

# FINANCIAL INCLUSION AND ITS DETERMINANTS: A COMPARATIVE ANALYSIS IN INDIA AND WEST BENGAL

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**Abstract:** FI is considered to be a powerful instrument of economic development. In India, different state governments and the Central Government have introduced and implemented many FI schemes like opening no-frill accounts and Jan Dhan Yojana accounts, various subsidies through bank account like LPG subsidy, widowed benefits, Loksmir Bhandar, and old age benefits etc from time to time. All these measures are expected to promote the level and extent of FI across the states of India and various districts of the state of West Bengal. Under this backdrop, using the data from RBI basic statistic and the BAES data of the Government of West Bengal, this paper examines the interstate variations in the level of FI in India and the inter-district variations of the same for the state of West Bengal. The index of FI has been estimated following UNDP goal posts method properly adjusted with the data driven weighting system using the Principal Component Analysis. It is observed that there is wide interstate as well as inter-district variations in the level of FI. However, the *sigma-test for convergence* reveals the fact that there is a tendency of convergence across the states of India and the districts of West Bengal. *The panel data regression* by fixing the random effect model identified that GDP per capita, internet connectivity, telecommunication, gross enrollment, factories, road length and capital expenditure etc have a significant influence on the level of FI across the states of India.

**Keywords:** FI, Principal Component Analysis, Random Effect Model

## Introduction

Since the early 1990s, banking reform has facilitated the growth of private-sector banks. Certain segments of society do not have access to adequate low-cost, fair, and safe financial products and services from mainstream providers. A key goal of FI is to ensure that all individuals have access

to appropriate financial assistance and understand and can use it. The concept of FI does not solely refer to opening up a savings account. It implies creating awareness about financial products, providing advice and education on money management, and offering debt

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counselling, among other things. Much research work has been done on this topic as it is an essential government tool for rural development. Rural people get their MGNREGA salaries and other government subsidies to their bank accounts through DBT. By enabling everyone to participate fully in the formal financial system, FI benefits individuals, the commercial enterprises serving them, and society as a whole (mckinsey and Company, 2010). FI is characterized by a high level of penetration of the banking system, a bank account, insurance, and easy access to credit at an affordable cost (Thoat 2010). The Nobel committee gave substantial weight to the objectives of FI by awarding Prof. Md. The Nobel Prize in 2006, Yunus and his Grameen Bank. The expansion of financial services is conditioned upon the level of economic development, especially on rural development, which influences both demand for and supply of financial services (Hurley and Shaw, 1955; Cameron, 2003). A developed financial system promotes growth in the real sector of the economy, which ultimately widens the horizon of economic opportunities available across the entire spectrum of the population, including the vulnerable section of society. Financial development facilitates the creation of an environment for better access to economic opportunities for the wider population, including the vulnerable section of the community. However, to ensure equal access, it is necessary to strengthen human capability to reduce economic opportunities which influence rural development.

FI has been the most influential developmental instrument since its introduction. In India, different State Governments and the Central Government introduced and implemented many FI schemes like opening no-frill accounts and Jan Dhan Yojana accounts. Finally, other subsidies are credited to single bank accounts, especially to women's accounts like LPG subsidy, widowed benefits, Loksmir Bhandar, and old age benefits. The government introduced the Sukanya Samriddhi Yojana for opening new bank accounts for newborn girl children. In the development paradigm, FI plays a significant role. In a country like India, especially in West Bengal, all financial decisions are made by men, and male members of society mainly dominate transactions.

The different components of the FI index and its formula have been discussed by Sarma (2008). The other demand side and supply side factors of FI have been mentioned and also found that western and southern states have more FI than eastern and northern states Kuri & Laha, (2011). In Hooghly, the no-frill account's success had been 50% in 2008. According to the study, the scheme failed to include excluded categories such as scheduled castes, scheduled tribes, backward classes, and those with less education in the financial system. This scheme is mistargeted, and its benefits are mostly reaped by the wealthy section of the society (Majumdar & Gupta 2013). Analysing the data from 2003-2004, found how FI and economic growth have been associated for 99 countries. It also

mentioned that more banking access facilitated more banking outreach. (Beck, Demirguc-Kunt, & Martinez Peria 2005). For convenience, Paper is divided into four sections, sections I, it deals with data and methodology. Section II, examines the inter-State improvement in level of FI. The inter district variation in the level of FI has been captured in section III. In section IV we have identified the factors which affect the FI. The conclusion and policy suggestions appear is suppose to have in section V.

### Section-I

In this backdrop, our prime objectives are:

- (a) To examine the interstate variation in the level of FI in India.
- (b) To examine the inter-district variation in the level of FI in West Bengal.
- (c) Identify the factors affecting FI.

### Data Sources and Methodology

We have taken the secondary data from RBI basic statistic returns from 2001 to 2019 across the state level. In the case of district level, we have taken data base from 2011 to 2021 in West Bengal.

### Principal Component Analysis

We have used UNDP methodology for constructing index FII using PCA. Here we have classified the FII into three categories if the value is greater than .50 we have considered a high level, if it lies between .20 to .50 it is considered a medium level; while the FII value is lower than .20 then it is considered as lower level of FI.(S.K Chattopadhaya, 2008).

### Panel Data Regression

In our study, we have incorporated 18 States from 2012 to 2016. The dependent variable is the FI index, while GDP per capita, per 100 mobile users, and per 100 internet connectivity, social expenditure, H.S enrollment, number of factories, female passed class X, road length and capital expenditure are the independent variables.

We have a balanced panel data set for the panel data analysis, as mentioned earlier. After importing the data in statistical software, we conducted an ordinary least square, whether pooled OLS or random effect model is better suited to our study; for that, we made a Brush pagan Lagrange multiplier test. We have concluded that pooled ordinary least squares are inferior to the random effect model.

We have found that calculated Chi-square is greater than tabulated Chi-square values, so random effect models are appropriate for our study. However, we have considered 18 states, so state-specific effects might be present in our result. To check the heterogeneity in our data among different states, we have employed the Hausman test to check whether the fixed or random effect is better. We have accepted the null hypothesis that random effect is more appropriate than fixed effect. The logic behind the acceptance is to state a specific effect is captured in the disturbance term, not by intercepts.

The same methodology has been applied in the second set of variables.

## Interstate Variation in Level of Financial Inclusion Index

**Table 1: Year-wise State-wise Change in FI in India**

States	2001	2006	Change in 2001-06	2011	Change in 2006-11	2016	Change in 2006-11	2019	Change in 2016-19	Overall Changes in 2001-19
Tripura	0.099	0.105	0.006	0.115	0.01	0.095	-0.02	0.629	0.534	0.53
Sikkim	0.138	0.206	0.068	0.19	-0.016	0.119	-0.071	0.385	0.266	0.247
Haryana	0.164	0.183	0.019	0.214	0.031	0.143	-0.071	0.405	0.262	0.241
Tamil Nadu	0.21	0.221	0.011	0.222	0.001	0.149	-0.073	0.431	0.282	0.221
Karnataka	0.209	0.237	0.028	0.237	0	0.159	-0.078	0.426	0.267	0.217
Punjab	0.316	0.321	0.005	0.312	-0.009	0.204	-0.108	0.527	0.323	0.211
Kerala	0.274	0.301	0.027	0.286	-0.015	0.178	-0.108	0.476	0.298	0.202
Mizoram	0.103	0.122	0.019	0.105	-0.017	0.075	-0.03	0.294	0.219	0.191
Himachal Pradesh	0.292	0.298	0.006	0.288	-0.01	0.163	-0.125	0.481	0.318	0.189
Jammu & Kashmir	0.188	0.206	0.018	0.168	-0.038	0.128	-0.04	0.374	0.246	0.186
Chhattisgarh	0.053	0.056	0.003	0.076	0.02	0.069	-0.007	0.231	0.162	0.178
Odisha	0.089	0.098	0.009	0.12	0.022	0.09	-0.03	0.248	0.158	0.159
Maharashtra	0.22	0.278	0.058	0.269	-0.009	0.202	-0.067	0.36	0.158	0.14
Arunachal Pradesh	0.092	0.083	-0.009	0.092	0.009	0.054	-0.038	0.205	0.151	0.113
West Bengal	0.15	0.147	-0.003	0.144	-0.003	0.116	-0.028	0.251	0.135	0.101
Gujarat	0.18	0.176	-0.004	0.164	-0.012	0.102	-0.062	0.274	0.172	0.094
Manipur	0.001	0	-0.001	0	0	0.008	0.008	0.093	0.085	0.092
Jharkhand	0.102	0.106	0.004	0.097	-0.009	0.077	-0.02	0.193	0.116	0.091
Madhya Pradesh	0.099	0.102	0.003	0.1	-0.002	0.077	-0.023	0.184	0.107	0.085
Rajasthan	0.093	0.092	-0.001	0.093	0.001	0.061	-0.032	0.178	0.117	0.085
Assam	0.067	0.065	-0.002	0.075	0.01	0.048	-0.027	0.141	0.093	0.074
Bihar	0.07	0.058	-0.012	0.046	-0.012	0.047	0.001	0.134	0.087	0.064
Puducherry	0.235	0.248	0.013	0.273	0.025	0.352	0.079	0.297	-0.055	0.062
Meghalaya	0.122	0.129	0.007	0.096	-0.033	0.068	-0.028	0.183	0.115	0.061
Delhi	0.572	0.632	0.06	0.626	-0.006	0.373	-0.253	0.629	0.256	0.057
Uttar Pradesh	0.113	0.105	-0.008	0.113	0.008	0.08	-0.033	0.163	0.083	0.05
Goa	0.772	0.793	0.021	0.743	-0.05	0.832	0.089	0.813	-0.019	0.041
Nagaland	0.023	0.023	0	0.05	0.027	0.022	-0.028	0.014	-0.008	-0.009
Andaman & Nicobar Islands	0.191	0.201	0.01	0.211	0.01	0.125	-0.086	0.178	0.053	-0.013
Andhra Pradesh	0.182	0.222	0.04	0.263	0.041	0.118	-0.145	0.117	-1E-03	-0.065
Chandigarh	0.963	0.915	-0.048	0.973	0.058	0.547	-0.426	0.72	0.173	-0.243

Source: Author's calculation

From the above table, we have found that from 2001 to 2006 Arunachal Pradesh, west Bengal, Gujrat, Manipur, Chandigarh, Uttar Pradesh, Bihar, Assam and Rajasthan deteriorated the level of FI; while the rest of the states have improved in terms of FII. From 2006-2011, we have observed that Punjab, Kerela, Mizoram, Himachal Pradesh, Goa, Delhi, Jammu Kasmir, Maharashtra, West Bengal, Gujrat, Jharkhand, Bihar, Meghalaya, Delhi decreased the level of FI during this period. Other states improved their FII during the same period. From 2011-16, we have found that Manipur, Bihar, Puducherry and Goa improved the FI index and the other states deteriorated in terms of the level of the FI index. In 2016-19, we explored that Puducherry, Goa, Nagaland and Andra Pradesh deteriorated in terms of the level of FI and the rest of the states improved in terms of FI.

Overall from 2001-2019, we have found that only four states namely Nagaland, Andaman & Nicobar, Andra Pradesh and Chandigarh deteriorated in terms of FI and other states improved in terms of FI.

**Analysis of FI Index across the states from 2001 to 2019:**

This Section examined the different FI indicators across the States. We have taken 31 states in our study from 2001 to 2019. We have mainly considered three indicators of FI: banking penetration (number of accounts per thousand adult populations), banking availability (number of Bank branches per thousand adult populations) and uses of bank services (credit& deposit as a proportion of the net state domestic product at constant prices).

**Table: 2: Degree wise Categorized of FI**

INDICATORS YEAR	FII		
	LOW	MEDIUM	HIGH
2001	Chhattisgarh, West Bengal, Mizoram, Uttar Pradesh, Meghalaya, Tripura, Andaman and Nicobar Islands, Jammu and Kashmir, Sikkim, Rajasthan, Orissa, Nagaland, Haryana, Andhra Pradesh, Manipur, Madhya Pradesh, Jharkhand, Bihar, Gujarat, Assam, Arunachal Pradesh	Tamil Nadu, Punjab, Karnataka, Pondicherry, Maharashtra, Kerala, Himachal Pradesh	Goa, Chandigarh, Delhi

INDICATORS YEAR	FII		
	LOW	MEDIUM	HIGH
2006	Gujarat, West Bengal, Rajasthan, Manipur, Uttar Pradesh, Tripura, Orissa, Nagaland, Madhya Pradesh, Mizoram, Meghalaya, Jharkhand, Haryana, Chhattisgarh, Bihar, Assam, Arunachal Pradesh	Andaman, Himachal Pradesh, Pondicherry, Tamil Nadu, Sikkim, Kerala, Punjab, Andhra Pradesh, Karnataka, Jammu and Kashmir, Maharashtra	Chandigarh, Goa, Delhi
2011	Madhya Pradesh, Bihar, Arunachal Pradesh, Manipur, Uttar Pradesh, Gujarat, Sikkim, Rajasthan, Jammu and Kashmir, Orissa, Nagaland, West Bengal, Tripura, Mizoram, Chhattisgarh, Meghalaya, Jharkhand, Assam	Tamil Nadu, Andaman and Nicobar Islands, Kerala, Punjab, Pondicherry, Maharashtra, Haryana, Karnataka, Himachal Pradesh, Andhra Pradesh	Goa, Chandigarh, Delhi
2016	West Bengal, Tamil Nadu, Karnataka, Mizoram, Andhra Pradesh, Jharkhand, Andaman and Nicobar Islands, Himachal Pradesh, Tripura, Sikkim, Kerala, Rajasthan, Haryana, Orissa, Nagaland, Meghalaya, Manipur, Madhya Pradesh, Jammu and Kashmir, Gujarat, Chhattisgarh, Bihar, Assam, Arunachal Pradesh, Uttar Pradesh	Delhi, Maharashtra, Punjab, Pondicherry	Goa, Chandigarh

INDICATORS YEAR	FII		
	LOW	MEDIUM	HIGH
2019	Uttar Pradesh, Jharkhand, Assam, Rajasthan, Nagaland, Andhra Pradesh, Meghalaya, Bihar, Manipur, Madhya Pradesh, Andaman	West Bengal, Jammu and Kashmir, Gujarat, Himachal Pradesh, Haryana Tamil Nadu, Sikkim, Chhattisgarh, Pondicherry, Orissa, Mizoram, Maharashtra, Karnataka, Kerala, Arunachal Pradesh	Tripura, Goa, Punjab, Delhi, Chandigarh

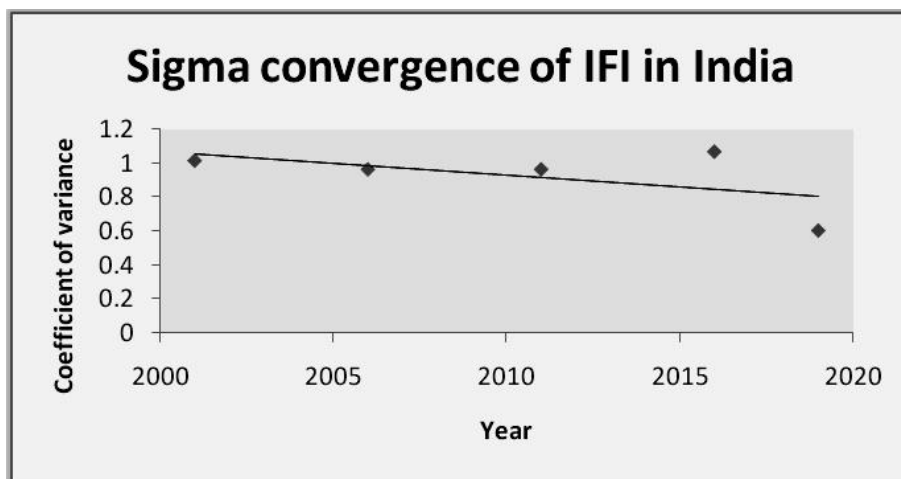
Source: Authors calculation

**Sigma Convergence: An Interstate Analysis in India**

From 2001 to 2019, we have seen that the country’s coefficient of variance of the level of the FI index has decreased, suggesting a convergence in India regarding the FI index. From the above

analysis, we have found a sharp decrease in the coefficient of variation of the FI index for India. So, the inequalities in FI have been reduced from 2001 to 2019 by taking various state and central government initiatives. In the diagram below, we have shown the convergence of FI for India.

Figure.1: Sigma Convergence of FI in India



The sigma convergence states that the gap between FI indices is being reduced across the states.

### District-wise change in FI index West Bengal

Using three indicators in this section we have explained the level of FI across West Bengal since 2011.

**Table: 3: Year wise District wise Improvement of FI in West Bengal**

District	2011	2016	Change in 2011-16	2021	Change in 2016-21	Overall Changes 2011-21
Coach Bihar	0.164	0.293	0.129	0.371	0.078	0.207
Birbhum	0.096	0.111	0.015	0.198	0.087	0.102
Uttar Dinajpur	0.133	0.145	0.012	0.229	0.084	0.096
Nadia	0.074	0.079	0.005	0.168	0.089	0.094
Darjeeling	0.298	0.288	-0.01	0.39	0.102	0.092
Barddhaman	0.139	0.136	-0.003	0.209	0.073	0.07
Hugli	0.098	0.113	0.015	0.166	0.053	0.068
Dakshin Dinajpur	0.171	0.148	-0.023	0.235	0.087	0.064
Purba Medinipur	0.073	0.09	0.017	0.136	0.046	0.063
Maldah	0.124	0.108	-0.016	0.184	0.076	0.06
Murshidabad	0.092	0.076	-0.016	0.146	0.07	0.054
Howrah	0.104	0.1	-0.004	0.148	0.048	0.044
Jalpaiguri	0.135	0.054	-0.081	0.164	0.11	0.029
South 24 Parganas	0.091	0.069	-0.022	0.115	0.046	0.024
North 24 Parganas	0.132	0.117	-0.015	0.141	0.024	0.009
Bankura	0.071	0.06	-0.011	0.072	0.012	0.001
Puruliya	0.025	0.007	-0.018	0.024	0.017	-0.001
Kolkata	1	1	0	0.97	-0.03	-0.03
Paschim Medinipur	0.128	0.109	-0.019	0.092	-0.017	-0.036

Source: Authors own



From 2011-16 we have found that only Coach Bihar, Birbhum, Uttar Dinajpur, Nadia Hoogly and Purba Medinipur improved in terms of the FI; other states witnessed a reduction in terms of FI. From 2016-21 we have observed that Kolkata and Paschim Medinipur deteriorated in FI and other states improved in FI. Overall we have witnessed only in three districts namely Purulia, Kolkata and Paschim

Mednipur decreased the level of FI and other districts improved in FI.

**District-wise FI index and its ranking in West Bengal**

In this section, we have explored the level of FI district-wise from 2011 to 2021 using three indicators as we have used our early models.

**Table:4 Year wise District wise and year-wise Classification of FI Index**

Year	District	Classification	Other Districts
2011	Kolkata	Darjeeling	Nadia, Malda, Bankura, Jalpaiguri, Barddhaman, Birbhum, Coach Bihar, Paschim Medinipur, South Dinajpur, Howrah, Hooghly, North 24 Pargana, Purba Medinipur, Uttar Dinajpur, Purulia, Dakhin 24 Parganas, Murshidabad
2016	Kolkata	Coach Bihar, Darjeeling	Nadia, Dakhin 24 Parganas, Bankura, Uttar 24 Parganas, Barddhaman, Uttar Dinajpur Birvum, Howrah, Hoogly, Jalpaiguri, Maldah, Puruliya, Murshidabad, Paschim Medinipur, Purba Medinipur, Dakshin Dinajpur
2021	Kolkata	Barddhaman, Coach Bihar, Dakshin Dinajpur, Darjeeling, Uttar Dinajpur	South 24 Parganas, Bankura, Birbhum, Puruliya, Purba Medinipur, Howrah, Hoogly, Jalpaiguri, Maldah, North 24 Parganas, Murshidabad, Nadia, Paschim Medinipur

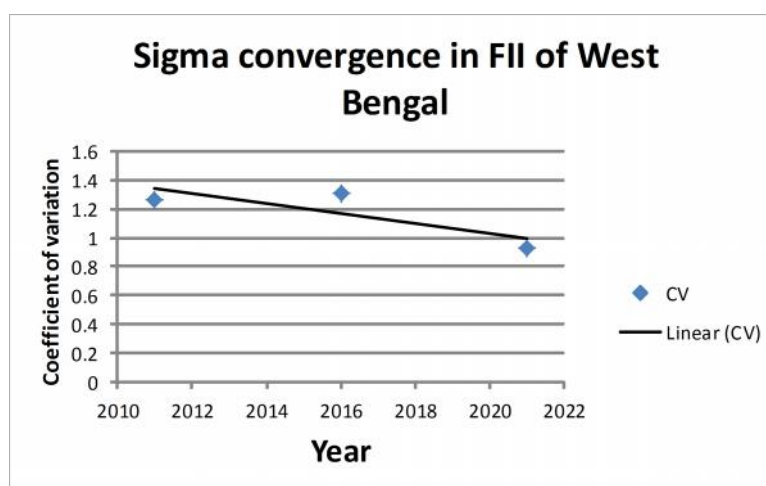
From the above table, we have found that only the Kolkata district has the high FI index for 2011, 2016 and 2021, respectively. In 2011, only one district was found to be under the middle level of the FI index, Darjeeling district. In 2016, one additional district was upgraded to the middle level of the FI index category: Coach Bihar. In 2021, three other districts have been uplifted to the middle level of FI category: Barddhaman, Uttar Dinajpur and Dakshin Dinajpur. In 2011, among 19 districts 17 districts are under a lower-level of FI index category, Bankura, Barddhaman, Birbhum, Coach Bihar, Dakshin Dinajpur, Howrah, Hugli, Jalpaiguri, Maldah, Murshidabad, South 24 Parganas, Nadia, Uttar Dinajpur, Puruliya, North 24 Parganas, Paschim & Purba Medinipur. In the year 2016, total 16 districts are under lower category; these districts are Bankura, Barddhaman, Birbhum, Dakshin Dinajpur, Howrah, Hugli, Jalpaiguri, Maldah, Murshidabad, Nadia, North 24 Parganas, Puruliya,

Paschim Medinipur, South 24 Parganas, Uttar Dinajpur. In the year 2021, out of 19 districts, 14 districts are under the lower FI category: Bankura, Birbhum, Howrah, Purba Medinipur, Hugli, Jalpaiguri, Maldah, Murshidabad, Nadia, Dakshin 24 Parganas, Uttar 24 Parganas, Paschim Medinipur, Puruliya, Purba Medinipur.

### **Sigma Convergence: A District wise Analysis in West Bengal:**

From 2011 to 2021, we have seen that West Bengal's coefficient of variance of the level of the FI index has decreased, suggesting a convergence in West Bengal's FI index. From the above analysis, we have found a sharp decrease in the coefficient of variation of the FI index for West Bengal. So, the inequalities in FI have been reduced from 2011 to 2021 by taking various State and Central Government initiatives. In the diagram below, we have shown the convergence of FI for West Bengal.

**Figure 2: Sigma Convergence of FI in West Bengal**



**Determinants of FI**

In reality, there are various factors affecting FI. Here we have used two panel regressions and identified socio-economic and infrastructural factors that directly affect FI. Furthermore, we have categorized our factors into socio-economic factors and infrastructural factors.

**Socio-Economic Determinants of FI**

In socio-economic factors we have considered GDP per capita, social expenditure, H.S. enrollment, number of factories and female passed class X.

**Model selection: Fixed vs Random**

The first regression of both the BP LM test and Hausman tests are given below in tabular format:

**Table 5: BP LM test and Hausman Test for Socioeconomic Factors**

Tests	Chi-square	Prob>chi square
<b>BP LM test</b>	<b>2.86</b>	<b>0.0454</b>
<b>Hausman Test</b>	<b>0.03</b>	<b>0.8691</b>

Source: Author's calculation

The empirical specification of the socio-economic regression model is given below:

$$FII_{11} = \mu_{11} + \beta_{11} \text{PercapitaSDP} + \beta_{12} \text{femalpassedX} + \beta_{13} \text{Socialexp} + \beta_{14} \text{Hsgrossenrollment} + \beta_{15} \text{Factories} + \dots(a)$$

- Where  $FII_{11}$  stands for FI index
- PercapitaSDP= per capita state domestic product
- femalpassedX= number of females who passed class X
- Socialexp= Social expenditure
- Hsgrossenrollment= Gross enrollment in higher secondary education
- Factories= total number of factories used as a proxy of industrialization
- $\mu_{11}$  is the disturbance term of socio-economic regression.
- We have found that as per capita state

domestic product increases the, FI increases; we know that as per capita income rises, it will boost the savings used for better infrastructural improvement. HS school enrollment improves the quality of life, which means that an individual has more opportunities to get a job and might start his business by taking advances from formal financial institutions. Conceptually, female education boosts women's awareness and provides job opportunities. Social expenditure means government expenditure on health, education, income, and social safety nets. Some government benefits directly transfer to the beneficiaries' accounts, enhancing FI to the financially excluded people. To determine the effect of industrialization, we have used the number of factories; this is considered for job security purposes.

**Table: 6: Random Effect Model of Socioeconomic Factors**

Random-effect PanelID R square: Within the group = 0.0279 between = 0.8986 overall = 0.5582	Observation = 90 Groups = 18 Observation in each group: minimum = 5 average = 5.0 maximum = 5 P Value														
Wald chi-square(5) = 106.13	0														
FII   PercapitaSDP femalpassedX Socialexp Hsgrossenrollment Factories _cons	<table border="1"> <thead> <tr> <th>Coef.</th> <th>P&gt;  z </th> </tr> </thead> <tbody> <tr> <td>1.32E-06</td> <td>0.002</td> </tr> <tr> <td>-0.0187695</td> <td>0.936</td> </tr> <tr> <td>1.98E-06</td> <td>0.004</td> </tr> <tr> <td>1.28E-03</td> <td>0.0001</td> </tr> <tr> <td>2.81E-06</td> <td>0.022</td> </tr> <tr> <td>0.1548517</td> <td>0.033</td> </tr> </tbody> </table>	Coef.	P>  z	1.32E-06	0.002	-0.0187695	0.936	1.98E-06	0.004	1.28E-03	0.0001	2.81E-06	0.022	0.1548517	0.033
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From the upper table, we have found that per capita SDP, Social expenditure, total HS enrollment and factories are significant at a 5% level and positively related. In contrast, female education up to class X is not associated with FI.

#### **Physical Infrastructural Determinants of FI**

In physical infrastructure, we have

considered per 100 mobile users, and per 100 internet connectivity, road length, per capita SDP and capital expenditure are independent variables.

#### **Model selection: Fixed vs Random**

Second regression, both BP LM test and Hausman tests are given below in the tabular format:

**Table 7: BP LM test and Hausman Test for Socio-physical Factors**

Tests	Chi-square	Prob>chi square
BP LM test	4.83	0.0325
Hausman Test	0.45	0.9123

Source: author's calculation

The empirical specification of the social-physical regression model is given below:

$$FII_{21} = \beta_{21} + \beta_{21} \text{Telephoneper100} + \beta_{22} \text{Roadlength} + \beta_{23} \text{PercapitaSDP} + \beta_{24} \text{Per100internetconnectivity} + \beta_{25} \text{capitalex} + \mu_{21} \dots(b)$$

Where  $FII_{21}$  stands for FI index

Telephoneper100 stands for per 100 population number of telephone user

Road length denotes the total length of roads in K.M.

Per100Internetconnectivity stands for internet users per 100 populations.

Capitalex represents the total capital expenditure of the country

$\mu_{21}$  is the disturbance term of physical infrastructure regression.

**Table 8: Random Effect Model for Infrastructural Factors**

Random-effect	Observation = 90	
Panel ID	Groups = 18	
R square	Observation in each group	
Within the group = 0.4121	minimum = 5	
between = 0.9013	average = 5.0	
overall = 0.5136	maximum = 5	
	P Value	
Wald chi-square (5) = 104.96	0	
FI	Coef.	P> z
Telephoneper100	1.20E-03	0.002
Roadlength	-0.0187695	0.425
PercapitaSDP	1.26E-06	0
Per100internetconnectivity	9.23E-04	0.025
capitalex	-1.16E-06	0.035
_cons	1.180339	0.033

Source: author's calculation

Telephone per 100 users and 100 individual internet connectivity improves digital payment and improves the FI. Road length is expected to affect FI as infrastructure improves economic activities positively. Theoretically, we know that capital expenditure has a multiplier complex impact with direct or indirect channels; it enhances labour productivity, which helps improve the financial infrastructure and inclusion.

In the above analysis, we couldn't incorporate inequality and unemployment as per the theoretical background these two must have a negative effect on FI. Those data are periodic, so we had to skip the database for the analysis. Apart from that, digital payments are not included in our study; this is increasing nowadays, but we cannot find any database for establishing the association between FI and digital transactions.

### Conclusion

From our above study we have found that during this period, the difference between the level of FI between the highest ranking state and the lowest ranking state is almost the same or even increases as time passes by.

The southwestern states are ranked at the top of the table. In contrast, Northeastern states are consistently lower in the table: the probable cause may be geographical location and lack of education of their residents.

The central states are more or less in the middle regarding the FI index.

Over the period, Tripura, Sikkim, Haryana, Tamil Nadu, Karnataka and Punjab improved in terms of FI. In contrast, states like Nagaland, Andaman & Nicobar Island, Andhra Pradesh, and Chandigarh had negative improvements.

Most surprisingly, our West Bengal, initially, in 2001, was under the lower category of FI but is now under the middle group of FI. It might be affected by some central and state government developmental and inclusive schemes.

Particular attention should be given to states like Manipur, Assam, Meghalaya and Assam for financial literacy and using various services provided by the banking institutes.

In the above study, we observed that Kolkata secured the first ranking during the three time periods: 2011, 2016 and 2021. The ranking of Darjeeling was the same for the periods 2011 and 2021. Dakshin Dinajpur dropped from 3rd to 4th place in the table from 2011 to 2021. Coach Bihar uplifted from 4th place to 3rd place. Bardhaman also dropped from 5th place to 6th place in the table. So, we can conclude that the ranking of the Bardhaman was more or less stable during the time mentioned above periods.

We may conclude that Kolkata and North Bengal districts improved FI. The intensive government's attention might be to the north Bengal districts and good governance. Surprisingly, the situation of the jungle Mahal was not improved, as we found the Purulia and Bankura at the bottom of the table.

In the case of states except Nagaland, Andaman, Andhra Pradesh and Chattisgarh all the other states have improved in the level of FI. While in districts Purulia, Kolkata and Paschim Mednipur all other districts have improved in FI.

Finally, we have observed a sharp decline in the coefficient of variation of the level of FI from 2011 to 2021 in West Bengal. So, the inter-district variation has reduced over the period, which indicates both demand side and supply side factors have improved by the initiatives of various governmental schemes like Laxmir Bhandar, Kanyashree, Rupashree, Bangla Awas Yojana, Krisak Bandhu, Jay Bangla Jay Jawar, Fasal Bima Yojana, student credit card, Kisan credit card, Sikhashree, Juvashree in West Bengal during these phases.

In the literature, we found that the hindrance in FI directly affects social inclusion. Over time, all the states improved their level of FI. The government's role in the succession of FI is remarkable.

We found that some socio-economic factors and infrastructure developments have been important determinants of FI. From our study, we observed that gross domestic product per capita is a primary determinant of FI, and industrialization also plays a significant role in improving the economic infrastructure in India. The use of telecommunication and the Internet reduces the gap between bank branches in remote rural areas. Rural

people need not visit the banks for transaction purposes because Internet banking nowadays is revolutionary.

Reserve Bank of India and other commercial Banks redress any financial disputes within 30 days and maintain the faith of the customers.

The internal working group of the Reserve Bank of India claims that marginal farmers are not getting credit from formal banking institutions; instead, they still depend on informal financial institutions for accessible credit facilities.

Finally, we know that in some parts of India, electricity and internet connectivity are inadequate to make real-time transactions, so India should focus on these determinants to fulfil the needs of the new era. The IT department also looks after the security matters. Otherwise, FI would be meaningless.

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The author declares that there is no conflict of interests that are directly or indirectly related to this research work.

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