. Result and Analysis:

Table 2 and Table 3 (Appendix) represent the proposed multi-dimensional supply and demand-side FII results from 2006 to 2019, covering 27 Indian states. Table 4 (Appendix), subsequently, ranks the Indian states based on the FII results obtained.

In 2006, from Table 2 and Table 4, based on the supply side, Goa bagged the highest rank with an FII value of 15.59. Kerala and Punjab, with FII values 8.86 and 7.87, respectively, bagged second and third positions. The least ranks were bagged by Chhattisgarh (25th), Nagaland (26th), and Manipur (27th), with FII values 2.26, 1.72, and 1.56, respectively. Based on demand-side, from Table 3 and Table 4, Tamil Nadu bagged the highest rank with an FII value of 9.68. Kerala and Goa, with FII values 8.98, and 8.53, respectively, bagged second and third positions. The least ranks were bagged by Chhattisgarh (25th), Manipur (26th), and Nagaland (27th), with FII values 2.00, 1.57, and 1.56, respectively. Figure 4 represents the respective index values of the 27 Indian states.

Figure 4: Supply and Demand-Side FII of Indian states for 2006.

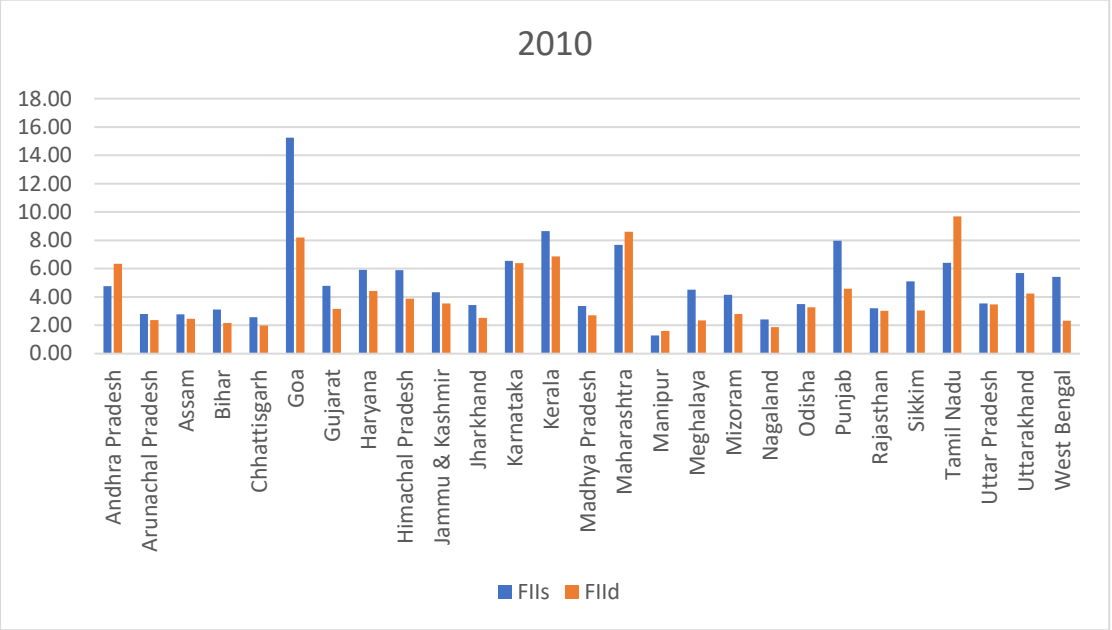


Source: Author's Analysis

In 2010, from Table 2 and Table 4, based on the supply side Goa bagged the highest rank with FII value 15.24, Kerala and Punjab, with FII values 8.64, and 7.97, respectively, bagged second and third positions. Haryana improved its rank from the ninth position in 2006 to the seventh position in 2010. Similarly, Gujarat and Meghalaya moved from 14th and 16th positions in 2006 to 12th and 14th positions in 2010. The least ranks were bagged by Chhattisgarh (25th), Nagaland (26th), and Manipur (27th), with FII values 2.56, 2.41, and 1.28, respectively. Based on demand-side, from Table 3 and Table 4, Tamil Nadu bagged the highest rank with an FII value of 9.68. Maharashtra, and Goa with FII values 8.61, and 8.21, respectively, bagged second and third positions. Kerala moved from the second position in 2006 to the fourth position in 2010. Haryana improved its rank from the ninth position in 2006 to the eighth position in 2010. The least ranks were bagged by Chhattisgarh (25th), Nagaland (26th), and Manipur (27th), with FII values

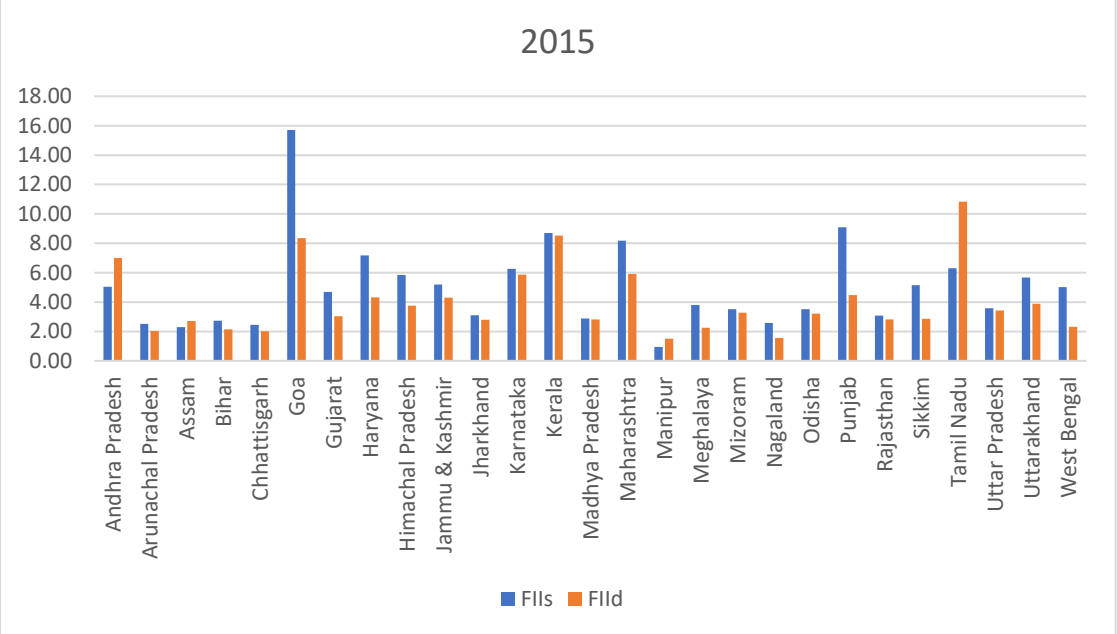
2.00, 1.88, and 1.60, respectively. Nagaland moved from the 27th position in 2006 to the 26th position in 2010. Figure 5 represents the respective index values of the 27 Indian states.

Figure 5: Supply and Demand-Side FII of Indian states for 2010.



Source: Author's Analysis

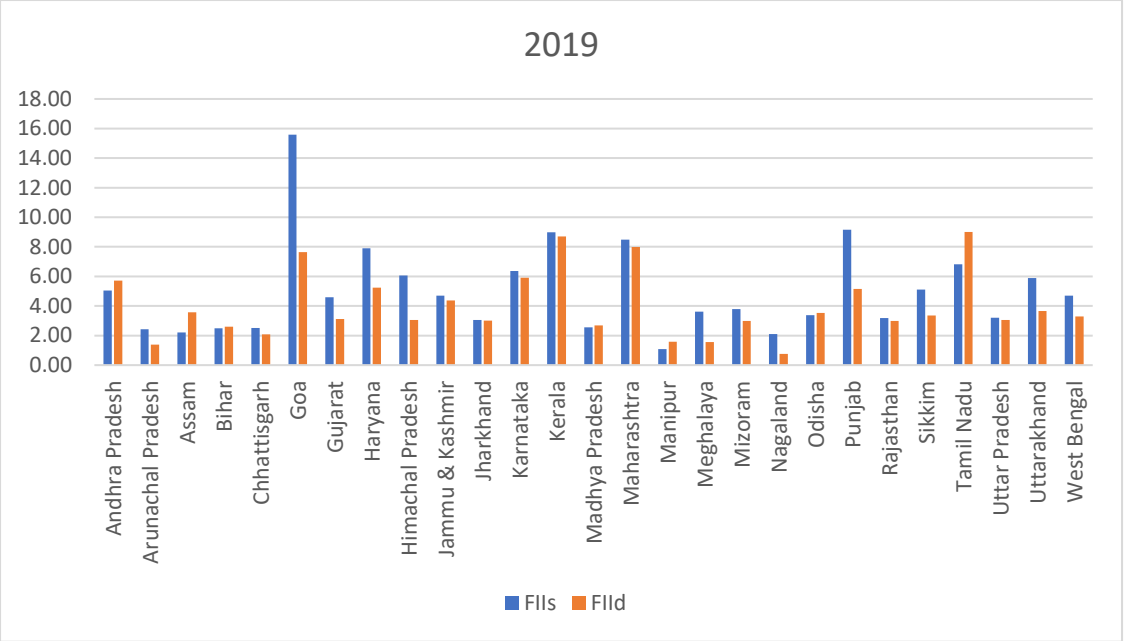
Figure 6: Supply and Demand-Side FII of Indian states for 2015.



Source: Author's Analysis

In 2015, from Table 2 and Table 4, based on the supply side Goa bagged the highest rank with an FII value of 15.71. Punjab and Kerala, with FII values 9.10, and 8.70, respectively, bagged second and third positions. Punjab improved its rank from the third position in 2010to the second position in 2015. Similarly, Haryana and Andhra Pradesh moved from the seventh and 13th positions in 2010 to the fifth and the 12th position in 2015. The least ranks were bagged byChhattisgarh (25th), Assam (26th), and Manipur (27th), with FII values 2.44, 2.30, and 0.94, respectively. Based on demand-side, from Table 3 and Table 4, Tamil Nadu bagged the highest rank with an FII value of 10.82. Kerala and Goa, with FII values 8.53, and8.35, respectively, bagged second and third positions. Kerala improved its rank from the fourth position in 2010 to the second position in 2015. Similarly, Andhra Pradesh and Jammu& Kashmir moved from the sixth and 11th positions in 2010 to the fourth and the ninth position in 2015. The least ranks werebagged by Chhattisgarh (25th), Nagaland (26th), and Manipur (27th), with FII values 2.02, 1.56, and 1.51, respectively. Figure 6 represents the respective index values of the 27 Indian states.

Figure 7: Supply and Demand-Side FII of Indian states for 2019.



Source: Author's Analysis

In 2019, from Table 2 and Table 4, based on the supply side, Goa bagged the highest rank with an FII value of 15.59. Punjab and Kerala, with FII values 9.16, and 8.97, respectively, bagged second and third positions. Jammu & Kashmir moved from the 10th position in 2015 to the 13th position in2019. Similarly, Chhattisgarh improved its rank from the 25th position in 2015 to the 22nd position in 2019. The least ranks were bagged by Assam (25th), Nagaland (26th), and Manipur (27th), with FII values 2.21, 2.11, and 1.08, respectively. Nagaland shifted from the 23rd position in 2015 to the 26th position in 2019. Based on the demand-side, from Table 3 and Table 4, Tamil Nadu bagged thehighest rank with an FII value of 9.00. Kerala and Maharashtra, with FII values 8.70, and 7.98, respectively, at second and third positions. Maharashtra moved from the fifth position in 2015 to the third position in 2019. Similarly, Chhattisgarh improved its rank from the 25th position in 2015to the eighth and the23rd position in 2019. The least ranks were bagged by Meghalaya (25th), Arunachal Pradesh (26th), and Nagaland (27th), with FII values 1.57, 1.39, and 0.77, respectively. Manipur improved its rank from the 27th position in 2015 to the 24th position in 2019.

Figures 4-7 and Table 2-4 (Appendix) show that Western and Southern states perform better in terms of financial inclusion from both supply and demand-side. Similarly, most Eastern and North-Eastern states correspond to low financial inclusion ranks from both supply and demand-side.

Table 5 (Appendix) shows the comparison of FII's using UNDP's and PCA methodologies. From supply-side, the top 5 performing states in financial inclusion using UNDP's methodology were Goa, Punjab, Kerala, Maharashtra, and Haryana. Compared to our study, similar result was accounted from supply-side. From demand-side, the top 5 performing states in financial inclusion using UNDP's methodology were Tamil Nadu, Goa, Kerala, Maharashtra, and Andhra Pradesh. Compared to our study, similar result was accounted from demand side. Sethy (2016), Goel and Sharma (2017), Yadav, Singh and Velan (2020), and other similar studies developed an index giving equal weights to each dimension, but each dimension cannot be equally important in determining the financial inclusion. So, our study allotted weights to each dimension using PCA and developed indexes.

Table 6 (Appendix) addresses the positioning of Indian states dependent on FII and HDI. The outcome demonstrated a positive relationship as high-ranking states compare to better HDI and few differences in ranking of some north-eastern states. Similar outcomes were accounted for by Bagli and Dutta (2012), in which Goa was positioned first among the states, followed by Maharashtra, and demonstrated a positive relationship among FII and HDI.

5. Conclusion:

The current study developed a state-wise FII using supply and demand indicators for 27 Indian states utilizing PCA. The index is developed for the period 2006-19. The Western and Southern states are performing better in terms of financial inclusion from both supply and demand-side. Similarly, most Eastern and North-Eastern states correspond to low financial inclusion ranks from both supply and demand-side. Also, FII demonstrated a positive relationship with HDI. Each dimension of financial inclusion was assigned appropriate weights, thus helps overcome criticism from researchers about subjective weight determination from previous studies. The current index can compare states or countries in terms of financial inclusion in the future with more extended dimensions. The major limitation lying with various financial inclusion dimensions' data availability can be extended further with data availability. This way, many changes are admissible in the institutional setting. The examination recommends that financial inclusion related thoroughness needs a sensible technique that joins an essential update of the financial system and strengthening and developing financial associations hoarding particularly in backward locales, where the action is needed by the government, simultaneously taking care of digitalized training, which will furthermore grow the premium for financial related administrations.

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Appendix

Table 1: Assigned weights using PCA

	Supply-Side					Demand Side		
Years	**W1**	**W2**	**W3**	**W4**	**W5**	**W6**	**W7**	**W8**
2006	0.90	0.87	0.75	0.07	0.75	0.70	0.91	0.95
2007	0.90	0.87	0.74	0.18	0.71	0.70	0.91	0.95
2008	0.91	0.89	0.75	0.18	0.60	0.69	0.91	0.94
2009	0.91	0.89	0.76	0.25	0.56	0.67	0.91	0.94
2010	0.90	0.88	0.77	0.43	0.59	0.70	0.91	0.95
2011	0.91	0.87	0.78	0.48	0.62	0.72	0.91	0.95
2012	0.90	0.83	0.83	0.55	0.61	0.71	0.90	0.96
2013	0.90	0.84	0.82	0.51	0.66	0.74	0.91	0.96
2014	0.91	0.88	0.78	0.43	0.71	0.77	0.91	0.97
2015	0.91	0.87	0.79	0.58	0.65	0.76	0.91	0.97
2016	0.92	0.86	0.78	0.61	0.63	0.71	0.89	0.96
2017	0.91	0.85	0.79	0.64	0.63	0.65	0.88	0.95
2018	0.92	0.85	0.79	0.69	0.62	0.63	0.88	0.95
2019	0.92	0.85	0.79	0.69	0.62	0.71	0.89	0.96

Source: Author's calculation.

Table 2: Financial Inclusion Index using Supply-Side indicators of Indian states

States/Years	2006	2007	2008	2009	2010	2011	2012
Andhra Pradesh	4.82	4.66	4.73	4.85	4.77	4.82	4.86
Arunachal Pradesh	2.67	2.75	3.06	3.18	2.80	2.80	2.67
Assam	2.85	2.89	2.97	2.94	2.77	2.72	2.56
Bihar	3.71	3.50	3.39	3.22	3.10	2.88	2.80
Chhattisgarh	2.66	2.57	2.61	2.63	2.56	2.41	2.37
Goa	15.59	15.27	15.06	15.02	15.24	15.33	15.12
Gujarat	4.47	4.50	4.58	4.66	4.78	4.67	4.56
Haryana	5.41	5.43	5.61	5.66	5.91	5.96	6.48
Himachal Pradesh	5.97	5.93	5.90	5.88	5.90	5.80	5.64
Jammu & Kashmir	4.79	4.84	4.69	4.46	4.34	4.04	4.09
Jharkhand	3.56	3.53	3.43	3.53	3.43	3.30	3.24
Karnataka	6.58	6.63	6.45	6.50	6.54	6.49	6.08
Kerala	8.86	8.70	8.54	8.52	8.64	9.10	8.74
Madhya Pradesh	3.47	3.41	3.40	3.39	3.36	3.26	3.17
Maharashtra	7.58	7.74	7.37	7.24	7.67	8.28	7.96
Manipur	1.56	1.66	1.78	1.80	1.28	1.24	1.22
Meghalaya	3.77	3.91	3.74	4.05	4.51	4.35	3.91
Mizoram	3.29	3.75	3.80	4.00	4.15	3.90	3.57
Nagaland	1.72	1.95	2.15	2.29	2.41	2.70	2.79
Odisha	3.52	3.50	3.49	3.50	3.50	3.98	3.84
Punjab	7.87	7.83	7.71	7.75	7.97	8.07	9.73
Rajasthan	3.27	3.24	3.32	3.23	3.19	3.00	2.94
Sikkim	5.05	5.28	5.69	5.32	5.10	5.22	4.69
Tamil Nadu	6.52	6.39	6.40	6.44	6.40	6.26	6.34
Uttar Pradesh	4.15	3.96	3.93	3.84	3.55	3.50	3.64
Uttarakhand	5.92	5.77	5.80	5.82	5.69	5.44	5.34
West Bengal	5.36	5.42	5.40	5.29	5.42	5.47	6.65

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Table 2: Financial Inclusion Index using Supply-Side indicators of Indian states (contd.)

States/Years	2013	2014	2015	2016	2017	2018	2019
Andhra Pradesh	5.00	5.15	5.03	5.11	5.15	5.07	5.03
Arunachal Pradesh	2.95	2.85	2.52	2.45	2.57	2.45	2.42
Assam	2.53	2.48	2.30	2.23	2.36	2.30	2.21
Bihar	2.77	2.85	2.74	2.60	2.65	2.44	2.49
Chhattisgarh	2.53	2.56	2.44	2.61	2.56	2.56	2.51
Goa	15.50	16.01	15.71	15.54	15.42	15.62	15.59
Gujarat	4.48	4.68	4.69	4.60	4.76	4.68	4.59
Haryana	6.46	6.67	7.17	7.23	7.40	7.71	7.90
Himachal Pradesh	5.60	5.61	5.84	5.90	5.92	5.89	6.07
Jammu & Kashmir	4.33	4.71	5.19	5.62	5.87	4.70	4.71
Jharkhand	3.19	3.27	3.11	3.24	3.19	2.98	3.05
Karnataka	6.05	6.09	6.25	6.50	6.27	6.47	6.36
Kerala	8.66	8.63	8.70	8.76	8.75	8.75	8.97
Madhya Pradesh	2.98	2.94	2.89	2.76	2.60	2.57	2.56
Maharashtra	7.95	8.21	8.17	8.08	8.11	8.35	8.48
Manipur	1.32	1.31	0.94	1.00	0.92	0.96	1.08
Meghalaya	3.92	3.74	3.80	3.73	3.71	3.87	3.62
Mizoram	3.53	3.68	3.51	3.58	3.50	3.67	3.79
Nagaland	2.83	2.91	2.58	2.28	2.14	2.17	2.11
Odisha	3.85	3.53	3.53	3.64	3.47	3.35	3.39
Punjab	9.70	8.65	9.10	9.01	9.18	9.27	9.16
Rajasthan	2.78	3.01	3.07	2.87	2.86	3.12	3.19
Sikkim	4.60	4.99	5.14	5.16	4.89	5.18	5.11
Tamil Nadu	6.32	6.40	6.30	6.40	6.46	6.91	6.81
Uttar Pradesh	3.67	3.67	3.58	3.53	3.48	3.28	3.21
Uttarakhand	5.22	5.35	5.67	5.68	5.75	5.79	5.89
West Bengal	6.30	5.07	5.02	4.91	5.05	4.90	4.71

Source: Author's calculation.

Table 3: Financial Inclusion Index using Demand-Side indicators of Indian states

States/Years	2006	2007	2008	2009	2010	2011	2012
Andhra Pradesh	5.94	6.28	6.06	6.17	6.35	6.78	6.62
Arunachal Pradesh	2.15	2.17	2.37	2.46	2.36	2.32	2.34
Assam	2.27	2.26	2.34	2.41	2.46	2.52	2.60
Bihar	2.10	2.10	2.03	2.30	2.17	2.18	2.25
Chhattisgarh	2.00	1.98	1.98	2.06	2.00	1.87	1.91
Goa	8.53	8.18	8.14	7.58	8.21	8.40	8.28
Gujarat	3.30	3.27	3.25	3.21	3.17	3.07	3.09
Haryana	4.29	4.13	4.07	4.26	4.42	4.51	4.16
Himachal Pradesh	4.12	4.02	3.87	4.30	3.88	4.46	4.07
Jammu & Kashmir	3.54	3.60	3.89	3.54	3.55	3.14	3.39
Jharkhand	2.83	2.64	2.71	2.56	2.52	2.56	2.65
Karnataka	7.01	7.20	6.38	6.66	6.40	6.44	5.92
Kerala	8.98	7.48	7.25	7.16	6.87	7.80	7.71
Madhya Pradesh	2.74	2.42	2.53	2.67	2.72	2.34	2.52
Maharashtra	4.68	6.66	9.79	10.30	8.61	8.46	8.21
Manipur	1.57	1.55	1.51	1.52	1.60	1.36	1.34
Meghalaya	2.84	2.75	2.62	2.38	2.35	2.31	2.43
Mizoram	2.23	2.30	2.64	2.70	2.80	2.64	2.96
Nagaland	1.56	1.78	1.97	2.06	1.88	2.06	2.14
Odisha	3.57	3.54	3.44	3.34	3.28	3.70	3.51
Punjab	5.12	5.23	4.85	4.91	4.59	4.71	4.49
Rajasthan	3.12	3.13	3.13	3.18	3.01	2.86	2.88
Sikkim	3.20	3.16	3.06	2.75	3.06	2.87	2.93
Tamil Nadu	9.68	9.93	8.16	7.36	9.68	8.80	9.73
Uttar Pradesh	3.35	3.32	3.29	3.45	3.48	3.39	3.44
Uttarakhand	4.43	4.28	4.18	4.28	4.25	4.12	3.98
West Bengal	2.83	2.63	2.47	2.44	2.32	2.32	2.46

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Table 3: Financial Inclusion Index using Demand-Side indicators of Indian states (contd.)

States/Years	2013	2014	2015	2016	2017	2018	2019
Andhra Pradesh	7.03	7.19	7.01	6.51	6.25	5.62	5.71
Arunachal Pradesh	2.23	2.09	2.04	1.68	1.70	1.83	1.39
Assam	2.62	2.66	2.70	3.52	3.91	3.83	3.57
Bihar	2.16	2.14	2.14	2.44	2.64	2.73	2.60
Chhattisgarh	1.82	1.90	2.02	2.09	2.26	2.43	2.08
Goa	8.45	8.37	8.35	7.95	7.12	6.87	7.64
Gujarat	3.03	3.02	3.03	2.88	2.88	2.95	3.11
Haryana	4.07	4.21	4.33	4.40	4.31	4.54	5.24
Himachal Pradesh	3.97	3.85	3.76	3.45	3.38	3.32	3.06
Jammu & Kashmir	4.11	3.91	4.30	4.28	4.38	4.47	4.38
Jharkhand	2.79	2.83	2.79	2.91	3.02	3.17	3.01
Karnataka	5.61	5.69	5.87	5.77	5.54	5.49	5.91
Kerala	8.28	8.47	8.53	7.64	7.25	6.78	8.70
Madhya Pradesh	2.51	2.74	2.82	2.95	3.03	2.94	2.69
Maharashtra	6.24	6.06	5.90	6.31	6.75	6.61	7.98
Manipur	1.41	1.45	1.51	1.21	1.44	1.74	1.59
Meghalaya	2.31	2.34	2.25	2.13	2.17	2.11	1.57
Mizoram	2.86	3.26	3.28	3.39	3.49	3.38	2.98
Nagaland	2.04	1.77	1.56	1.16	1.23	1.28	0.77
Odisha	3.50	3.26	3.21	3.11	3.18	3.26	3.54
Punjab	4.49	4.41	4.47	4.53	4.44	4.57	5.15
Rajasthan	2.85	2.77	2.82	3.00	2.94	3.05	2.99
Sikkim	3.04	2.99	2.86	3.47	3.48	3.42	3.35
Tamil Nadu	10.71	11.02	10.82	10.80	10.72	11.28	9.00
Uttar Pradesh	3.49	3.42	3.44	3.34	3.33	3.25	3.05
Uttarakhand	3.99	3.87	3.88	4.00	3.85	3.72	3.65
West Bengal	2.39	2.31	2.31	3.08	3.30	3.36	3.30

Source: Author's calculation.

Table 4: Indian States Ranking in Financial Inclusion

	2006				2010			
States/Years	**FIIs**	**Rank**	**FIId**	**Rank**	**FIIs**	**Rank**	**FIId**	**Rank**
Andhra Pradesh	4.82	12	5.94	5	4.77	13	6.35	6
Arunachal Pradesh	2.67	24	2.15	23	2.80	23	2.36	21
Assam	2.85	23	2.27	21	2.77	24	2.46	20
Bihar	3.71	17	2.10	24	3.10	22	2.17	24
Chhattisgarh	2.66	25	2.00	25	2.56	25	2.00	25
Goa	15.59	1	8.53	3	15.24	1	8.21	3
Gujarat	4.47	14	3.30	14	4.78	12	3.17	14
Haryana	5.41	9	4.29	9	5.91	7	4.42	8
Himachal Pradesh	5.97	7	4.12	10	5.90	8	3.88	10
Jammu & Kashmir	4.79	13	3.54	12	4.34	15	3.55	11
Jharkhand	3.56	18	2.83	18	3.43	19	2.52	19
Karnataka	6.58	5	7.01	4	6.54	5	6.40	5
Kerala	8.86	2	8.98	2	8.64	2	6.87	4
Madhya Pradesh	3.47	20	2.74	20	3.36	20	2.72	18
Maharashtra	7.58	4	4.68	7	7.67	4	8.61	2
Manipur	1.56	27	1.57	26	1.28	27	1.60	27
Meghalaya	3.77	16	2.84	17	4.51	14	2.35	22
Mizoram	3.29	21	2.23	22	4.15	16	2.80	17
Nagaland	1.72	26	1.56	27	2.41	26	1.88	26
Odisha	3.52	19	3.57	11	3.50	18	3.28	13
Punjab	7.87	3	5.12	6	7.97	3	4.59	7
Rajasthan	3.27	22	3.12	16	3.19	21	3.01	16
Sikkim	5.05	11	3.20	15	5.10	11	3.06	15
Tamil Nadu	6.52	6	9.68	1	6.40	6	9.68	1
Uttar Pradesh	4.15	15	3.35	13	3.55	17	3.48	12
Uttarakhand	5.92	8	4.43	8	5.69	9	4.25	9
West Bengal	5.36	10	2.83	19	5.42	10	2.32	23

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Table 4: Indian States Ranking in Financial Inclusion (contd.)

	2015				2019			
States/Years	**FIIs**	**Rank**	**FIId**	**Rank**	**FIIs**	**Rank**	**FIId**	**Rank**
Andhra Pradesh	5.03	12	7.01	4	5.03	11	5.71	6
Arunachal Pradesh	2.52	24	2.04	24	2.42	24	1.39	26
Assam	2.30	26	2.70	20	2.21	25	3.57	11
Bihar	2.74	22	2.14	23	2.49	23	2.60	22
Chhattisgarh	2.44	25	2.02	25	2.51	22	2.08	23
Goa	15.71	1	8.35	3	15.59	1	7.64	4
Gujarat	4.69	14	3.03	15	4.59	14	3.11	15
Haryana	7.17	5	4.33	8	7.90	5	5.24	7
Himachal Pradesh	5.84	8	3.76	11	6.07	8	3.06	16
Jammu & Kashmir	5.19	10	4.30	9	4.71	13	4.38	9
Jharkhand	3.11	19	2.79	19	3.05	20	3.01	18
Karnataka	6.25	7	5.87	6	6.36	7	5.91	5
Kerala	8.70	3	8.53	2	8.97	3	8.70	2
Madhya Pradesh	2.89	21	2.82	17	2.56	21	2.69	21
Maharashtra	8.17	4	5.90	5	8.48	4	7.98	3
Manipur	0.94	27	1.51	27	1.08	27	1.59	24
Meghalaya	3.80	15	2.25	22	3.62	16	1.57	25
Mizoram	3.51	18	3.28	13	3.79	15	2.98	20
Nagaland	2.58	23	1.56	26	2.11	26	0.77	27
Odisha	3.53	17	3.21	14	3.39	17	3.54	12
Punjab	9.10	2	4.47	7	9.16	2	5.15	8
Rajasthan	3.07	20	2.82	18	3.19	19	2.99	19
Sikkim	5.14	11	2.86	16	5.11	10	3.35	13
Tamil Nadu	6.30	6	10.82	1	6.81	6	9.00	1
Uttar Pradesh	3.58	16	3.44	12	3.21	18	3.05	17
Uttarakhand	5.67	9	3.88	10	5.89	9	3.65	10
West Bengal	5.02	13	2.31	21	4.71	12	3.30	14

Source: Author's calculation.

Table 5: Comparison with UNDP methodology.

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

Source: Yadav, Singh and Velan (2020) and Author's calculation.

Table 6: FII and HDI Ranking, 2018.

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

Uttar Pradesh	26	18	17
Uttarakhand	12	9	11
West Bengal	19	12	14

Source: Author's calculation and Global Data Lab.