

Demand-Side and Supply-Side Determinants of Financial Inclusion in Indian States: Evidence from Post-Liberalization Period

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journals.sagepub.com/home/emi**Rajesh Barik¹ and Sanjaya Kumar Lenka²**

Abstract

An initiative of financial inclusion helps to boost the economies of poorer regions and countries. Also, greater financial inclusion is a prime driver for attaining social inclusion in most of the developing nations across the globe. So, the main purpose of this article is to investigate the determinants of financial inclusion from both demand- and supply-side variables in Indian states during the post-liberalization periods (1993–2015). Furthermore, the study uses different econometric models such as fixed effect, random effect, panel-corrected standard errors, and feasible generalized least squares for analysis purpose. The empirical findings of this study suggest that among the demand-side factors, literacy and per capita state GDP have a positive impact on financial inclusion, whereas other two variables like rate of unemployment and percentage of rural population have a negative impact on financial inclusion. Likewise, from the supply-side factors, our empirical findings depict that all four variables (i.e., road length, electricity supply, social sector expenditure, and capital receipt) have a positive and significant effect on financial inclusion in the post-liberalized Indian states.

Keywords

Financial inclusion, demand side, supply side, post-liberalization, Indian states

Introduction

Financial inclusion is an imperative policy instrument to improve livelihood and reduce poverty and inequality (Kapoor, 2014; Sinha, 2014). Easy and affordable access to financial products and services is a productive means for the poor and marginalized people to access other basic necessities of life. Hence, exclusion from the formal

financial system of an individual has an intrinsic negative value of its own, and it can also lead the individual to face other kinds of deprivation, thereby limiting further basic living opportunities. Therefore, financial exclusion is also termed as “social exclusion.”

In this context, while looking at the data on financial inclusion for India, it was realized that “India,” being the second largest populous country

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in the world, comprises a large number of unbanked people. Hence, to bring these unbanked people into the banking system, both the Government of India (GoI) and the Reserve Bank of India (RBI) have undertaken many financial inclusion initiatives (Mohanty, 2015). The first initiatives toward financial inclusion in India can be traced back to the nationalization of banks in 1969. Correspondingly, the pre-liberalization period has also seen other policy initiatives, like the establishment of RRBs in 1975 and NARAB in 1982. However, the financial reforms in 1991 witnessed a paradigm shift in the functioning of India's financial market in general and banking sector in particular. The post-liberalized India welcomed many foreign-sector banks to operate in the Indian market. With the operation of foreign banks, it was expected that the presence of these banks would extend the outreach of banking services in India. Similarly, the post-liberalization period also witnessed the speedy operation of microfinance institutions (MFIs) by lending microloans to self-help groups (SHGs) and linking the members of the SHGs with formal sector banking. Similarly, the period of post 2000 has also seen a number of pro-financial inclusion policy initiatives in India. Such policies include the formation of financial inclusion committee, implication of Know Your Customer (KYC) norms, introduction of no-frills account, introduction of Direct Benefit Transfer (DBT) scheme, and very recent implication of the Pradhan Mantri Jan Dhan Yojana (PMJDY) in 2015. Hence, as a consequence of these policy initiatives, researchers on financial inclusion have found that since the post-2000 period, India has witnessed tremendous growth in the financial inclusion process (Lenka & Sharma, 2017). However, despite progress being made in financial inclusion, a large section of poor and marginalized people in India are still out of the formal banking sector. In a study conducted by Center for Financial Inclusion (CFI), Sharma and Chatterjee (2017) argue that globally, 2 billion people and in India, 37 percent people are excluded from the formal financial system. In this context, it is necessary

to know what are the factors that restrict people from participating in formal sector banking?

There are various social, economic, cultural, and institutional factors that are responsible for an individual's chances to participate in the formal financial system. Sometimes the socioeconomic factors restrict the individual to take part in the formal financial system, and sometimes other factors like cultural, religions, and institutional reasons disallow the individuals to participate in the banking system. Some of the social factors such as individual's gender identity (see Arnold & Gammage, 2019; Barik & Sharma, 2018, 2019, 2020; Ghosh & Vinod, 2017), social identity (like caste and religion), low income, family size, dependency ratio, location of habitant (like rural or urban), age group, and literacy level play a significant role for the individual to be included within the formal banking system. Similarly, on the other side, the number of staffs present in the bank, the discriminatory behavior of the bank staffs, the availability of machines in the bank, the supply of electricity, and the availability of transport facilities like road, autorickshaw, bus, and so on, also determine the chances of an individual to participating in the banking activities.

All the social, economic, cultural, and institutional factors of financial inclusion can be simply divided into two main categories, namely, demand and supply factors. Hence, we can alternatively argue that both demand-side and supply-side factors are responsible for enhancing the process of financial inclusion in a country. In India, some studies have been conducted to identify the various determining factors of financial inclusion (e.g., see Kaur & Kapuria, 2020; Kumar, 2013; Nandru et al., 2016; Raichoudhury, 2020; Sahoo et al., 2017), but all these studies are undertaken either from demand side or from supply side only. There is a shortage of studies showing the effect of both demand- and supply-side factors altogether on financial inclusion. Additionally, previous studies have considered limited proxies of financial inclusion as per their availability and suitability. Moreover, the earlier studies conducted in India have used the Euclidean

distance-based method for measuring financial inclusion. Hence, understanding the gap in the earlier research, this study takes a greater number of financial proxies and tries to construct a composite index of financial inclusion among the 28 Indian states. Unlike earlier studies, this study uses the principal component analysis (PCA) method to construct a composite financial inclusion index (FII). And lastly, considering both demand-side and supply-side factors separately, this study tries to know the impact of these two sides differently on financial inclusion among Indian states.

Review of Literature

The process of financial inclusion is constrained by both demand-side and supply-side factors. The demand-side determinants of financial inclusion include economic status, social identity, educational training, and cultural/religious characteristics of the individuals. Similarly, the supply-side determinants of financial inclusion comprise infrastructural facilities, well-trained bank staff, and pro-financial inclusion policies by the government. While finding the determinants of financial inclusion, it was observed that there are handful studies conducted in cross-country context, and a few other studies are also conducted with African country context. Researchers like Nguyen (2020), Eldomiaty et al. (2020), and Bozkurt et al. (2018) have conducted their studies at the cross-country level to know the factors determining financial inclusion. Similarly, other researches, such as Soumaré et al. (2016), Zins and Weill (2016), Evans (2016), Wokabi (2018), Akileng et al. (2018), and Lotto (2018), have tried to measure the determining factors of financial inclusion within African countries context.

However, in the context of India, few researchers have tried to know the determining factors of financial inclusion. Kumar (2013) conducted a study with annual data of 29 states in India from 1995 to 2008. The findings of the study depicted that supply-side determinants like bank branch expansion and employment-generating scheme

have a significant impact on the expansion of financial inclusion. Conversely, the demand-side factors like employee base and level of industrialization have influential impact on financial inclusion. Nandru et al. (2016) conducted a primary survey in Pondicherry (India) to know the socio-economic determinants of financial inclusion. The author used various social and economic variables (such as income level, age, gender dimension, employment status, and education level) to know the determining factors of financial inclusion. The result of the study shows that level of income and education have a significant impact on financial inclusion, which is measured by ownership of bank account. A different kind of study was conducted by Sahoo et al. (2017) among the tribals in Odisha (India) to know the determining factors of financial inclusion among the tribal people. A primary survey was conducted with 300 households in two districts of Odisha (i.e., Bolangir & Mayurbhanj). From the result, it was found that almost 72 percent of households did not have any savings accounts in their names. Similarly, almost 98 percent of people did not have even a post office savings accounts in their names. The result showed that the level of education of the household head, size of land ownership, household income, and participation in the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) are the major factors that determine the degree of financial inclusion among the tribal people in Odisha. Recently, Raichoudhury (2020) conducted a study on 28 Indian states to know the various socioeconomic factors determining financial inclusion across the Indian states. Using the Wroclaw Taxonomic Approach, the study measures financial inclusion in a composite manner. The study finds that the state of Goa tops the list, while state like Nagaland occupies last rank in the financial inclusion rank list. The further economic analysis of the article finds that income, infrastructure, and employment opportunities are the significant predictors of financial inclusion among the Indian states. Another recent study was by

Kaur and Kapuria (2020), which tries to find out the determining factors of financial inclusion in rural India. Further, the study also tries to look at the role of gender in determining financial inclusion in rural India. Similarly, a recent study was conducted by Kumar Vaid et al. (2020) to know the determinants of financial inclusion in low-income rural segments in Raipur, Chhattisgarh. The study used factor analysis to identify the determinants of financial inclusion. The findings of the study suggest that financial service outreach and penetration are significant determinants of financial inclusion.

Model Specifications, Variable Selection, and Econometric Methods Used

Construction Financial Inclusion Index

Measuring a holistic and unbiased composite FII is a challenging assignment for the researchers. Meanwhile, previous studies (Arora, 2010¹; Chakravarty & Pal, 2013²; Gupte et al., 2012; Sarma, 2008³) have used different methods (like distance-based approach adopted by UNDP to compute Human Development Index (HDI), Analytical and Hierarchical Process (AHP) and axiomatic approach) to compute the index of financial inclusion. Each method has its own merits and demerits for computation of the index. Most of the studies have used AHP for the weights of the variables in the composite index construction. However, the problem with AHP is that there is no prior information available about the weight of a particular variable (Lenka & Barik, 2018). So, AHP may not be a good method to find out the weight of factors included in the multidimensional index. Also, looking at the volatile nature of financial access variables, AHP, and distance-based approaches may not solve unbiased index construction.

To overcome these deficiencies, the present study relies on the statistical procedure for the construction of the weights of the factors, that is, PCA⁴ method. Though ‘N’ number of financial inclusion

indicators can be used as a proxy for financial inclusion, here, as per the availability of state-level data for the period of 1993–2015, the study has used six financial access indicators to construct a single holistic FII. All six indicators have been collected from the Scheduled Commercial Banks of the RBI. The six indicators included in the FII are (a) number of bank branches in proportion to 1,000 population (BB), (b) number of bank employees as the ratio of bank branches (BE), (c) deposit bank accounts in proportion to 1,000 population (DBA), (d) credit bank accounts in proportion to 1,000 population (CBA), (e) amount of deposit as the percentage of state GDP (DEP), and (f) amount of credit as the percentage of state GDP (CRE).

In the PCA method, first we calculate the factor scores (weights) through their eigenvalues. Then we calculate the factor score (weights) of each variable and multiply it with the respective original variable. Unlike other methodologies, PCA assigns equal weight to every variable (Kendall, 1939; Lenka & Barik, 2018). Finally, we add them together to get the single value of the composite index for i^{th} state for a particular time period t . Hence, for constructing a single index of financial inclusion, the formula is expressed as

$$FII_i = \sum_{i=1}^p W_{ji} X_{pi} \quad (1)$$

By expanding this equation, it can be expressed as

$$FII_i = W_{i1}X_1 + W_{i2}X_2 + W_{i3}X_3 + L + W_{ip}X_p, \quad (2)$$

where FII_i is the FII, W_i is the weight of the factor coefficient, X is the respective original value of the component, and p is the number of variables used.

Finally, FII for all Indian states is calculated using these below cited variables:

$$FII_i = W_{1i}BB_i + W_{2i}BE_i + W_{3i}DBA_i + W_{4i}CBA_i + W_{5i}DEP_i + W_{6i}CRE_i. \quad (3)$$

Here, the FII for all the Indian states are calculated by adding together the entire factor scores

(weights) and their respective original values. FII_i is the FII of i th state and W_1, W_2, \dots, W_6 are the weights of different factor scores.

Demand-Side Determinants of Financial Inclusion

Though there are wide range of demand-side factors that can be used as the determinants of financial inclusion, as per the availability of secondary data for the time period 1993–2015 for 28 Indian states, this study has considered four demand-side factors: literacy rate, rate of unemployment, per capita GDP, and percentage of rural population. The data for this analysis are collected from various secondary data sources, such as the Census of India, Centre for Monitoring Indian Economy (CMIE), RBI, and so on. All the used demand-side indicators are well supported by the existing literature. Here, the study uses the composite index of financial inclusion as the dependent variable, and the four demand-side factors are used in the independent variable side of the equation. Using unbalanced panel data regression, the study attempts to isolate the key predictors of financial inclusion. The regression equation for this estimation can be expressed in the following manner.

$$FII_{it} = \alpha + \beta_1 LIT_{it} + \beta_2 UNEMP_{it} + \beta_3 PCSGDP_{it} + \beta_4 R_POP_{it} + \beta_5 Reg_Dum_{it} + \varepsilon_{it} \quad (4)$$

In the above regression equation, FII is the composite index of financial inclusion, which is used in the dependent variable side. Similarly, in the independent variable side, the sign α is the constant term, whereas $\beta_1, \beta_2, \beta_3,$ and β_4 are the coefficient values of the four independent variables. Similarly, β_5 indicates the coefficient value of the regional dummies, and ε_{it} is the error term. Here, i indicate the individual states like 1, 2, 3, ... 28 and t refers to the time period such as 1993, 1994, 1995, ... 2015. As the analysis is intended for the state-level data of India, to capture

the different zonal impacts on financial inclusion, the study has considered dummy variables in the regression model. The study has collected data for 28 Indian states from 1993 to 2015 for its analysis. Here, all 28 Indian states are classified into six zones (i.e., Central India, East India, Northern India, Northeast India, Southern India, and Western India). Therefore, in order to capture the six zonal effects on financial inclusion, the study uses five dummies based on the $n - 1$ econometric rule. The main intention of including the zonal effect in the regression is to check whether there are regional factors that are having an impact on financial inclusion. As India is a vast country covering vast areas of land, there is a wide range of socioeconomic variation among people's living standards and government policies as well. Hence, in order to capture the varieties of socioeconomic inequalities within the different regions of India, region dummies have been used in this study.

In order to empirically investigate the impact of various demand-side factors on financial inclusion, the study has used four different econometric models (i.e., fixed effect [FE], random effect [RE], panel-corrected standard error [PCSE], and feasible generalized least squares [FGLS]). First, on the basis of the Hausman test, the best-fit model was determined, and then, in order to remove the problems of autocorrelation and heteroscedasticity from the dataset, the study used PCSEs. Finally, the study uses FGLS to check the robustness of the results.

Description of Explanatory Variables for Demand-Side Determinants

Literacy (LIT): The rate of literacy is an essential ingredient for determining the progress of financial inclusion. In order to gain a basic understanding of banking activities and to have a fuller participation in banking system, a person needs to have a basic level of education. A literate person will be able to understand the various financial products and services available by the formal financial system. Similarly, for opening a savings

bank account, applying for credit, and using various modes of modern digital payment technologies, a basic level of education is required (see Bhuvana & Vasantha, 2016; Datta & Singh, 2019; Lenka & Barik, 2018; Izquierdo & Tuesta, 2015; Park & Mercado, 2017; Siddik et al., 2015). Hence, it is assumed that the rate of literacy is positively associated with the enhancement of financial inclusion.

Unemployment (UNEMP): The employment status of people also plays a very significant role in determining the expansion of financial inclusion. First, when an individual is employed (either in formal or informal sector), he/she receives income, which ultimately pushes him/her to open a bank account for saving. Second, employment in the formal sector automatically links the employees with the formal banking system because the formal employees receive their monthly salary through their bank accounts. Hence, a rise in formal employment is more likely to increase the level of financial inclusion (Lenka & Barik, 2018). Conversely, people with unemployed status or irregular income pattern are less likely to participate in the formal banking sector. Their unemployment status and lack of regular income discourage people from participating in the formal banking system (Lenka & Barik, 2018; Sarma & Pais, 2011).

Per Capita State GDP (PCSGDP): Per capita state GDP has a significant role to play in enhancing financial inclusion. The rise in per capita income of the individual raises the economic status of the person and equally persuades the individual to open a bank account in her/his name (Datta & Singh, 2019; Kumar, 2013; Lenka & Barik, 2018; Sarma & Pais, 2011). Similarly, the rise in income encourages a person to make various kind of investments and financial transactions. Correspondingly, the rise in per capita income enforces individuals to use cashless payment systems by relying on modern digital technology, which ultimately enhances their banking habits. Hence, per capita income is the most essential element of financial inclusion. It is expected that per

capita income is positively associated with financial inclusion.

Rural Population (R_POP): The geographical location of the population is also a significant indicator of financial inclusion. It is quite often observed in India that people from rural areas mostly rely on their friends, relatives, or the local money lender for their financial needs. The primary objective of financial inclusion is to extend the financial products and services to the last mile of the globe, but people from rural and remote areas are mostly excluded from the formal financial system. The lack of banking knowledge, low income, less presence of banking, less literacy, and low investment profile of the village people restrict them to participate in the formal banking system (Lenka & Barik 2018; Izquierdo & Tuesta, 2015; RBI, 2015; Siddik et al., 2015). Furthermore, it is assumed that the demand for banking products is lower in rural areas. Hence, because of less demand and less participation of village people in the banking system, the presence of more rural people can hinder the process of financial inclusion. Therefore, rural people are expected to have a negative relationship with financial inclusion.

Supply-Side Determinants of Financial Inclusion

Similar to demand-side variables, there are diverse supply-side factors that can be used as supply-side predictors of financial inclusion, but as per the availability of secondary data for all Indian states from 1993 to 2015, this study has considered only four factors: road length, electricity, social sector expenditure (SSE), and capital receipt (CR). The data for roads and electricity have been collected from CMIE, data regarding state-wise SSE have been gathered from NITI Aayog, and data for capita receipt have been gathered from RBI. Like the demand-side determinants, the study uses similar kind of panel data regression model to identify the key predictors of financial inclusion. In the regression model, the

composite index of financial inclusion is used in the dependent variable side, and all four predictors, along with the error term, are used in the independent variable side. Hence, the regression equation for this estimation can be expressed in the following manner:

$$FII_{it} = \alpha + \beta_1 LOG_R_{0,AD_{it}} + \beta_2 LOG_ELCTY_{it} + \beta_3 SSE_{it} + \beta_4 CR_{it} + \beta_5 Reg_Dum_{it} + \varepsilon_{it}. \quad (5)$$

In the above regression equation, FII is the composite index of financial inclusion, which is used in the dependent variable side. Similarly, in the independent variable side, the sign α is the constant term, whereas $\beta_1, \beta_2, \beta_3$, and β_4 are coefficient values of the four independent variables. Similarly, β_5 indicates the coefficient value of the regional dummies, and ε_{it} is the error term. Here, i indicate the individual states like 1, 2, 3, ... 28 and t refers to the time period such as 1993, 1994, 1995, ... 2015. Similar to demand-side determinates, the study has also used dummy variables to capture the effect of regional characteristics on financial inclusion. The use of a number of dummy variables and the reasons for this follow the same explanations as demand-side determinants.

Like demand-side determinates, the study has also endeavored to find out the supply-side determinants of financial inclusion. Using four different econometric models (i.e., FE, RE, PCSE, and FGLS), the study examined the impact of each individual factor on financial inclusion. Like the demand-side determinants, here also the study relied on the Hausman test to know whether the FE is best-fit model over RE or vice versa. Looking at the nature of panel data (i.e., both time and cross-sectional dimensions), the study assumed the presence of autocorrelation and heteroscedasticity. In order to take care of this problem, the study used PCSEs. Finally, at the end, the study uses FGLS to check the robustness of the results.

Description of Explanatory Variables for Supply-Side Determinants

Road Length: Geographical proximity plays a significant role in the matter of financial service availability and accessibility (Brevoort & Wolken, 2009). India being a vast country, covering a wide range of geographical territories, including many hilly and remote areas, where it is quite difficult to provide safe and affordable banking services. Visiting a long-distance bank to access banking services always involves high monetary and time cost. The monetary cost due to long distance is directly associated with the number of transactions the customer wishes to do with the bank (Ghosh, 2020). For example, people like small business owners, street vendors, and small shopkeepers are often more likely to visit the bank for their financial transaction, but when they face hurdles because of the long distance, they obviously tend to reduce their number of visits to the bank. Consequently, these things will create barriers in the process of financial inclusion. Similarly, long-distance travel can also create asymmetric information bias among customers and bankers. Because of both time and money consumption, customers will hesitate to visit the bank to obtain any required information, which will ultimately restrict them to associate with bank. Hence, long-distanced road travel is expected to have a negative impact on the financial inclusion process.

Electricity (ELCTY): In recent years, the Indian economy has witnessed high-speed growth in digital payment technologies (Barik & Sharma, 2019). Financial institutions in India in general and banking sectors in particular have perceived a paradigm shift in the usage of digital technology in their financial transactions. This has undoubtedly altered the style of operation, organizational structure, and strategy of building inter- and intra-banking relationships among the banks in India (Campanella et al., 2017). Moreover, India's recent

digital technological upgradation is driven by innovations in mobile/internet banking, the use of various UPIs (Unified Payments Interface), and the use of high-speed internet/Wi-Fi services. Over the past few years, the Indian market has observed a decline in cash-based transactions with corresponding rise in digital transactions. Correspondingly, the rise of internet banking has enabled people to access their banking services with a single finger click without visiting physical bank branches (Lenka & Barik, 2018). Hence, in order to run the various digital technologies in the banking sector in a smooth and uninterrupted way, a constant supply of electricity is required. Without the constant supply of electricity, it would be quite difficult for bankers to run computers, ATM machines, biometric machines, and so on, which will surely hamper the process of financial inclusion. On the other hand, the frequent cut in electricity would lead to slow processing in banking activities, which would alternatively force customers to have a long queue in front of the bank. This kind of problem is most often seen in remote areas of India. So, the uninterrupted supply of electricity is expected to have a positive impact on the process of financial inclusion.

Social Sector Expenditure (SSE): In recent years, India has witnessed a speedy rise in SSEs. In every development sector, like health, education, sanitation, food security, LPG gas cylinder, and mid-day meal, the government is spending heavy amount of money every year. Correspondingly, with the rise in government spending on social expenditures, the corruption through the middleman has also increased drastically. Whether it comes to the case of wage distribution through MGNREGS or it may be the case of school mid-day meals, everywhere the middleman is doing enormous amount of corruption. Consequently, these developmental schemes are not able to reach the real beneficiaries. Realizing this problem, in order to mitigate the middleman corruption, recently the GoI and many state governments have started sending money directly to the beneficiaries' bank/post office

accounts through DBT schemes. Hence, in order to receive any government help or subsidies (like old age/widow pension, gas subsidy, money for mid-day meal, and so on), the beneficiary needs to have a bank or post office account in her/his name. Hence, it is expected that the rise in SSE is intended to have a positive impact on the enhancement of financial inclusion process.

Capital Receipt (CR): Similarly, the amount of CR can also indirectly impact the process of financial inclusion. The rise in CR would enhance government resources, and that would encourage the government to spend more money on SSE. As discussed in the earlier section, the increase in SSE will automatically enforce individuals to connect with the formal sector banks to reap the government benefits. Hence, the CR is expected to have a positive effect on the process of financial inclusion.

Empirical Results and Discussions

Results and Discussions of the Demand-Side Determinants of Financial Inclusion

Here, the results of the demand-side determinants of financial inclusion are presented in Table 1. The study has used four demand-side determinants: LIT, UNEMP, PCSGDP, and R_POP. The constructed composite index of financial inclusion is used here in the dependent variable side, and the four demand-side factors are used in the independent variable side along with the error term.

The overall results from Table 1 depict that literacy rate and the per capita state GDP have a positive impact on financial inclusion, whereas the other two variables, such as the rate of unemployment and the percentage of rural population, have a negative impact on financial inclusion across the 28 Indian states from the time period 1993 to 2015 (see Table 1). If we observe the results from the individual variable perspective, then it can be noticed that the first variable (i.e., LIT) is having a negative impact on financial inclusion in the FE and RE

Table 1. Regression Results of the Demand-Side Determinants.

Variable	FE	RE	PCSE	FGLS
LIT	-84.6151 (132.2885)	-210.5056 (134.2875)	210.5056*** (42.7362)	210.5056 (133.2002)
UNEMP	1.2293*** (0.1195)	1.2284*** (0.1216)	-1.2284*** (0.1360)	-1.2284*** (0.1206)
PCSGDP	1657.622*** (158.8182)	1690.286*** (93.5273)	1690.286*** (109.1149)	1690.286*** (92.77)
R_POP	-0.7806*** (0.1349)	-0.7670*** (0.1289)	-0.7670*** (0.0811)	-0.7671*** (0.1279)
North	5.3690*** (1.4968)	5.5499*** (1.5156)	5.5499*** (0.4149)	5.5499*** (1.5033)
Northeast	-6.3846*** (1.5062)	-5.9197*** (1.5471)	-5.9197*** (0.7592)	-5.9197*** (1.5345)
East	3.6764* (1.6119)	3.9105* (1.6551)	3.9105*** (0.5211)	3.9105* (1.6417)
South	8.0253*** (1.5965)	8.4474*** (1.6264)	8.4474*** (0.8429)	8.4474*** (1.6133)
West	16.4683*** (1.8358)	16.7719*** (1.7446)	16.7719*** (1.1648)	16.7719*** (1.7305)
Central	163.7409 (238.9259)	390.6465 (242.5238)	390.6464*** (76.8496)	390.6464 (240.56)
Obs.	620	620	620	620
R-squared	0.6823	0.6829	0.6829	
F-statistics	120.83			
Prob. (F-statistics)	0.0000			
Wald chi-square		1,313.52	8,922.90	1,335.05
Prob > chi-square		0.0000	0.0000	0.0000
Log likelihood				-2,186.338
Hausman test		-35.31		
No. of states	28	28	28	28

Note: Standard errors in parentheses. *p < 0.10, **p < 0.05, ***p < 0.01.

models. However, after controlling the standard error and the issues of autocorrelation and heteroscedasticity, we found a positive effect in the PCSE and FGLS models. That means it can be said that the literacy rate is having a positive impact on the expansion of financial inclusion. The study has obtained its results as per the expectation. Because the more people are literate, they would prefer to use the formal sector banking activities instead of relying on the informal money market. In the past decades, both the central government and many state governments have undertaken pro-active policy measures to boost the overall literacy rate in India. The post-liberalization period has seen a number of policy reforms in the education sector. The implementation of *Sarva Shiksha Abhiyan* (education for all), right to education policy, provision of mid-day meals, free books, dress codes, cycles, and scholarships are some of the eye-catching recent initiatives that have helped students from rural and marginalized sections of society to participate in school education (Bazaz, 2016; Venkatanarayanan, 2015). Similarly, post-liberalized India has also witnessed the rise of private schools across the states. These private schools have also helped to raise the literacy level in India. The combination of these policy reforms has helped to enhance the basic literacy rate in Indian states, which has ultimately assisted in enhancing the process of financial inclusion across the states. Other researchers have also used literacy rate as a determining factor for financial inclusion. The results of their study suggest that literacy level plays a significant role in enhancing the process of financial inclusion (see Akileng et al., 2018; Bhuvana & Vasantha, 2016; Kaur & Kapuria, 2020; Raichoudhury, 2020; Sahoo et al., 2017; Soumaré et al., 2016; Wokabi, 2018; Zins & Weill, 2016). Similarly, the second variable (i.e., unemployment rate) has a negative impact on financial inclusion. Like literacy, in the FE and RE models, we found a positive impact of unemployment on financial inclusion. However, after controlling the issues of standard error, autocorrelation, and heteroscedasticity, we found a

positive result in the superior models. It is expected that the higher level of unemployment will reduce the income level of the individuals, which will discourage them from opening a bank account or saving money in their account. In this course, the unemployment rate is having a negative and significant impact on the process of financial inclusion (Akileng et al., 2018; Raichoudhury, 2020; Wokabi, 2018). Likewise, per capita state GDP has a positive and significant impact on financial inclusion. As the rise in income raises the demand for banking services and encourages people to participate in banking activities by opening a bank account or saving money in their account. Hence, rising individual income can be considered a primary factor in demanding more financial products and services from banking institutions (Bhuvana & Vasantha, 2016; Kumar, 2013; Raichoudhury, 2020; Soumaré et al., 2016; Uddin et al., 2017). Similarly, the last variable (i.e., rural population) shows that the presence of a higher percentage of rural population negatively impacts financial inclusion across the 28 Indian states. As it is known, rural people have a high number of illiteracy (both in terms of basic literacy and financial literacy) and low income; hence, these factors discourage them from demanding more banking services.

Similarly, the results from the regional dummies depict that regions like Northern, Southern, Western, and Eastern have a positive impact on financial inclusion, whereas only Northeast region has a negative impact on the demand for financial inclusion. As most of the Northeast regions are coming under the lower ranks of financial inclusion (see Table A2), this region is showing a negative relationship with financial inclusion.

Results and Discussions of the Supply-Side Determinants of Financial Inclusion

Like demand-side determinants, here the study has discussed the impact of supply-side factors on financial inclusion across the 28 Indian states from the time period of 1993 to 2015. The study has used four

Table 2. Regression Results of Supply-Side Determinants.

Variable	FE	RE	PCSE	FGLS
LOG_ROAD	0.3176 (1.7209)	9.0150*** (1.5524)	10.7231*** (1.7481)	10.7231*** (1.5169)
LOG_ELCTY	0.4588 (0.9749)	3.5157*** (0.9858)	4.5448*** (0.7925)	4.5448*** (1.0083)
SSE	8.3045*** (1.3883)	2.9616*** (1.0271)	6.5127*** (1.5064)	6.5127*** (0.8716)
CR	2.0441* (0.8185)	0.5555 (0.8506)	0.7209 (1.0617)	0.7209 (0.8312)
North	6.4083*** (1.7895)	7.0645*** (7.0644)	7.9264*** (0.7095)	7.9264*** (2.0517)
Northeast	-10.9124*** (2.0480)	-5.4857* (2.1872)	-3.9133*** (1.3405)	-3.9133* (2.2756)
East	4.5704* (1.9047)	2.6185* (2.0809)	2.5430*** (0.5849)	2.5431* (2.1759)
South	14.423** (1.8647)	13.4423 (2.0449)	13.7071*** (1.1794)	13.7071*** (2.1389)
West	26.6798*** (1.9784)	26.0547*** (2.17060)	26.5294*** (1.4552)	26.52936*** (2.269323)
Central	69.0224*** (5.6839)	41.0011*** (5.6395)	31.6336*** (5.8891)	31.6336*** (5.6918)
Obs.	620	620	620	620
R-squared	0.6488	0.5025	0.4390	
F-statistics	69.88			
Prob. (F-statistics)	0.0000			
Wald chi-square		479.22	2,192.65	485.10
Prob > chi-square		0.0000	0.0000	0.0000
Log likelihood				-2,363.186
Hausman test		97.03*** (0.0000)		
No. of states	28	28	28	28

Note: Standard errors in parentheses. *p < 0.10, **p < 0.05, ***p < 0.01.

supply-side factors: road length (LOG_ROAD), electricity supply (LOG_ELCTY), social sector expenditure (SSE), and capital receipt (CR). The FII is used in the dependent variable side, and the four supply-side factors are used in the independent variable side along with the error term. The results of the supply-side determinants are presented in Table 2.

The results from Table 2 demonstrate that all four independent variables (i.e., LOG_ROAD, LOG_ELCTY, SSE, and CR) are having a positive and significant impact on financial inclusion across the 28 Indian states. Here, variables like road length and electricity are used to indicate the infrastructural development across the states. The regression results suggest that road length and electricity supply will have a positive and significant impact on the process of financial inclusion across the Indian states. These results are quite obvious because the rise in road length would raise the connectivity possibility, which would encourage customers to frequent participation in banking activities. It has been often observed that the unavailability of good connectivity discourages customers from frequent visits to banks. Correspondingly, the unavailability of road connectivity is more cost-effective in both money and time sense. The customer has to spend more money and time in order to reach the bank branch office. Therefore, better road connectivity can eradicate this problem, and customer could ably save both their money and time. Hence, the provision of good road connectivity would increase customers frequency to visit bank branches. Similarly, another infrastructural facility, such as electricity supply, can equally help raise financial inclusion. The constant and uninterrupted electricity supply to bank branches helps to speed up banking activities and enhance banking productivity. Many times, it has been observed that due to frequent electricity cut in rural areas, customers have to wait for long hours in queue in front of the bank office or at the ATM machine to obtain their banking services. So, the provision of better electricity supply can help increase banking productivity and enhance the financial inclusion process.

Similarly, among the economic factors, the results show that SSE is having a positive and significant impact on financial inclusion. Likewise, the CR is also having a positive impact, but it is insignificant in nature (see Table 2). This means that higher government expenditure on various social activities encourages people to participate in banking activities. When the government spends more money to provide various subsidies and pensions (like old age pension, window pension, physical disability pension, and so on), it encourages many underprivileged individuals to open a bank account in order to reap the government benefits. The recent opening of the *Jan Dhan Yojana* account would be the best example in this context. The GoI has enabled poor and marginalized people to open a bank account with zero balance. On the other hand, in order to reduce the corruption caused by middlemen, the government is directly transferring money to the bank/post office accounts of the beneficiaries. Correspondingly, both the central government and many state governments in India are extending housing and sanitation by providing *Pradhan Mantri Gramin Awaas Yojana* (for rural poor), *Pradhan Mantri Awas Yojana* (for urban poor), *Biju Pucca Ghar Yojana* (under the Odisha state government), and building household toilets under *Swachh Bharat Mission Scheme*. Similarly, many state and central governments are also providing various kinds of scholarships to school-going children, transferring money to girl's child's account for buying bicycle, dresses and books to promote girls' participation in education. Hence, opening a bank account is the primary precondition for people to obtain various government assistance. Therefore, spending on SSE would surely enhance the process of financial inclusion among the Indian states.

Like demand-side results, here our regional dummies for supply-side determinants also follow the same results. That is, regions like Northern, Southern, Western, and Eastern have a positive impact on financial inclusion, whereas only the Northeast region has a negative impact on financial inclusion.

After regressing two isolated regressions for both the demand- and supply-side determinants of financial inclusion, now the study tries to combine these two sides and endeavors to see if any divergent outcome is coming because of combining two sides of factors. The results of the combined factors are presented in Table 3. However, the study did not observe any divergence from the main results after taking the combined factors together (see Table 3). The study found that for all the combined factors, the signs remained same, like earlier

demand- and supply-side determinants. However, in the combined results, some changes have been observed in the case of coefficient values, their standard errors, and the level of significance compared to the earlier two regression results (i.e., demand- and supply-side determinants results).

Conclusion and Policy Suggestions

The primary objective of this study is to empirically examine the determinants of financial

Table 3. Measuring the Determinants of Financial Inclusion with Combined Sample.

Variable	FE	RE	PCSE	FGLS
LIT	-53.9082 (132.1941)	-199.1565 (135.1486)	199.1565*** (49.92472)	199.1565 (133.6141)
UNEMP	1.3339*** (0.1370)	1.2570*** (0.1390)	-1.2570*** (0.2016)	-1.2570*** (0.1374)
PCSGDP	1,634.059*** (165.7312)	1,758.028*** (133.1972)	1,758.028*** (97.2594)	1,758.028*** (131.6848)
R_POP	-0.8799*** (0.1917)	-0.5716*** (0.1809)	-0.5716*** (0.0986)	-0.5716*** (0.1789)
LOG_ROAD	4.7253*** (1.5496)	1.0038 (1.39)	1.0038 (1.1157)	1.0038 (1.3742)
LOG_Electricity	0.7159 (0.9669)	0.3298 (0.8863)	0.3298 (1.0803)	0.3298 (0.8762)
SSE	1.7435 (1.4439)	0.3009 (0.8189)	0.3009 (0.7384)	0.3009 (0.8096)
CR	1.4047* (0.7014)	-0.1884 (0.6343)	0.1884 (0.6580)	0.1883 (0.6271)
North	4.2745*** (1.5441)	5.0389*** (1.5927)	5.0389*** (0.4641)	5.0389*** (1.5746)
Northeast	-5.4953*** (1.7949)	-6.9209*** (1.7424)	-6.9209*** (0.7929)	-6.9209*** (1.7226)
East	2.5043 (1.6403)	3.6169* (1.6888)	3.6169*** (0.5527)	3.6169* (1.6696)
South	7.0022*** (1.6541)	8.6283*** (1.6550)	8.6283*** (0.8413)	8.6283*** (1.6362)

(Table 3 Continued)

(Table 3 Continued)

Variable	FE	RE	PCSE	FGLS
West	15.1827*** (15.1827)	16.2749*** (1.8278)	16.2749*** (1.1596)	16.2749*** (1.8070)
Central	107.7966 (238.5903)	377.4932 (243.8445)	377.4932*** (88.9446)	377.4932 (241.0757)
Obs.	620	620	620	620
R-squared	0.6636	0.6842	0.6842	
F-statistics	85.75			
Prob. (F-statistics)	0.0000			
Wald chi-square		1,312.84	15,971.19	1,343.17
Prob > chi-square		0.0000	0.0000	0.0000
Log likelihood				-2,185.052
Hausman test		0.56 (1.0000)		
No. of states	28	28	28	28

Note: Standard errors in parentheses. *p < 0.10, **p < 0.05, ***p < 0.01.

inclusion in post-liberalized Indian states. In order to execute the study, it has gathered data from diverse state-level data sources. For constructing the FII among the Indian states, the study has used the PCA method. However, it has used various regression models, such as FE, RE, PCSE, and FGLS, for its empirical analysis. The empirical findings of this study illustrate that among the four demand-side determinants (i.e., LIT, rate of unemployment, per capita state GDP, and percentage of rural population) of financial inclusion, LIT and PCSGDP have a positive impact on financial inclusion, whereas other two variables like rate of UNEMP and R_POP have a negative impact on financial inclusion. Similarly, with context to the four supply-side determinants (i.e., road length,

electricity supply, SSE, and CR) of financial inclusion, our empirical findings show that all four variables are having a positive and significant impact on the process of financial inclusion among the 28 Indian states.

Policy Implications

Based on our empirical findings, this study takes the opportunity to suggest the following thoughts for policy consideration.

As the demand-side determinants results show that literacy and per capita state GDP have a positive impact on financial inclusion, the study suggests that both the central and state governments should endeavor to increase the

literacy rate and per capita income of the citizens, and the financial institutions should try to promote financial literacy in order to enhance the process of financial inclusion. Similarly, as the results show, the rate of unemployment and percentage of rural population have a negative impact on financial inclusion; hence, it is advised that the government should try to reduce the rate of unemployment in the country and provide basic services to rural areas (like increasing rural literacy, increasing rural income, providing basic banking facilities, and so on), so that the rural people will not be excluded from the formal banking system.

Similarly, our supply-side determinants results depict that all four variables (i.e., road length, electricity supply, SSE, and CR) have a positive impact on financial inclusion. Hence, based on these results, it is advised that both central government and all state governments should extend more infra-structural and economic support, so that more people can be brought into the formal banking system.

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Notes

1. For each dimension, we have n number of variables: $D_i = X_1, X_2, X_3 \dots X_n$. For each variable, we

compute D^i using the following formula: $d_i = A_i - m_i / M_i - m_i$, where A_i = actual value of X_i , m_i = minimum value of X_i , and M_i = maximum value of X_i . $D_i = (d_{i1} + d_{i2} + d_{i3} \dots d_{in}) / n$
 $FAI = D_i \Gamma W_i / D_i \Pi W_{ii} + D_i \text{III} * W_{iii}$, where FAI = Financial Access Index, W_i , W_{ii} , and W_{iii} are the weight to three dimensions.

2. $A_r(x_i, m_i, M_i) = (x_i - m_i / M_i - m_i)^r$, where $0 < r < 1$ is a constant. The parameter r can be interpreted as an inclusion sensitivity parameter in the sense that given x_i, m_i , and M_i , as the value of r decreases $A_r(x_i, m_i, M_i)$ increases. We now state the following four basic axioms for an arbitrary indicator A of an individual functioning and analyse the index in terms of these axioms. *Normalization*: $A(x_i, m_i, M_i) = \{1$ if and only if $x_i = M_i$, 0 if and only if $x_i = m_i$. *Monotonicity*: Given m_i and M_i , for any $\delta > 0$ such that $x_i + \delta \in [m_i, M_i]$, $A(x_i + \delta, m_i, M_i) - A(x_i, m_i, M_i) > 0$. *Homogeneity*: For any $c > 0$, $A(x_i, m_i, M_i) = A(cx_i, cm_i, cM_i)$. *Lower difference in gain at higher levels of attainment difference*: Let $x_i \in [m_i, M_i]$ be any attainment level for functioning i . Then, for any $\delta > 0$ such that $x_i + \delta \in [m_i, M_i]$, the magnitude of gain in the indicator of functioning i , $A(x_i + \delta, m_i, M_i) - A(x_i, m_i, M_i)$, is a decreasing function of x_i . By averaging the individual indicators across functioning, we get the Financial Inclusion Index (FII): $I_r(A_r(x_i, m_i, M_i), \dots, A_r(x_k, m_k, M_k)) = \frac{1}{k} \sum_{i=1}^k (x_i - m_i / M_i - m_i)^r$.
3. $D_i = A_i - m_i / M_i - m_i$, where = actual value of dimension of i , m_i = minimum value of dimension i , M_i = maximum Value of dimension i . The value of D_i is $0 \leq D_i \leq 1$. A country i will be represented by a point $D_i = (d_{i1}, d_{i2}, d_{i3}, \dots, d_{in})$ on the n dimensional Cartesian space. Index of Financial Inclusion (IFI) $= 1 - \sqrt{(1-d1)^2 + (1-d2)^2 + \dots + (1-dn)^2} / \sqrt{n}$.
4. $Y_k = W_k X_p$. The first step in PCA to create a maximum variance linear function of the n variables in the matrix x , on the form: $Y_1 = W_{11}X_1 + W_{12}X_2 + \dots + W_{1n}X_n$. The second maximum variance linear function: $Y_2 = W_{21}X_1 + W_{22}X_2 + \dots + W_{2n}X_n$. This procedure is then repeated to create a system of maximum variance uncorrelated linear functions up to $Y_n = W_{n1}X_1 + W_{n2}X_2 + \dots + W_{nn}X_n$.

Appendix

Table A1. Components of Financial Inclusion Index.

Variables	Definition	Data Sources
BB	Number of bank branches in proportion to 1,000 population	RBI
BE	Number of bank employees as the ratio of bank branches	RBI
DBA	Deposit bank accounts in proportion to 1,000 population	RBI
CBA	Credit bank accounts in proportion to 1,000 population	RBI
DEP	Amount of deposit as the percentage of state GDP	RBI
CRE	Amount of credit as the percentage of state GDP	RBI

Table A2. Status of Financial Inclusion Across the States Over the Years.

State	1993	Rank	2001	Rank	2015	Rank
Haryana	26.97683	5	23.26115	6	54.41994	6
Himachal Pradesh	26.0737	6	25.15859	5	50.87011	8
Jammu and Kashmir	21.9785	8	23.07755	7	49.88385	9
Punjab	37.60291	4	34.56425	2	61.54774	4
Rajasthan	14.6027	15	12.89559	16	30.83058	18
Uttar Pradesh	9.539031	23	6.977314	26	12.65495	28
Arunachal Pradesh	13.97031	18	10.84255	21	20.59341	23
Assam	13.74318	19	12.60687	18	32.66097	17
Manipur	6.918663	25	5.16338	28	20.15459	25
Meghalaya	17.3532	12	13.18883	14	27.86725	20
Mizoram	11.797	21	8.261193	22	35.61518	16
Nagaland	7.604094	24	5.718008	27	20.16395	24
Tripura	18.13729	11	16.74882	10	53.52673	7
Sikkim	11.19629	22	11.45765	19	41.69923	11
Bihar	14.36706	16	8.108157	23	17.84848	26
Odisha	12.49038	20	12.6237	17	40.7244	12
West Bengal	24.72923	7	21.89586	8	45.92991	10

(Table A2 Continued)

(Table A2 Continued)

State	1993	Rank	2001	Rank	2015	Rank
Madhya Pradesh	19.25023	10	11.21049	20	29.68482	19
Andhra Pradesh	14.2189	17	13.15901	15	25.80539	22
Karnataka	16.15218	14	14.37178	13	37.3863	14
Kerala	39.00592	3	34.34499	4	71.1657	3
Tamil Nadu	19.55773	9	19.08693	9	59.73001	5
Gujrat	16.70837	13	14.80828	12	36.94587	15
Maharashtra	39.98575	2	34.43052	3	91.05867	1
Goa	65.41975	1	55.69504	1	87.30442	2
Uttarakhand	N/A		6.997807	25	14.53171	27
Jharkhand	N/A		16.15691	11	37.54776	13
Chhattisgarh	N/A		7.553125	24	26.8673	21

N/A: Refers to the new states which formed in 2001. Hence, Financial Inclusion ranks are not calculated for the year 1993.

Table A3. Demand-Side Determinants of Financial Inclusion.

Variables	Definition	Data Sources
LIT	Literacy rate	Census of India
UNEMP	Rate of unemployment	CMIE
PCSGDP	Per capita state domestic product	CMIE
R_POP	Rural population	Handbook of statistics on India states

Table A4. Supply-Side Determinants of Financial Inclusion.

Variables	Definition	Data Sources
ROAD	Length of roadways	CMIE
ELCTY	Electricity	CMIE
SSE	Social sector expenditure	NITI Ayog
CR	Capital receipt	Handbook of statistics on India states

Table A5. Zonal-Wise Classification of Indian States.

Zonal-Wise Classification of States	
Central India	Chhattisgarh and Madhya Pradesh
East India	Bihar, Jharkhand, Odisha, and West Bengal,
North India	Utter Pradesh, Haryana, Himachal Pradesh, Punjab, Rajasthan, Jammu and Kashmir
Northeast India	Arunachala Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, and Tripura
South India	Andhra Pradesh, Karnataka, Kerala, and Tamil Nadu
Western India	Goa, Gujrat, and Maharashtra

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