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**IS FINANCIAL INCLUSION CAUSE OR OUTCOME?
A STATE-WISE ASSESSMENT IN INDIA**

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Abstract

Financial inclusion is considered as cause as well as outcome of inclusive growth. This study tries to construct a comprehensive measure of financial inclusion and evaluate the extent of financial inclusion for 20 major states in India for the period from 2008 to 2012 using principal component Analysis. Further, it intends to examine the extent of causal relationship between financial inclusion and macroeconomic variables such as agricultural growth, industrial growth and progress in elementary and secondary education for the states. A Panel data analysis claimed strong one way causality between financial inclusion and agricultural growth and elementary education. However, reverse causality which is acclaimed by the theory, doesn't occur.

Keywords: *Financial Inclusion, PCA Analysis, Random effect model, Ordered Probit Random effect model*

JEL Codes: *G21, G32, C30, C33*

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INTRODUCTION

Access to a well-functioning financial system, by creating equal opportunities, enables economically and socially excluded people to integrate better into the economy and actively contribute to economic development and protects themselves against economic shocks. However, availability of adequate and timely finance is still a hindrance for economic development for developing countries like India. Census 2011 estimated that out of 24.67 crore households in the country, 14.48 crore (58.7 percent) households had access to banking services. Of the 16.78 crore rural households, 9.14 crore (54.46 percent) were availing banking services. Of the 7.89 crore urban households, 5.34 crore (67.68 percent) households were availing banking services. In the year 2011, Banks covered 74,351 villages, with population more than 2,000 (as per 2001 census); with banking facilities under the "Swabhimaan" campaign with Business Correspondents (BC's). However the programme had a very limited reach and impact. Out of the total number of saving bank accounts the vast majority are dormant. Status of active 'no frill accounts' is altogether alarming. Across India, less than 10 percent of the 'no frill accounts' are active¹. There are huge demand side constraints along with supply side limitations despite the fact that the subject of providing credit to the poor and, particularly, those who live in rural areas has been explored extensively from time to time in India. The Indian rural institutional financial system has emerged, is a product of both evaluation and intervention. The broad objective of policy intervention have been: a) to institutionalize credit, b) to enlarge its coverage, c) to ensure provision of timely and adequate finance at reasonable rates of interest to as large as segment of rural population as possible. The institutional innovations have been a continuous process with changes occurring depending on experience (Rangarajan, 2005). However, this isolation of the poor from formal financial sector of the country can be sorted out

¹ <http://indiamicrofinance.com/financial-inclusion-india-2014-overview.html>

only by using financial inclusion. Financial inclusion is nothing but the process of ensuring the complete access to financial services at an affordable cost whenever needed by the vulnerable groups such as weaker sections and low income groups. Financial inclusion, more particularly promoted in the wider context of economic inclusion, can uplift financial conditions and improve the standards of lives of the poor and the disadvantaged. However, greater financial inclusion, by providing individuals, households, and small firms with greater access to financial risk-managing tools can enhance resilience and stability of the real economy and thus also the financial system that serves it (Cull, *et. al.*, 2012). However, financial inclusion does not always lead to financial stability in the economy. Policy makers have often endorsed marketing to subprime borrowers as a means of financial inclusion (Collard, Kempson, 2005). With hindsight, it seems clear that such over-extension of credit has the potential to affect the quality of the credit portfolio of banks and financial institutions and could have sown the seeds of financial fragility, and ultimately of financial instability. The position may be further aggravated by regulatory or governmental forbearance which has the potential to vitiate the credit culture amongst the target group. Achieving sustainable financial inclusion will require a systemic effort which leverages technology, viable business models and appropriate regulatory framework cohesively. Indian experience has proved that financial inclusion can work within the framework of financial stability given an enabling regulatory environment. Twin objectives of financial stability and financial inclusion are arguably two sides of a coin but it is imperative that a robust risk-mitigating framework which exploits their complementarities while minimizing the conflicts is adopted to ensure that they do not work at cross purposes². Various models used in India to promote financial inclusion (Gwalani, Parkhi, 2013). First, Lead Bank System, where each district had been assigned to different banks (public

² Address by H.R. Khan, at BANCON, 2011 organised by Indian Bankers Association and IOB, Chennai.

and private) to act as a leader to coordinate the efforts of banks in the district particularly in matters like branch expansion and credit planning. Second is, Correspondent banking where banks use intermediaries as Business Facilitators (BFs) or Business Correspondents (BCs) for providing financial and banking services. Third is, mobile banking. Last but not least is, microfinance model that includes Microfinance system in India including Self Help Groups and Microfinance institutions as well. However, building an inclusive financial system is a complex process. The literature identifies five major forms of financial exclusion – access exclusion, where segments of population remain excluded from the financial system either due to remoteness or due to the process of risk management of the financial system; condition exclusion, when exclusion occur due to conditions that are inappropriate for some people; price exclusion, when the exclusion happens due to unaffordable prices of financial products; marketing exclusion, when exclusion occurs due to targeted marketing and sales of financial products and self-exclusion, that takes place when certain groups of people exclude themselves from the formal financial system owing to fear of refusal or due to psychological barriers (Kempson and Whyley, 1999a, Kempson and Whyley, 1999b). There are similar kinds of experiences observed in different countries. According to the United Nations, the main goals of financial inclusion can be described as: (a) access to a range of financial services at a reasonable cost for all households and enterprises. Such services should be bankable, including savings, short and long-term credit, leasing and factoring, mortgages, insurance, pensions, payments, local money transfers and international remittances. (b) Sound institutions guided by good internal management systems, industry performance standards and performance monitoring by the market. (c) financial and institutional sustainability as a means of providing access to financial services over time and (d) multiple providers of financial services, wherever feasible in order to bring cost-effective and a wide variety of alternatives to customers (Gupte, *et. al.*, 2012). In Brazil, new

regulations were attempted to achieve universal access by enabling partnerships between banks and third-party agents. Being the early leader in agent banking through large-scale introduction of “banking correspondents” to distribute welfare grants to unbanked Brazilians; it aimed to get access to all data on the agents and giving the financial institution enough freedom to articulate the relationship with the agents on their own terms. In Kenya, the e-money transfer service m-PESA offered by mobile network operator Safaricom achieved impressive progress. Philippines launched the first successful mobile payment service in a developing country in 2004. Indonesia proved how public-owned financial institutions may become the driving force behind economic development in the rural areas. Bank Rakyat Indonesia (BRI), a government owned development bank, is the biggest provider of rural financial services within Indonesia. Even when the Indonesian banking system collapsed during the financial crisis in 2008, BRI’s micro-banking division remained relatively profitable. Thereby these achievements in developing countries around the world can serve us as an inspiration to adopt new techniques to serve the poor.³ Furthermore, initiatives for financial inclusion are being announced at regular intervals by Governments, Central Banks of countries and developmental organizations like the United Nations. For example the German Bankers’ Association had introduced a voluntary code in 1996 providing for an ‘everyman’ current banking account that facilitates basic banking transactions. In the United States, the Community Reinvestment Act (1997) requires banks to offer credit throughout their entire area of operation and thus prohibiting them from targeting only the rich neighbourhood. In France, the law on exclusion (1998) emphasizes the right to have bank accounts. In South Africa, a low cost bank account called ‘Mzansi’ was launched for financially excluded people in 2004 by the South African Banking Association. In United Kingdom, the Financial

³ Address by H.R. Khan, at BANCON, 2011 organised by Indian Bankers Association and IOB, Chennai.

Inclusion Task Force had been constituted by the government in 2005 in order to monitor the development of financial inclusion. The British government has set up a fund of Sterling pound 120 million Pound Sterling for addressing issues of financial inclusion. Brazil has urged the state banks to reach out to the rural areas and the poor. Out of the 45 percent deposits that a bank is mandated to hold with the central bank, it is encourage to use 2 percent for micro loans at an interest of 24 to 48 percent. This has helped them gain eight million new customers within a span of three and half years. Kenya has passed a Micro Finance Act in 2006 to provide an impetus to financial inclusion. The central bank of China has also promoted micro lending since 2006 and seven domestic micro credit corporations were established.⁴

The focus of financial inclusion in India at present is confined to ensure the financial access using technological innovations. There could be multiple levels of such inclusion. At one extreme, it is possible to identify the 'super-included', i.e., those who are actively courted by the financial services industry and at the other extreme, we have the financially excluded, and who are denied access to even the most basic financial products.⁵ There is a need to discuss about the reasons behind such exclusion. Firstly, lack of sources of financial services in the rural areas which leaves moneylenders as the only option available to the poor. Secondly, the presence of high information barriers and low awareness especially for women and in rural areas leads to such exclusion. And finally, inadequate access to formal financial institutions due to high cost of operations, less volume of transactions and more number of clients. In order to tackle this problem of financial exclusion, the Government has suggested and implied several measures to bring about an improvement in the financial access of the nation to the rural

⁴ Gupte R., Venkataramani B., Gupta D., Computation of financial index for India, International Conference on emerging economies- prospects and challenges, Procedia 37 (2012) 133-149, published by Elsevier Ltd., 2012.

⁵ Dr. Rangarajan C., Report of the committee on financial inclusion, RBI, January 2008. (pgs. 1-27)

people, thereby bringing about collateral economic development in the rural economy.

In India, efforts were made during post-nationalization of banks by way of introducing preferential lending by banks (1969 and 1980) to priority sectors and poorer communities of the society. In addition, by establishing the specialized institutions such as regional rural banks (RRBs) and national bank for rural development (NABARD) to cater the needs of the rural and marginal sections also contributed for the high density of credit institutions as well as credit access to the communities. Thus the state's continuous policy intervention with repressive approach has contributed for considerable increase in density of banking institutions and deployment of credit to the neglected communities. With respect to the last decade, a brief study of the three most impacting committee reports submitted by the Khan Commission in 2005-2006⁶, the Rangarajan Committee in 2007-2008 and the Mor Committee in 2012-2013⁷ shows that each committee had a unique aspect of approaching the same problem of reducing financial exclusion. The Khan Commission relied on a methodological framework to improve financial access (BC/BF model) and some measures to improve the outreach. The Rangarajan Committee focused on planned implementation of policies and technological implantation to boost up the progress of financial inclusion. And, lastly, the Mor Committee used the help of judiciary system to enforce legal measures to confirm the progress of the financial inclusion to a positive scale. Furthermore, in the last decade the main instruments of enhancing financial inclusion have been microfinance institutions, self-help groups and regional rural banks. Census 2011 estimated that out of 24.67 crore households in the country, 14.48 crore (58.7 percent) households had access to banking services. Of the 16.78 crore rural

⁶ Dr. Khan H. R., Report of the internal group to examine issues relating to rural credit and microfinance, RBI, July 2005. (pgs. 56-64)

⁷ Dr. Mor N., Committee report on comprehensive financial services for small businesses and low income households, RBI, December 2013. (pgs. 06-24)

households, 9.14 crore (54.46 percent) were availing banking services. Of the 7.89 crore urban households, 5.34 crore (67.68 percent) households were availing banking services. In the year 2011, Banks covered 74,351 villages, with population more than 2,000 (as per 2001 census); with banking facilities under the "Swabhimaan" campaign with Business Correspondents (BC's). However the programme had a very limited reach and impact. The government of India aims to provide bank accounts to at least 75 million people by January 26, 2015. According to the World Bank Findex (2012) only 35 percent of Indian adults had access to a formal bank account and 8 percent borrowed from a formal financial institution in last 12 months. These numbers suggest the urgency to push our research efforts towards measuring financial inclusion so that the weakest sections of the society also come in the realm of the formal financial system.

While, financial inclusion is a multidimensional phenomenon, literature lacks a comprehensive measure that can be used to measure the extent of financial inclusion. Sarma (2008), in her concept note 'Index of Financial Inclusion' has considered three dimensions to measure the extent of financial inclusion, namely, (a) depth of access using a proxy measure of the bank accounts per 1000 population, (b) availability to measure proximity of access using the number of bank branches and number of ATM branches per 1000 population and (c) usage to measure the extent and frequency of use by the customers. Using three variables for outreach and one for usage, Sarma adopted the concept used in the calculation of Human Development Index (HDI) and named the index as Index of Financial Inclusion (IFI). Mehrotra (2009) also built an index for financial inclusion using similar kind of aggregate indicators like number of rural offices, number of rural deposit accounts, volume of rural deposit and credit from banking data for sixteen major states of India.

Chakrabarty and Pal (2010) use the axiomatic measurement approach for the measurement of financial inclusion. Arora (2010), in her study, has calculated the IFI using the same reasoning as Sarma for two major groups of countries- advanced economies and the developing countries, adopting the IMF classification as the basis. Gupte (2012) has attempted to compute the IFI only for 98 countries for the years 2009 and 2010 as a geometric mean of 4 critical dimensions- outreach (penetration and accessibility), usage, and ease of transactions and cost of transactions, following the methodology used by UNDP in computing the HDI in 2010. Past studies have been seen to omit several important dimensions during the construction of the index, for example, it did not include ease cost and usage. In this paper, we first tried to make a comprehensive composite index of financial inclusion that captures information on several dimensions of an inclusive financial system and then we have attempted to examine the impact of financial inclusion on economic development, specifically, on agricultural growth and improvement in access to elementary education.

DATA AND METHODOLOGY

A Composite form for Financial Index has been calculated using principal component techniques. The objective is to construct an index using principal component analysis to measure financial inclusion over a period of time. In the Indian context, as the term 'financial inclusion' used for the first time in April 2005 in the Annual Policy by the Governor of RBI, we have kept our analysis within the timeframe 2008-2012. Annual data has been collected for 20 states starting from 2007-2008 till 2011-12, i.e., the period of the Eleventh five year plan. The main data sources referred are NABARD's annual reports on state of microfinance and RBI online database. Due to unavailability of data for every indicator, Delhi, Meghalaya, Nagaland, Arunachal Pradesh, Mizoram, Manipur, Sikkim, Andaman and Nicobar Islands, Uttarakhand and Goa have been left out. We try to compute the composite index using 9 well defined indicators.

The inter-related indicators which have been used to construct the index are following:

1. "branch": Number of bank branches according to population.
2. "save_per": Percentage of savings of SHGs to the total amount of savings annually.
3. "loandis_per": Percentage of loan disbursed by SHGs to the total amount of loan disbursed annually.
4. "loanout_per": Percentage of loan outstanding by SHGs to the total amount of loan outstanding annually.
5. "pa": Performing assets as percentage to loans outstanding against SHGs.
6. "scb_no": Number of offices of scheduled commercial banks.
7. "cred_no": Number of credit accounts of SCBs.
8. "dep_no": Number of deposit accounts of SCBs.
9. "cdrat": Credit-deposit ratio in percentage.

In order to derive the relative importance of the indicators of financial inclusion and to construct the Financial Inclusion Index for each state in India this study applies the technique of Principal Component Analysis (PCA) on the selected indicators of financial inclusion. This is a data reduction method that is used to re-express multivariate data in fewer dimensions. The motive is to re-orient the data so that a multitude of original variables can be summarized with relatively few factors/components that capture the maximum possible information from the original variables. Thus we need to find components $z = [z_1, z_2, \dots, z_p]$ which are linear combinations of the original variables $x = [x_1, x_2, \dots, x_p]$ that achieve the maximum variance. Annual reports of State of Microfinance in India, Statements II(a) – II(d), NABARD, 2007-08, 2008-09, 2009-10, 2010-11 and 2011-12, Economic Survey, 2009-10 and 2012-13, RBI online database, Flash statistics of elementary education in India: progress towards UEE, DISE survey, National University of

Education Planning and Administration and Handbook of statistics on Indian economy are the major data sources in this regard.

EMPIRICAL ANALYSIS

I. Constructing Financial Inclusion Index

We intend to use this composite index as a proxy to measure state wise status of financial inclusion to compare states' performances over last 5 years using principal component analysis (PCA). We then try to estimate the impact of financial inclusion on developmental indicators of a rural economy, viz., agricultural productivity (measured by agricultural share of gross state domestic product in amount at constant prices with base year 2004-2005) and improvement in elementary education in rural areas (measured by number of enrolments in government managed and privately managed schools between classes I-V). In order to apply PCA we have to first make sure whether the size of the sample taken for study is adequate or not. This is done by inspecting whether the value of Kaiser-Meyer-Olkin (KMO) measure of Sampling Adequacy is greater than 0.5 or not as shown in table 1. Secondly, we check whether the selected indicators of financial inclusion are inter-correlated, which is true if the value of chi-square statistic in Bartlett's Test of Sphericity is statistically significant.

Table 1: KMO Measure and Bartlett's Test of Sphericity

Measure	2007-08	2008-09	2009-10	2010-11	2011-12
Kaiser-Meyer-Olkin Measure	.667	.674	.729	.609	.654
Bartlett's Test of Sphericity	427.102* (66)	470.707* (66)	493.928* (66)	448.587* (66)	422.674* (66)

Note: *significant at 5 percent level of significance.

Factor loadings are the correlations between the original variables x and the components z . In case of PCA without rotation, the Eigen vectors may not align close to the data clusters and thus may not focus the actual states as well. The rotated PCA methods rotate the PCA eigenvectors so that they align closer to the cluster of data. And for this, the Varimax rotational method has been used which computes the rotated sum of square loadings for each identified principal component and it indicates what percentage of variation in financial inclusion has been explained by a particular indicator. The components are numbered as 1, 2 and so on the basis of decreasing rotated sum of square loadings.

Table 2: Initial Eigen Values and Their Percentage of Explained Variation

Year	Component	1	2	3	4	5	6	7	8	9
2007-2008	Eigen Value	5.310	1.733	.855	.776	.209	.066	.034	.011	.005
	percent of variation	59	19	9	9	2	1	0	0	0
2008-2009	Eigen Value	5.252	1.920	.705	.585	.271	.232	.028	.007	.001
	percent of variation	58	21	8	7	3	3	0	0	0
2009-2010	Eigen Value	5.493	1.988	.635	.585	.219	.045	.026	.007	.001
	percent of variation	61	22	7	6	2	0	0	0	0
2010-2011	Eigen Value	5.441	1.911	.714	.521	.250	.120	.033	.007	.002
	percent of variation	60	21	8	6	3	1	0	0	0
2011-2012	Eigen Value	5.121	1.868	.940	.726	.208	.087	.044	.006	.001
	percent of variation	57	21	10	8	2	1	0	0	0

For each state, we obtain the respective rotated component scores have been obtained by applying regression method and are stored as factors. This makes most factor loadings on any specific factor small while only a few factor loadings large in absolute value. Hence these

factors can be interpreted as the clusters of variables that are highly correlated with a particular factor. We notice from the above table that the first four components in each of the five periods explain almost 95 percent of the variation in given data. Now, FIN_IND is basically a weighted sum of the first 4 components that explain most of the variation.

$$\text{FIN_IND}_{it} = (0.60 \times \text{factor1}_{it}) + (0.20 \times \text{factor2}_{it}) + (0.11 \times \text{factor3}_{it}) + (0.09 \times \text{factor4}_{it})$$

Where, $i = 1, 2, \dots, 20$ and $t = 1, 2, \dots, 5$

Now, this procedure gives a unique score for each state, i.e., the composite index of financial inclusion. We get the index to measure state wise financial inclusion. The higher the value of the index, the better will be condition of the state in terms of financial inclusion.

It can be claimed that high yielding states on the basis of financial inclusion are Uttar Pradesh, Andhra Pradesh, Tamil Nadu, West Bengal, Karnataka and Maharashtra. This means the outreach of banks to the rural population has been most successful in these states and the possible reasons are awareness programs, dominance of microfinance institutions and self-help groups and bank linkages programs connecting with scheduled commercial banks. It's surprising that being generally considered as most financially included states, Gujarat, Kerala and Orissa are not performing so well when we measure it in terms of composite index. However, at present, states that require immediate concern to be financially included are Haryana, Jharkhand, Assam, Jammu and Kashmir, Himachal Pradesh and Tripura.

Table 3: Ranking of States Over the Period 2008-2012 on the Basis of FIN_IND Scores

State	2007-08	2008-09	2009-10	2010-11	2011-12
Uttar Pradesh	1	1	1	1	1
Andhra Pradesh	2	2	2	2	2
Tamil Nadu	3	4	5	5	6
West Bengal	4	6	3	3	5
Karnataka	5	3	4	4	3
Maharashtra	6	7	6	6	4
Gujarat	7	5	7	8	9
Rajasthan	8	11	11	9	8
Bihar	9	8	8	7	7
Madhya Pradesh	10	12	13	11	14
Kerala	11	10	9	13	11
Punjab	12	9	10	10	10
Orissa	13	13	12	12	13
Haryana	14	14	14	14	12
Jharkhand	15	15	15	15	15
Assam	16	20	16	17	16
Chattisgarh	17	19	18	20	17
Jammu and Kashmir	18	16	20	16	18
Himachal Pradesh	19	17	19	19	20
Tripura	20	18	17	18	19

FINANCIAL INCLUSION AND ECONOMIC GROWTH: PANEL DATA ANALYSIS

Increasing commercialization of agriculture and rural activities is bound to result in to cycle of higher income, higher consumption, higher savings and higher investment resulting into higher income. Financial inclusion will strengthen financial deepening and provide resources to the banks to expand credit delivery. Thus financial inclusion is not only the cause but also as outcome of economic development. There should be two way

causal relations among these variables. In this section now we will examine how financial inclusion impacts on economy's basic indicators for inclusive growth such as agricultural production and elementary education. We consider the following models which can be used to explain the relationship between financial inclusion and macroeconomic variables such as agricultural output growth, industrial output growth and enrolment status in elementary education. Specifically, the variables that have been used to examine the impact of financial inclusion on the inclusive growth are as follows.

1. \ln_agsdp : Natural Logarithm of Agricultural Share of Gross State Domestic Product at Constant Prices (Base Year Being 2004-2005).
2. \ln_enrol : Natural Logarithm of Number of Enrolments in all Government and Privately Managed Schools For Class I-V.
3. $industrygr$: Growth Rate of Gross State Domestic Product in Industry Sector
4. fin_ind : Financial Inclusion Index (estimated state wise composite index)
5. fin_ind_class : Financial inclusion category where financial inclusion status is categorized into 5 different levels according to the performance ranking for financial inclusion.

We set up a panel data model over 5 time periods, the first being 2007-2008 and so on, across 20 cross-sectional units for each period. We first classify the performance rank of the states into five different levels. We treat the financial inclusion performance (fin_ind) status as an

independent variable which is in category structure and two regressors to describe the model. The equations of the models are given as follows:-

Model A

$$\ln_agsdp_{it} = constant + \beta_1 \ln_enrol_{it-1} + \beta_2 \ln_ind_{it-1} + \rho_{it} + V_{it} \quad (1)$$

$$\ln_enrol_{it} = constant + \beta_1 \ln_agsdp_{it-1} + \beta_2 \ln_ind_{it-1} + \beta_3 \ln_industrygr_{it-1} + \rho_{it} + V_{it} \quad (2)$$

Model B

$$\ln_ind_{it} = constant + \beta_7 \ln_agsdp_{it-1} + \beta_8 \ln_enrol_{it-1} + \beta_9 \ln_industrygr_{it-1} + \mu_{it} + W_{it} \quad (3)$$

Model C: Ordered Probit Random Effect Model

$$P(\ln_ind_class_{it}) = constant + \beta_7 \ln_agsdp_{it-1} + \beta_8 \ln_enrol_{it-1} + \beta_9 \ln_industrygr_{it-1} + \tau_{it} \quad (4)$$

Where $i = 1,2,\dots,20$; $t = 1,2,\dots,5$; $t-1 = 1,\dots,4$. (t-1) specifies one period lag values of the variables. ρ_{it} and μ_{it} are within entity errors and V_{it} and W_{it} are between entity errors. Random effects assume that the entity's error term is not correlated with the predictors which allows for time-invariant variables to play a role as explanatory variables.

Model C performs an Ordered Probit model to analyze the impact of economic growth on different levels of financial inclusion. Do developed states get faster financial inclusion than others. Ordered probit technique is a generalization of the linear regression analysis to cases

where the dependent variable is discrete and takes only a finite number of values possessing a natural ordering (Hausmann *et. al.*, 1991). This is akin to a generalization of the linear regression model to cases where the dependent variable is discrete. Underlying the analysis is a "virtual" regression model with an unobserved continuous dependent variable (let us assume as m^*), whose conditional mean is a linear function of observed "explanatory" variables. Although m^* is unobserved, y^* is observed whose realisations are determined by a select set of independent variables, where m^* lies in y^* 's domain. By partitioning the domain into a finite number of distinct levels, m^* may be viewed as an indicator function for y^* over different levels. Here states' financial inclusion status is categorized into 5 different levels according to the performance ranking for financial inclusion. Therefore, dependent variable is discrete and naturally ordered. There is a disturbance term that follows a standard normal distribution. We are now concerned regarding changes in the predictors translate into the probability of observing a particular ordinal outcome.

$$\begin{aligned}
 P(fin_{ind_{class\ it}}) &= 1 \text{ if rank of the states according to } fin_{ind} \leq 4; \\
 P(fin_{ind_{class\ it}}) &= 2 \text{ if rank of the states according to } 4 < fin_{ind} \leq 8; \\
 P(fin_{ind_{class\ it}}) &= 3 \text{ if rank of the states according to } 8 < fin_{ind} \leq 12; \\
 P(fin_{ind_{class\ it}}) &= 4 \text{ if rank of the states according to } 12 < fin_{ind} \leq 16; \\
 P(fin_{ind_{class\ it}}) &= 5 \text{ if rank of the states according to } 16 < fin_{ind} \leq 20;
 \end{aligned}$$

The estimator which maximizes this function will be consistent, asymptotically normal and efficient. It can be shown that this log-likelihood function is globally concave in β , and therefore standard numerical algorithms for optimization will converge rapidly to the unique maximum.

If we express equation (4) as $y^* = x^*\beta + \epsilon$

$$\begin{aligned}
P[y_i = 1] &= P[\mu_0 < y_i^* \leq \mu_1], \\
&= P[\mu_0 - x_i^* \beta < \epsilon \leq \mu_1 - x_i^* \beta], \\
&= f(\mu_1 - x_i^* \beta) - f(\mu_0 - x_i^* \beta)
\end{aligned}$$

Similarly, we will get,

$$P[y_i = j] = f(\mu_j - x_i^* \beta) - f(\mu_{j-1} - x_i^* \beta) ; j=1, 2, 3, 4 \text{ and } 5$$

The table below mentions summary statistics of all the variables considered for the analysis.

Table 4: Summary Statistics of the Variables

Variable	Observations	Mean	Std. Dev.	Min	Max
Financial Inclusion index <i>fin_ind_{it}</i>	100	0.000	0.635	-0.972	1.710
Financial Inclusion Class [Extremely Good Performance=1; Extremely Poor = 5] <i>fin_ind_class_{it}</i>	100	3.000	1.421	1	5
LN (Agricultural Output) <i>ln_agdp_{it}</i>	100	9.967	0.873	7.799	11.37
LN(Elementary Enrolment) <i>ln_enrol_{it}</i>	100	15.274	1.013	12.860	17.08
Industrial output Growth <i>Industrygr_{it}</i>	100	7.145	6.023	-2.79	28.44
LN(snd_enrol) <i>ln(enrolm_sec)_i</i>	100	3.497	0.606	1.247	4.35

As mentioned above there are three different models. Each model has three specifications. Model B is considered for examining reverse causality among the variables. We first checked between and within variations for each variable. The between variation explains the variation among individuals and the within variation explains the variation of the variable over time. A higher between variations implies that the variable has more cross-section effect than time effect. It has been observed that there are no cross-section independent variables in the model and thereby we can expect that less variation in magnitude of

variables over time. Hence it suggests that an appropriate model under this situation should possess random effects. Moreover, we have selected the best model using the commonly known Hausmann test and the LM test. Another reason we can add in favour of using random effects model is that as the value of theta is more than 0.8 in each case, it means that the idiosyncratic error variance is relatively high, i.e, the individual-specific effects are highly significant and must not be ignored. Again, as expected the regressors don't change much overtime and hence using a fixed effects model in such a scenario will result in dropping of variables due to time-demeaning. Hence, we assume the models follow random effects GLS regression model.

Table 5: Random-Effects GLS Regression (Elementary Education Growth is Dependent Variable)

Model A.1: ln(enrolment)	Coefficient/Std	Coefficient/Std
Lag[ln(agsdp)]	0.354*** (0.1036)	0.284** (0 .0902)
Lag [enrolm_sec]	-0.358 (0.0465)	
Fin_inclu		0.236*** (0 .088)
Lag(Fin_inclu)	0.189*** 0 .1098	
ln(agsdp)		0.2885** (0.0884)
enrolm_sec		-0.0497 (0 .0432)
_constant	11.8785*** (1.0195)	12.584*** (0.845)
sigma_u	0.4143	0.4305
sigma_e	0.0616	0.0677
Rho	0.978	0.974

Note: *, **, *** relates to statistically significant at 1 percent , 5 percent and 10 percent respectively.

Source: Authors calculation.

We have considered logarithmic value of elementary enrollment rates as the dependent variable and 2 sets of specified independent variables to examine whether the access to primary education increases along with the financial inclusion in rural population. We found that there is minimal positive impact by financial inclusion on improvement of elementary education for the states. There exists some positive causality between agricultural productivity and elementary education. This is might be because of indirect income effect for rural population based on agricultural sector. We have examined the impact with one period lag values of independent variables. Financial inclusion index showed significant positive relationship with enrolment change.

Table 6: Random-Effects GLS Regression (Agricultural Growth is Dependent Variable)

Model A.2:ln(agsdp)	Coefficient/Std	Coefficient/Std
ln(enrolment)	0.494*** (0.086)	
enrolm_sec	0.187*** (0.0467)	
Fin_inc	0.230** (0.099)	
Lag[ln(enrolment)]		0.560*** (0.099)
Lag[fin_incl]		0.187 (0.128)
Lag[enrolm_sec]		0.165*** (0.058)
_constant	1.763 (1.341)	0.8504 (1.55)
sigma_u	0.3271	0.337
sigma_e	0.0909	0.973
Rho	0.928	0.923

Note: *, **, *** relates to statistically significant at 1 percent , 5 percent and 10 percent respectively.

Source: Authors calculation.

Table 6 showed the determinants of agricultural growth with two sets of independent variables. Financial inclusion index confirmed a positive causal relationship with agricultural growth for current values as well as for one period lag values.

Now we have considered financial inclusion index as dependent variable to get the binding factors for inclusive financial growth for the economy. Here we found a significant positive impact on financial inclusion status by both agricultural productivity elementary education levels of the states.

Table 7: Random-effects GLS Regression (When Financial Inclusion Index is Dependent Variable)

Model B: Fin_Index	Coefficient/Std Error	Coefficient/Std Error
Lag[ln(agsdp)]	0.357*** (0 .113)	
ln(agsdp)		0.242*** 0.090
ln(enrol)		0.269*** 0.0904
lag[ln(enrol)]	0.167* 0 .105	
Industrygr	0.0015 0.0023	
_constant	-6.11*** 1.17	-6.53*** 1.126
sigma_u	0.3575	0.354
sigma_e	0.1048	0.102
Rho	0.92	0.924

Note: *, **, *** relates to statistically significant at 1 percent , 5 percent and 10 percent respectively.

Source: Authors calculation.

Here, we found a significant positive impact of both agricultural productivity and growth of enrolment in elementary education. Whereas, there is no significant association caused between industrial growth and financial inclusion as shown in table 7. Now, in order to find out specific impact for different category (different status of financial inclusion) states and also to make valid comparisons in terms of coefficient estimates across different specifications we have to determine ordered probit analysis in random effect model. Here, dependent variable is the financial inclusion class which is classified according to the performance of financial inclusion. States are classified according to the financial inclusion index values. For each observation, our best guess for the predicted outcome is the one with the highest predicted probability. The estimation table reports the parameter estimates, the estimated cut points ($\kappa_1, \kappa_2, \kappa_3$), and the estimated panel-level variance component labeled σ^2_u . Underneath the parameter estimates and the cutpoints, the table below shows the estimated variance component. The estimate of σ^2_u is 3.604 with standard error 2.075. The reported likelihood-ratio test shows that there is enough variability between states' financial inclusion status and growth.

Table 8: Ordered Probit Random Effect Panel Regression (When Financial Inclusion Class is Dependent Variable)

Model C: Fin_Index-Class	Coefficient/Std Error	Coefficient/Std Error
Lag[ln(agsdp)]	-0.433** (1.249)	
ln(agsdp)		-3.674*** (1.081)
ln(enrol)		-1.375 (1.00)
Industrygr		0.027 (0 .027)
enroll_sec		0.230 (0 .595)
lag[ln(enrol)]	-0.947 (0.944)	
Lag[enroll_sec]	-0.063 (0.638)	
Lag(Industrygr)	0.0103 (0.03)	
cut1	-62.204*** (15.09)	61.05*** (14.15)
cut2	-59.564*** (14.79)	58.53*** (13.90)
cut3	-56.846*** (14.71)	55.81*** (13.52)
cut4	-53.44*** (13.86)	-52.45*** (13.11)
Sigma2_u	3.604 (2.075)	3.466 (2.01)

Note: *, **, *** relates to statistically significant at 1 percent, 5 percent and 10 percent respectively.

Source: Authors calculation.

We can explain that only if agricultural growth increases, financial inclusion performance will be more for high yielding states. There no other significant impact by other explanatory variables. There is

only one way basic causal relationship exists between financial inclusion and agricultural growth. Financial inclusion increases if income increases for rural population. They earn more get more incentive to invest and approach formal financial institution to get more financial support at subsidized rate. However, we didn't get the significant relation between the elementary education and financial inclusion. However, theory suggests that access to basic education provides information and awareness to the poor population about the availability of subsidized credit markets and easy available financial market and eventually it decreases demand side costs which are the major constraints in recent time to provide easy accessible financial service to the vulnerable section of population. Therefore, we are still at initial stage. We need to make proper set up to channelize funds in a productive way and implement some adoptable new technologies with efficiency. Further, we need to stress the initiative to educate the targeted population about the financial structure and availability of funds and how it can be availed. Lack of proper understanding and information about the structure and arrangement of existing tool and process, financial inclusion is not possible.

CONCLUSION

This research has sought to address a question in the development literature over whether targeting financial inclusion causes economic growth and development and the welfare of children through education and vice-versa. Although Indian states have been experiencing high productivity in agricultural sector along with improvement in access to in elementary education, financial inclusion is still under executed. The current study claimed that efforts have been made to achieve the goal but for a diversified country like India it is necessary to bring the basics first, and customize the models as per the need, thus, will lead to financial development in a country which will help to accelerate inclusive economic growth. Lack of proper

understanding and information about the structure and arrangement of existing tool and process, financial inclusion is not possible. Therefore, there is an earnest need to make a appropriate set up with some new technologies. Financial inclusion can act as dynamic tool for inclusive growth. The focus on financial literacy is the fundamental step to achieve complete success. Lack of knowledge or low level of awareness caused low level of financial inclusion in some of the states. If financial inclusion has to succeed, the eventual benefactor from this game plan- the banks- have to make upfront investment in financial literacy and financial counseling, which eventually, becomes market investment for banks in the long run. Increasing the accessibility of formal credits by reducing the transaction costs is an essential step to improve formal credit sector, especially for the rural mass. Formal financial institutions need to mobilize more and more resources from a wider customer base and extend credit to business activities to vulnerable section of the society to encourage productive investment. As one of the main reasons of the gap between urban and rural areas in terms of accessibility to financial products and services is the lack of financial literacy, we need to promote financial literacy. A proper information and communication technology can help to develop a platform to tab the rural areas and can lead us to a more sustainable and inclusive economic structure in near future.

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