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Financial Inclusion, Active Bank Accounts and Poverty Reduction in India

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Abstract: *Using the World Bank's Global Findex data, this research first shows that the efforts by the Indian Government and the Reserve Bank have been successful in providing access to formal banking services, especially in the rural areas of the country. Similarly, financial account ownership gap has been eliminated in terms of gender and income. Further analysis, using the Financial Inclusion Insights dataset, shows that financial inclusion has a positive and significant effect on reducing poverty in India. A closer look at the utilisation of the financial accounts shows that active usage of these accounts would lead to further reductions in poverty levels in India. Therefore, targeted programmes, such as offering financial education both in and outside schools, with the aim of improving financial literacy, could lead to further poverty reduction in India.*

1. Introduction

Financial inclusion is defined as having access to useful and affordable financial products and services, delivered in a responsible and sustainable way (World Bank, 2020). There have been multiple studies showing access to financial services promoting growth, especially for developing countries. Similarly, there is a growing body of literature showing the positive role of financial inclusion on improving household wellbeing and economic growth. For example, Burgess and Pande (2005), Beck et al. (2007), and Bruhn and Love (2014) show that greater access to finance reduces income inequality and poverty. Similar positive effects on a myriad of outcome measures have also been presented in the literature.[1] However, the number of studies linking financial inclusion and reduction in poverty levels in a country are limited (Chibba, 2009; Jalilian and Kirkpatrick, 2005; Churchill and Marisetty, 2019).[2]

The focus of this paper is financial inclusion and reducing poverty for India. To this end, we make use of a unique set of household-level data comprising more than 47,000 observations across India. India is an important case study, not just because of the size of the economy, but also because of the targeted efforts of the Reserve Bank of India (RBI) and the Government of India (GOI). Financial inclusion was in the RBI's 2005–6 annual policy statement, and, in 2010, RBI required both private and public banks to submit a *3-year financial inclusion plan* (Menon, 2019). Furthermore, in August 2014, the *Pradhan Mantri Jan Dhan Yojana* (PMJDY) campaign was implemented with the aim of ensuring households have access to basic bank accounts, as well as combatting black money in the economy and making banking facilities (savings and deposit accounts, remittances, credit, insurance and pension) available to the unbanked, especially by offering zero-balance accounts. More recently, in 2015, the *Jan Dhan-Aadhar-Mobile* (JAM) was introduced with the aim of integrating PMJDY with a biometric ID initiative and mobile technology.

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[1] See Allen et al. (2016) for an increase in savings, Prasad (2010) for employment, Mani et al. (2013) for better decision-making, and Angelucci, Karlan, and Zinman (2013) for improvements in mental wellbeing.

[2] In a recent study, Neaime and Gaysset (2018) show that. while financial inclusion decreases income inequality, it has no significant effect on poverty in Middle East and North Africa (MENA) countries.

In 2017, the GOI launched *Cashless India*, promoting cashless payment modes (banking cards, mobile wallets, digital banking, etc.). In addition to these targeted and direct efforts, financial inclusion in India benefitted from an indirect push through the deposit payments to bank accounts for the Mahatma Gandhi National Rural Employment Guarantee scheme and the demonetisation programme that took place on 9 November 2016. These initiatives have helped to grow financial inclusion in India and encourage previously underbanked populations, such as women, rural and below-poverty-line individuals, to access formal financial institutions.

As a result of all these efforts by the RBI and the GOI, many of the disparities between previously unbanked populations have been reduced. Most Indians now own a bank account and have access to banking services. Our aim is to study the effect of this increase in financial inclusion on poverty alleviation in India. A few studies have previously focussed on this question before, but from a range of different perspectives. Burgess and Pande (2005), for example, asked the same question using state-level panel data. More specifically, the authors studied the effect of rural bank branch expansion and showed that it helped with poverty reduction in rural India. They observed no significant effect on urban poverty. More recently, again using panel data for Indian states and union territories, Inoue (2019) utilised the numbers of bank branches and accounts (financial inclusion and financial deepening) to show the positive impact on poverty reduction. However, this effect is present only for public sector banks. Other studies using country, state, or district-level data to analyse similar research questions are Binswanger and Khandker (1995), Bell and Rousseau (2001), and Sehrawat and Giri (2016).

Only a few studies use micro-level data to focus on the poverty-reducing effect of financial inclusion in India. Using household survey data, Swamy (2014) focuses on gender differences, while analysing the impact of financial inclusion programmes on income, expenditure, and food security. Ghosh and Vinod (2017) also emphasise the importance of gender, showing significant differences in both access to formal (and informal) finance, as well as the use of finance. Lastly, a recent study by Churchill and Marisetty (2019) is closest to this paper in terms of

the data and the analysis. The authors make use of an earlier wave of the Financial Inclusion Insights (FII) survey (that will be utilised in this paper) and construct a multidimensional indicator of financial inclusion to examine the effects of financial inclusion on poverty. Their findings show a strong poverty-reduction effect of financial inclusion in India. Moreover, similar to our paper, the authors utilise instrumental variable techniques to correct for potential endogeneity bias in the regressions. Our paper, however, uses the most recent wave of the FII survey and introduces new (and arguably better) variables to be used as exclusion restrictions. Methodologically, we also add to the current literature by using a two-stage residual inclusion technique, which has been mostly utilised in the health economics literature so far. Lastly, in addition to the standard financial inclusion variables, we also focus on the active usage of bank accounts, due to the existence of many dormant bank accounts in India.

Our results show a considerable poverty-reduction effect of financial inclusion, as well as the active use of bank accounts. However, the effect is statistically significant only after the endogeneity is controlled for. As a result, one of the major implications of this paper is the need for a careful empirical analysis before any policy decisions can be made. The real effect of financial inclusion on poverty could be masked by the bias due to endogeneity of the variable of interest.

The rest of the paper is structured as follows. The next section provides an initial look at financial inclusion in India using multiple waves of the World Bank's Global Findex database. Section 3 introduces the data and the empirical model, and section 4 presents the empirical results. In section 5, we provide concluding remarks and possible policy implications.

2.   A First Look at Financial Inclusion in India

We first use the World Bank's Global Findex database to see how the concerted efforts in India have impacted financial inclusion.[3] We focus on three main indicators of financial inclusion: account ownership (formal account); savings in a formal financial institution (formal savings); and bank credit usage (formal credit). In Figure 1, we observe a significant increase in the percentage of formal accounts held from 35% in 2011 to 80% in 2017 when all adults (aged 15 years or older) are considered. Similar success can be observed in closing the gender gap for account ownership. In 2017, we see no significant gender differences amongst Indian adults. We can observe whether access translates to the usage of these formal accounts for saving or borrowing. Figures 9.2 and 9.3 show the formal saving and credit behaviour for the same period and again for males and females. We observe a modest increase in the saving behaviour from 12% in 2011 to 20% in 2017. The gender gap, although narrowed, has not been eliminated, unlike the trend we have seen in account ownership. Formal credit percentages, on the other hand, had a slight decline over the same period. In 2011, 8% of Indian adults were accessing formal credit while the same number in 2017 was 7%. Moreover, the gender gap in formal credit has widened over time. In short, we see a considerable success in access (account ownership); however, this did not clearly translate into usage (formal saving and credit).
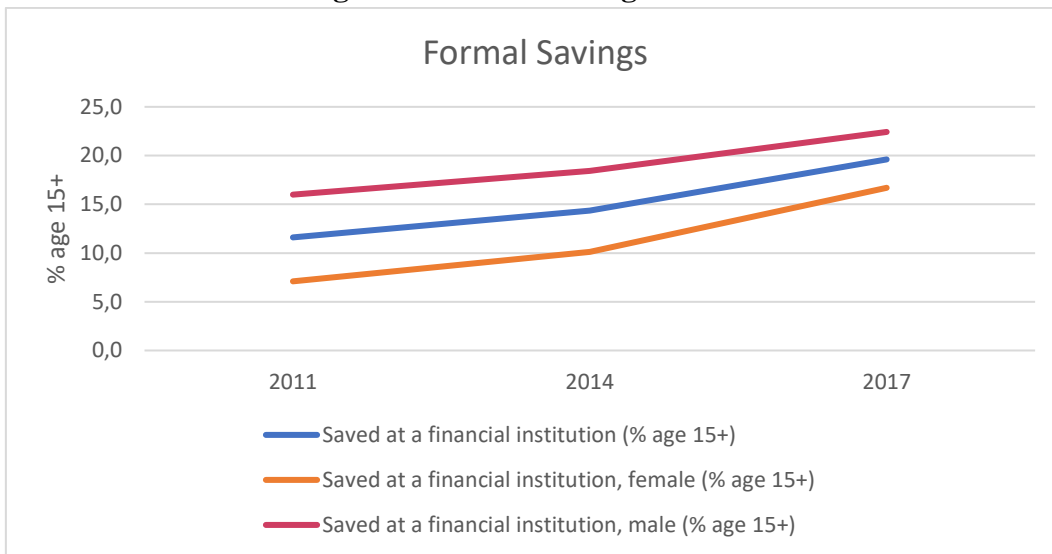
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[3] We use three waves of the Global Findex database (World Bank 2011; 2014; 2017).

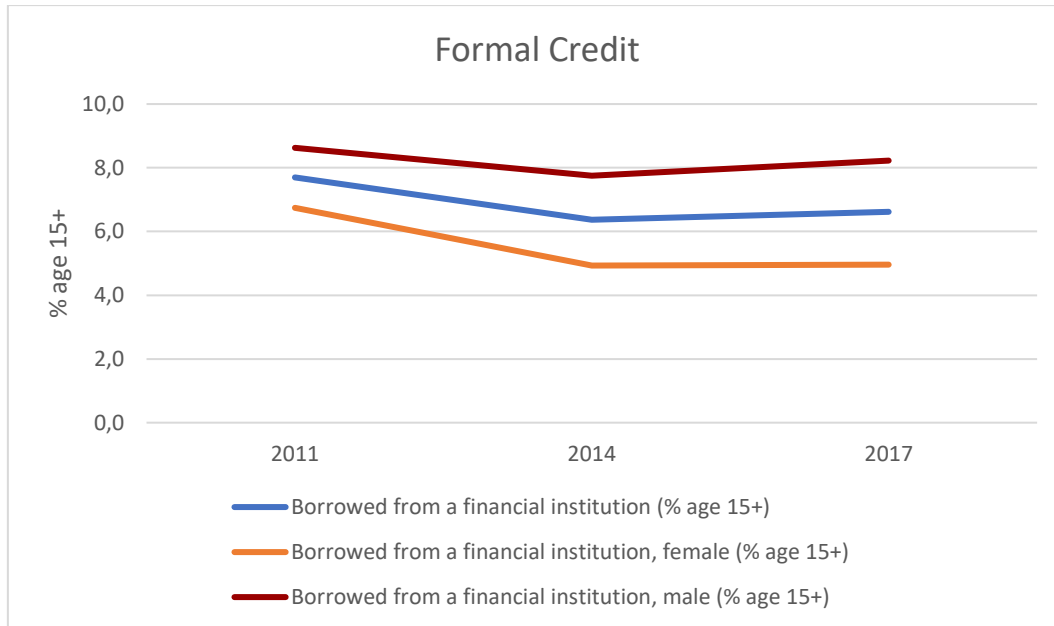**Figure 1. Formal Account Ownership in India**
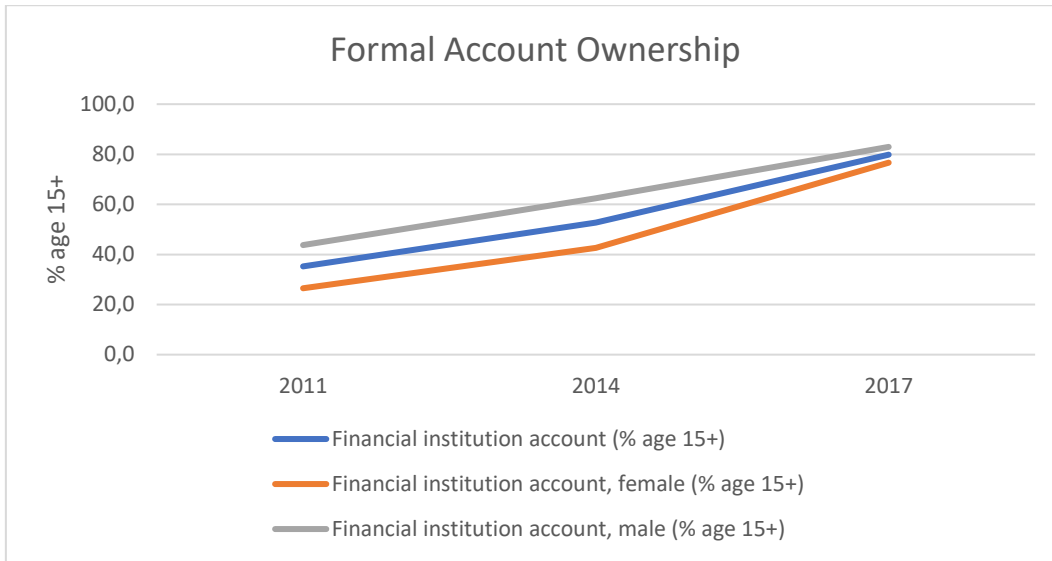
Source: World Bank Global Findex data 2011–2017.

Figure 2. Formal Savings in India

Source: World Bank Global Findex data, 2011–2017.

Figure 3. Formal Credit in India

Source: World Bank Global Findex data 2011–2017.

Further success of India's financial inclusion policies on account ownership can be observed in Figure 4. Focusing on the 2017 data, we see no significant difference in terms of age, education, income, being in or out of the labour force, and also no rural versus urban divide. Compared to other countries such as Pakistan and Bangladesh, these figures highlight the importance of the targeted efforts by the RBI and the GOI to address these gaps explicitly. For example, in both of those countries, there is still a wide account ownership gap in terms of gender, income, and being in the labour force. It would appear, at least casually, that the policy objectives of the RBI and GOI have resulted in clear increases in bank account ownership.

Figure 4. Account Ownership in India for Various Sub-Groups of the Population
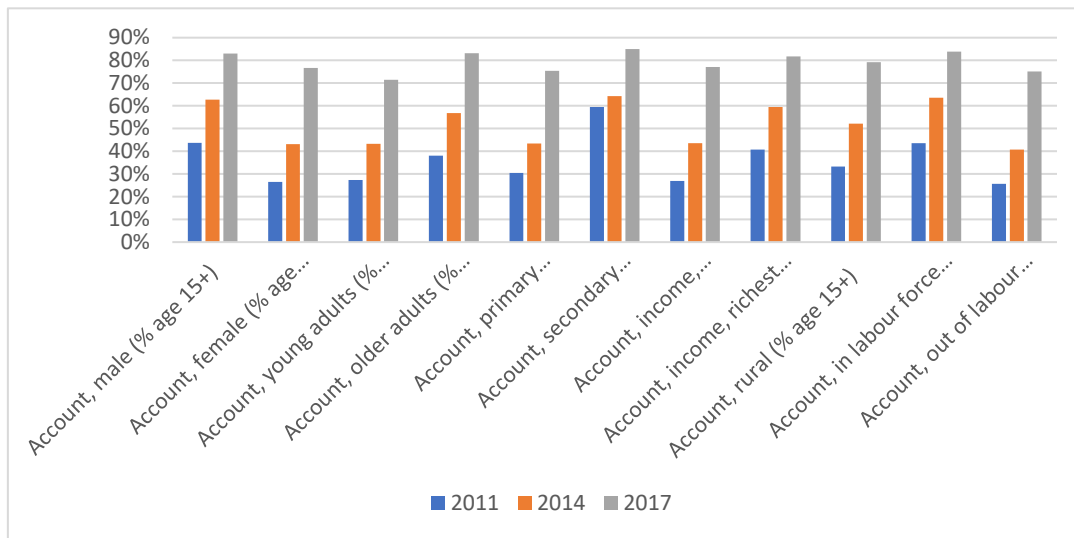
Source: World Bank Global Findex data 2011–2017.

3. Data and Empirical Model

According to the World Bank, 'financial inclusion is a key enabler to reducing poverty and boosting prosperity.' It has also been shown in academic studies that financial inclusion has been found to reduce rural poverty (Burgess and Pande, 2005; Swamy, 2014).[4] While we observe the success of financial inclusion, at least in terms of account ownership, in India, the lack of active usage of these accounts remains a concern. More recent data show 15% of the accounts having a zero balance and 84% only being 'operative', with at least one transaction in the last 2 years (Abraham, 2019). Our study thus scrutinises whether basic financial inclusion, defined as account ownership, can alleviate poverty in India. Consequently, we consider the active users of these accounts, and see if usage is associated with households' propensity to be above the poverty level in India. In order to answer these questions, we make use of the FII survey database, which is more detailed and more frequently available compared to the World Bank Global Findex database.

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[4] For a summary of empirical studies on financial inclusion and growth see Demirguc-Kunt et al. (2017).

We use the fifth wave of the FII surveys, which were collected in 2017.[5] The survey started in August 2017 and ended in December 2017. The data were gathered from a nationally representative sample of adults aged 15 and older.[6] The survey includes information on ownership and usage of banks, other financial institutions and mobile phones as well as mobile financial services. Financial behaviours, poverty indicators and socio-demographics, amongst other information, are also included in the dataset. The 2017 FII survey was carried out on 47,132 adults. For the purpose of our study, after dropping the observations with missing information, the final sample includes 44,990 individuals.[7]

The main model for estimating the relationship between financial inclusion and poverty is the following:

$$Poverty_i = \alpha FI_i + \beta X_i + \delta_i + \varepsilon_i \qquad (9.1)$$

where $Poverty_i$ is the main outcome variable, which is the measure of poverty for household i. As we discuss in detail below, we make use of two distinct versions of the outcome variable. FI_i is the financial inclusion variable, which we measure in three different ways, as specified below. X_i represents all the control variables in our analysis, including gender, age, location (rural or urban), marital status, number of people in the household, literacy, education, ownership of farmland, employment status and religion. δ_i is the state-level dummy variable controlling for unobserved heterogeneity amongst the various states in India. Finally, ε_i is the error term, which we assume to be normally distributed.

We make use of two different measures of poverty in our analysis. First, we consider the Poverty Probability Index (PPI), which is already available in our dataset. PPI is a continuous measure of poverty that provides a score for each household depending on the household characteristics and asset ownership. This

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[5] The data are available at: http://finclusion.org/.
[6] Sampling weights for the data are based on the probability of selection at each stage of sampling. They are then adjusted for non-response at the household and household member levels. The sampling weights are also normalised at the national level.
[7] Note that in one part of our analysis we focus only on those respondents with a bank account. In this part of our study, our sample is reduced to 35,671 respondents.

score determines the likelihood of the household living below the poverty line.[8] In our dataset, the poverty line is set by the FII survey at US$2.50 per day. The PPI score ranges between 0 and 100, with 0 representing the most likely poor household and 100 with the least likely one.[9] Second, we make use of a dummy variable, *Poor*, to represent a household living in poverty or not. This variable takes the value 1 if the household lives below the poverty line of $2.50 per day, and 0 otherwise.

For the financial inclusion (*FI*) variable in our regression, we make use of three different measures. This first one is the *financial inclusion* measure introduced in the FII dataset. Financially included are those who have an account in their name with a full-service institution.[10] Our second variable is a basic one. We use *bank account ownership* as a measure. It is a dummy variable that is equal to 1 if the respondent has a bank account under their name, and 0 otherwise. The last measure we consider is *active bank account*. Amongst those with a bank account, we identify the active ones as those who have used their bank account at least once in the previous 3 months. With this measure, we would like to see whether actively using the bank account, compared to having an unused one, matters for poverty alleviation.

Table 1 presents the summary statistics for all the variables in our study.[11] More than 60% of the households in our sample are classified as *poor*, while 78% are financially included. As mentioned before, due to the concerted efforts of the GOI, there is no gap in terms of *financial inclusion* between the poor and non-poor households. *Bank account ownership* average is very close to financial inclusion one since most of these efforts were focused on giving bank accounts and extending bank branches to rural areas of India. However, amongst those with a bank account, only 68% use their account actively. The majority of the households in our sample are in rural areas, with an average of four people in the household. Most of the respondents are married. While 32% do not have any

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[8] For further details on PPI, see https://www.povertyindex.org/.
[9] In our analysis, we rescale the PPI variable such that it is between 0 and 1.
[10] FII considers an institution to be a full-service financial institution if it offers the following services: savings, credit, money transfers, insurance, and investment. According to the FII survey, these institutions are banks, mobile money service providers, and non-bank financial institutions, such as payments banks.
[11] Detailed definitions of these variables are presented the Appendix.

formal education and 14% have less than 6 years of schooling, 72% of the respondents are literate. In terms of employment, almost half of the respondents are not working, with only 23% having a full-time job. Forty percent of households own farmland and majority of the respondents are Hindus, followed by 11% of the respondents being Muslim.

The last four variables in Table 1 are used as instrumental variables in our regression analysis. Twenty-two percent of the respondents are financially literate, and 9% belong to an informal financial institution. While 8% actively use a mobile phone, only 2% have an active mobile money account. These figures are low compared to some other countries, especially those in Africa, where mobile money services are highly prevalent.

Table 1. Summary Statistics

Variables	Mean	Std. Dev.	Min	Max
Poverty Probability Index	0.51	0.22	0	1
Poor	0.61	0.49	0	1
Financial inclusion	0.78	0.41	0	1
Bank account ownership	0.76	0.43	0	1
Active bank account[a]	0.68	0.47	0	1
Male	0.52	0.5	0	1
Age:				
Age 15–24	0.21	0.41	0	1
Age 25–34	0.26	0.44	0	1
Age 35–44	0.21	0.41	0	1
Age 45–54	0.15	0.35	0	1
Age 55 and over	0.17	0.38	0	1
Rural	0.68	0.46	0	1
Married	0.73	0.44	0	1
Number of People	3.97	1.75	1	8
Education level:				
No education	0.32	0.47	0	1
Less than six	0.14	0.35	0	1
Six to 12	0.45	0.5	0	1
More than 12	0.09	0.29	0	1
Literate	0.72	0.45	0	1
Farmland	0.4	0.49	0	1
Employment:				
Full-time employed	0.23	0.42	0	1
Part-time employed	0.08	0.26	0	1
Self-employed	0.06	0.24	0	1
Occasionally employed	0.16	0.25	0	1
Not working	0.47	0.50	0	1
Religion:				
Hinduism	0.85	0.36	0	1
Islam	0.11	0.32	0	1

Christianity	0.02	0.12	0	1
Sikhism	0.01	0.12	0	1
Buddhism	0.003	0.05	0	1
Household head	0.39	0.49	0	1
Financial literacy	0.22	0.41	0	1
Active phone	0.08	0.26	0	1
Active mobile money	0.02	0.14	0	1
Belong to informal financial institution[b]	0.09	0.29	0	1
Num. of Obs.	**47,132**			

Note: All summary statistics have been weighted using the sampling weights provided in the 2017 Financial Inclusion Insights Survey – Wave 5. [a] Summary statistics for the active bank account variable are based on a sub-sample of those with a bank account (n=37,165). [b] Summary statistics for the informal financial institution variable are based on a reduced sample size due to missing values (n=39,400).
Source: Authors' calculations using data from The Financial Inclusion Insights Program, InterMedia.

4. Empirical Results

Table 2 presents our linear regression results. The dependent variable is the poverty probability index. As for the variables of interest, column 1 uses the *financial inclusion* variable, while columns 2 and 3 have *bank account ownership* and *active bank account* variables. Amongst the three variables of interest, only the *bank account* variable is statistically significant, but at the 10% level. Although the sign is negative, the coefficient is relatively small. In other words, in our base regressions we find no notable effect of all three variables on poverty alleviation. For the explanatory variables, we see that gender, age, rural locale, number of people in the household, literacy and education, employment, having farmland, and the household head variables seem to have a significant effect. The two variables that are consistently insignificant for all three columns are the marital status and religion indicators.

Table 2. Linear Regression Assuming Exogeneity
(Dependent Variable: PPI score)

Variables	Financial Inclusion	Bank Account	Active Bank Account
Financial inclusion	-0.002 (0.002)		
Bank account ownership		-0.003* (0.002)	
Active bank account			0.000 (0.002)
Male	0.004** (0.002)	0.004** (0.002)	0.001 (0.002)
Age 15–24	0.036*** (0.003)	0.036*** (0.003)	0.036*** (0.004)
Age 25–34	0.036*** (0.003)	0.036*** (0.003)	0.038*** (0.003)
Age 35–44	0.022*** (0.003)	0.022*** (0.003)	0.022*** (0.003)
Age 45–54	0.003 (0.003)	0.003 (0.003)	0.003 (0.003)
Rural	0.029*** (0.002)	0.029*** (0.002)	0.026*** (0.002)
Married	0.003 (0.002)	0.003 (0.002)	0.002 (0.002)
Number of people	-0.068*** (0.001)	-0.068*** (0.001)	-0.068*** (0.001)
Literate	-0.040*** (0.004)	-0.040*** (0.004)	-0.053*** (0.005)
Less than six	-0.002 (0.005)	-0.002 (0.005)	0.009 (0.005)
Six to 12	0.004 (0.004)	0.004 (0.004)	0.020*** (0.005)
More than 12	-0.018*** (0.005)	-0.017*** (0.005)	-0.003 (0.006)
Farmland	-0.007*** (0.002)	-0.007*** (0.002)	-0.005** (0.002)
Part-time employed	-0.020*** (0.004)	-0.020*** (0.004)	-0.025*** (0.004)
Occasionally employed	-0.013*** (0.003)	-0.013*** (0.003)	-0.012*** (0.003)
Self-employed	-0.005 (0.004)	-0.005 (0.004)	-0.004 (0.004)
Not working	-0.010*** (0.003)	-0.011*** (0.003)	-0.010*** (0.003)
Hinduism	0.023 (0.054)	0.023 (0.055)	-0.007 (0.076)
Islam	0.003 (0.055)	0.003 (0.055)	-0.026 (0.077)
Christianity	-0.000	-0.000	-0.028

	(0.055)	(0.055)	(0.077)
Sikhism	-0.010	-0.010	-0.041
	(0.055)	(0.055)	(0.077)
Buddhism	-0.009	-0.009	-0.040
	(0.057)	(0.057)	(0.079)
Household head	0.009***	0.009***	0.013***
	(0.002)	(0.002)	(0.003)
R^2	0.43	0.43	0.43
N	44,990	44,990	35,671

PPI = Poverty Probability Index.
Note: All models have been weighted using the sampling weights provided in the 2017 Financial Inclusion Insights Survey – Wave 5. Robust standard errors are reported in parenthesis. *** - significant at the 1% level; ** - significant at the 5% level; * - significant at the 10% level.
Source: Authors' calculations.

Next, we focus on the results for the probit regression. We now find statistically significant effects of the three variables of interest. Being financially included lowers the probability of being poor by 1.3%. Similarly, having a bank account lessens the likelihood by 1%. Finally, amongst those with a bank account, active usage of the account lowers the propensity to be poor by 1.4%. While statistically significant, the magnitudes are quite small to make economic impact. Given all the work by the Indian government to financially include everyone, a decrease of 1%–1.4% might not economically justify the efforts. Most of the other variables in our regressions are statistically significant. Gender, age, rural, marital status, literacy, education variables and employment status have significant effects on likelihood of being poor, as expected. Only owning farmland, religion, and household head variables show no statistical significance.

Table 3. Probit Regression Assuming Exogeneity (Dependent Variable: Poor)

Variables	Financial Inclusion	Bank Account	Active Bank Account
Financial inclusion	-0.013**		
	(0.005)		
Bank account ownership		-0.010**	
		(0.005)	
Active bank account			-0.014***
			(0.005)
Male	-0.016***	-0.016***	-0.009
	(0.005)	(0.005)	(0.006)
Age 15–24	-0.072***	-0.072***	-0.073***
	(0.008)	(0.008)	(0.009)
Age 25–34	-0.084***	-0.084***	-0.088***
	(0.007)	(0.007)	(0.008)
Age 35–44	-0.057***	-0.057***	-0.060***

	(0.007)	(0.007)	(0.007)
Age 45–54	-0.018**	-0.018**	-0.021***
	(0.007)	(0.007)	(0.008)
Rural	-0.035***	-0.035***	-0.028***
	(0.005)	(0.005)	(0.005)
Married	-0.015***	-0.015***	-0.010***
	(0.005)	(0.005)	(0.006)
Number of people	0.116***	0.116***	0.115***
	(0.001)	(0.001)	(0.001)
Literate	0.067***	0.067***	0.100***
	(0.011)	(0.011)	(0.014)
Less than six	0.003	0.003	-0.021
	(0.011)	(0.011)	(0.014)
Six to 12	-0.019*	-0.019*	-0.057***
	(0.012)	(0.012)	(0.014)
More than 12	-0.002	-0.003	-0.034**
	(0.013)	(0.013)	(0.015)
Farmland	0.005	0.005	0.003
	(0.005)	(0.005)	(0.005)
Part-time employed	0.044***	0.044***	0.055***
	(0.008)	(0.008)	(0.009)
Occasionally employed	0.034***	0.034***	0.036***
	(0.007)	(0.007)	(0.007)
Self-employed	0.015*	0.015*	0.014
	(0.009)	(0.009)	(0.010)
Not working	0.023***	0.023***	0.021***
	(0.006)	(0.006)	(0.007)
Hinduism	0.034	0.033	-0.010
	(0.123)	(0.124)	(0.163)
Islam	0.072	0.072	0.026
	(0.124)	(0.124)	(0.164)
Christianity	0.093	0.092	0.051
	(0.125)	(0.125)	(0.165)
Sikhism	0.064	0.064	0.031
	(0.126)	(0.126)	(0.166)
Buddhism	0.111	0.111	0.077
	(0.129)	(0.129)	(0.168)
Household head	0.001	0.001	-0.010
	(0.006)	(0.006)	(0.006)
N	44,990	44,990	35,671

Note: All models have been weighted using the sampling weights provided in the 2017 Financial Inclusion Insights Survey – Wave 5. Marginal effects are reported, and they are measured at the mean of the corresponding control variable for continuous variables, and as the difference in predicted probability of switching from 0 to 1 for dummy variables. Robust standard errors are reported in parentheses. *** - significant at the 1% level; ** - significant at the 5% level; * - significant at the 10% level.
Source: Authors' calculations.

Next, we conduct a robustness check for potential endogeneity between financial inclusion and the PPI index. The endogeneity might exist due to reverse causality and/or existence of factors that affect financial inclusion along with the

poverty index.[12] If our concern of endogeneity is valid, the estimates presented in Tables 9.2 and 9.3 might be biased. In order to correct for potential endogeneity, instead of the linear regressions, we employ two-stage least squares (2SLS). Using two sets of instrumental variables, in the initial stage, we first obtain predicted values for financial inclusion variables using linear regression. The predicted values are then substituted into the poverty equation, where a linear regression is again used to obtain second-stage estimates.

For the regressions where the variables of interest are *financial inclusion* and *own bank account*, we use *active phone* and *active mobile money* as the instruments. The first instrument is where the respondent owns a smartphone and has been using it for financial transactions in the last 90 days. Similarly, our second instrument represents those who have used a registered mobile money account within the past 90 days. We argue that these instruments are highly correlated with the financial inclusion variables in our dataset. However, these instruments do not perform well when we restrict the analysis to those respondents with a bank account in the regression for the *active bank account*. Therefore, we use two other instrumental variables; *financial literacy* and *belong to informal financial institution*. The informal financial institutions comprise informal societies or group saving schemes, while we define *financial literacy* as a dummy variable which is equal to 1 if the respondents answered three or more of the five financial literacy questions in the survey correctly.[13] Amongst those with a bank account, these two instruments are correlated with actively using a bank account.

Table 4 presents the endogeneity-corrected linear regression results.[14] Our variables of interest are now all positive and highly statistically significant. This substantial change is evidence of a sizeable downward endogeneity bias. After correcting for it, our estimates suggest being financially included increases the PPI value by 0.227 units. The effect of bank account ownership is even larger; 0.34 units. However, amongst those with a bank account, active usage of the

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[12] See Churchill and Marisetty (2019) for a similar endogeneity correction analysis.

[13] Our definition of *financial literacy* is similar to the one used by Lyons et al. (2019).

[14] First-stage regression results, other than the estimates of the instrumental variables, are not presented in the paper, but they are available upon request.

account increases the PPI value only by 0.135 units. All three estimates are economically significant, hinting at the successful outcome of the efforts by the GOI to address the issue of poverty reduction through increasing bank accounts in households.

Next, in the mid-section of Table 4 we present the estimates of the instruments in the first-stage regression. We observe that they all have significant explanatory power. Moreover, at the bottom section of Table 4, we present tests for under-identification, weak identification, and over-identifying restrictions. The Kleibergen-Paap rk LM statistic indicates that our chosen set of instruments for all three columns is relevant and that the model is identified.[15] We also reject the null hypothesis of weak identification based on the Kleibergen-Paap rk Wald statistic.[16] Moreover, having multiple instruments lets us test the validity of the instruments. Based on the Hansen J statistic of overidentifying restrictions, we fail to reject the joint null hypothesis that the instruments are valid.

Table 4. Linear Regression Controlling for Endogeneity (Dependent Variable: PPI score)

Variables	Financial Inclusion	Bank Account	Active Bank Account
Financial inclusion	0.227*** (0.037)		
Bank account ownership		0.340*** (0.062)	
Active bank account			0.135*** (0.039)
Other control variables	YES	YES	YES
R^2	0.26	0.03	0.33
N	44,990	44,990	30,165
Instrumental variables			

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[15] This is a rank test. Under the null hypothesis that the equation is under-identified, this statistic is distributed as χ^2 with (L1 - K1 + 1) degrees of freedom, where L1 is the number of excluded instruments and K1 is the number of endogenous regressors. A rejection of the null indicates that the matrix of reduced form coefficients is of full rank, meaning the model is identified (Baum, Schaffer, and Stillman, 2010).

[16] The weak ID test critical values are compiled by Stock and Yogo (2005) are:

10% maximal IV size – 19.93

15% maximal IV size – 11.59

20% maximal IV size – 8.75

25% maximal IV size – 7.25

Active phone	0.052***	0.04***	----
	(0.007)	(0.008)	
Active mobile money	0.154***	0.093***	----
	(0.007)	(0.011)	
Financial literacy	----	----	0.026***
			(0.006)
Belong to informal financial institution	----	----	0.082***
			(0.008)
Tests			
Kleibergen-Paap rk LM statistic (p-value)	522.645	140.81	110.454
	(0.0000)	(0.0000)	(0.0000)
Kleibergen-Paap rk Wald F statistic (10% maximal IV size)	502.706	78.33	56.189
	(19.93)	(19.93)	(19.93)
Hansen J statistic (p-value)	0.039	0.443	0.818
	(0.8438)	(0.5057)	(0.3658)

PPI = Poverty Probability Index.
Note: All models have been weighted using the sampling weights provided in the 2017 Financial Inclusion Insights Survey – Wave 5. Robust standard errors are reported in parenthesis. *** - significant at the 1% level; ** - significant at the 5% level; * - significant at the 10% level.
Source: Authors' calculations.

Earlier, when the dependent variable is *poor*, we used the probit model to identify the effects of financial inclusion variables on the household's likelihood of being poor. However, we did not control for possible endogeneity. In order to do that, we again need to implement a two-stage model, similar to 2SLS. Since *poor* is a dummy variable, implementing a linear two-stage least squares would not be appropriate. Thus, we use the two-stage residual inclusion (2SRI) method to address this concern.[17] To do this, in the first stage we estimate the financial inclusion variables using a linear probability model (LPM) and calculate the residual from this LPM estimation. We then include the residual as an additional regressor along with the financial inclusion variable in the probit model for the poverty regression.

Table 5 presents the endogeneity-corrected results. While the financial inclusion variables were all negative and significant in Table 3, the magnitudes of the estimates were minimal. Now, however, we observe the actual effect of these variables. Compared to not being financially included, those households that are

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[17] The 2SRI method is a special case of the control function approach to address endogeneity. This approach has gained popularity recently, especially in applied health research. See for instance, DeSimone (2002), Shea at al. (2007), Terza, Basu, and Rathouz (2008), Biro (2014), and Eldridge, Onur, and Velamuri (2017).

financially included are 53.3% less likely to be poor. We observe an even larger effect for bank account ownership, which is consistent with our finding in Table 4. Having a bank account, compared to not having one, lowers the probability of being poor by 79.7%. Lastly, having an active bank account, compared to having a dormant one, lowers the likelihood of being poor by 44.5%.

We report the estimates for the first-stage residual, which is added to the second stage regression. This variable is statistically significant for all three columns, implying that the financial inclusion variables are indeed endogenous. Moreover, the bottom section of Table 5 presents the LPM estimates of the instruments for the first stage regression. All instrumental variables (IVs) are highly significant.

Table 5. Linear Probability Model Controlling for Endogeneity

(Dependent Variable: Poor)

Variables	Financial Inclusion	Bank Account	Active Bank Account
Financial inclusion	-0.533*** (0.072)		
Bank account ownership		-0.797*** (0.109)	
Active bank account			-0.445*** (0.090)
First-stage residual	0.522*** (0.072)	0.789*** (0.109)	0.429*** (0.090)
Other control variables	YES	YES	YES
N	44,990	44,990	30,165
Instrumental variables			
Active phone	0.052*** (0.007)	0.04*** (0.008)	----
Active mobile money	0.154*** (0.007)	0.093*** (0.011)	----
Financial literacy	----	----	0.026*** (0.006)
Belong to informal financial institution	----	----	0.082*** (0.008)

Note: All models have been weighted using the sampling weights provided in the 2017 Financial Inclusion Insights Survey – Wave 5. Marginal effects are reported, and they are measured at the mean of the corresponding control variable for continuous variables, and as the difference in predicted probability of switching from 0 to 1 for dummy variables. Robust standard errors are reported in parenthesis. *** - significant at the 1% level; ** - significant at the 5% level; * - significant at the 10% level.
Source: Authors' calculations

5.   Conclusion

This paper focuses on the effect of financial inclusion on poverty reduction in India. We first highlight the successful efforts by the RBI and the GOI in terms of extending access to banking services to rural areas of the country. Using the World Bank's Global Findex data, we first show that these efforts have been greatly successful; by 2017, a large majority of Indians had access to formal banking services. More impressively, the account ownership gaps in terms of gender, income, and location (rural/urban) have been eliminated.

We then scrutinise the poverty reduction effect of the financial inclusion success in India. We utilise various measures of poverty, as well as for financial inclusion. We also correct for possible endogeneity of the financial inclusion variables in our analysis. Our results show that financial inclusion has a positive and significant effect on reducing poverty in India. The findings are consistent across various measures. We also emphasise the importance of controlling for endogeneity bias. If the bias is not taken into consideration, we find potentially misleading results of no association between financial inclusion and poverty levels in India. Policy makers should be cautious about the significant level of bias while doing a similar analysis.

Lastly, we focus on those with a bank account, and show that an active usage of the bank accounts would lead to *further* reductions in poverty levels in India. In other words, the RBI and the GOI, which have been quite successful in extending access to formal banking, should consider policies which would encourage the usage of these bank accounts. Targeted programmes, such as offering financial education both in and outside the schools, with the aim of improving financial literacy could lead to further poverty reduction in India.

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Table A1: Variable Definitions

Variable	Definition
PPI Score	A continuous score between 0 and 1 measuring the likelihood of a household living below the $2.50/day (2005 PPP) poverty line.
Poor	Equals 1 if the household is living below the $2.50/day (2005 PPP) poverty line, and zero otherwise.
Bank account ownership	Equals 1 if the respondent has a bank account registered in their name, and zero otherwise.
Active bank account	Equals 1 if account is used for withdrawal/deposit or other financial activity in the last 90 days, and zero otherwise.
Male	Equals 1 if the respondent is male, and zero otherwise.
Age	Age of the respondent.
Rural	Equals 1 if the respondent lives in a rural area, and zero otherwise.
Married	Equals 1 if the respondent is married, and zero otherwise.
Number of people	Number of people in the household.
Education	Variable that shows the education level of the respondent being no education, one to 6 years, six to twelve years, or more than twelve years.
Literate	Equals 1 if the respondent is literate, and zero otherwise.
Farmland	Equals 1 if the household owns farmland, and zero otherwise.
Employment	Variable that shows if a person is full-time, part-time, occasionally, self-employed, or not employed.
Religion	Variable representing the religion of the respondent being Hinduism, Islam, Christianity, Sikhism or Buddhism.
Household head	Equals 1 if the respondent is the head of the household, or zero otherwise.
Financial literacy	Equals 1 if the respondent answered three or more of the five financial literacy questions in the survey correctly, or zero otherwise.
Active phone	Equals 1 if the respondent owns a smartphone and has been using it for financial transactions in the last 90 days, or zero otherwise.
Active mobile money	Equals 1 if the respondent has used a registered mobile money account in the last 90 days, or zero otherwise.
Belong to informal financial institution	Equals 1 if the respondent belongs to an informal financial institution such as informal societies or group saving schemes, or zero otherwise.

PPI = poverty probability index, PPP = purchasing power parity.
Note: Five financial literacy questions assess the respondent's knowledge of interest rates, compounding interest (two questions), inflation and risk diversification.
Source: The Financial Inclusion Insights Program, InterMedia.

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