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Financial Inclusion in India: Logistic Regression Estimation of Financial Penetration

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Abstract *Despite financial inclusion initiatives of the government through Jan-Dhan Yojana and the RBI, financial penetration is low and disproportionate in India among the poor, women, and the illiterate. This paper analyses the factors that influence formal institutional account-holding and the sources of borrowing in India, using the World Bank financial inclusion survey (Global Findex). The binary logit model of account-holding status and multinomial logit model of the choice of borrowing from formal and informal financial institutions are estimated. The estimated results show that an individual's savings frequency and wage earnings influence the account-holding status in formal financial institutions. Women have lesser access in owning bank accounts as well as borrowing from formal sources. Less educated people and the poor mostly resort to informal borrowing, as they are not exposed to the financial market, and even if they are exposed, they do not have collateral security for formal institutional credit.*

Keywords *Financial Inclusion, Financial Penetration, Bank Account, Credit Source, Logistic Regression*

INTRODUCTION

In today's monetising economy, without access to financial services in various forms offered by different institutions, the economically poor individuals and small business enterprises rely on their limited savings and earnings, and to a significant extent, the local moneylenders and informal monetary transactions. Including the entities that are hitherto excluded from financial services, i.e. financial inclusion, serves as an effective tool for reducing poverty and income inequality, as well as improving the welfare of people. However, the nature, scope, and ways and means of financial inclusion vary according to the place and sources. There is no universally accepted definition of financial inclusion. Financial inclusion is generally understood as the access and uptake of affordable financial services, which allows an individual to store money in a safe place, access credit and insurance products, and manage risks. The Consultative Group to Assist the Poor (CGAP) (2009) defines financial inclusion as "a state in which all working-age adults have effective access to credit, savings, payments and insurance from formal service providers", and effective access is defined as "convenient and responsible service delivery, at a cost affordable to the customer and sustainable for the provider". The World Bank (2017) defines financial inclusion as the "means that individuals and businesses have access to useful and affordable financial products and services that meet their needs - transactions, payments, savings, credit and insurance - delivered in a responsible and sustainable way".

The concept of financial inclusion has become the buzz word and gained momentum in the context of developing economies, with the development of the concept and institutions of microfinance and with the ambitious launching of the Millennium Development Goals (MDGs) and Sustainable Development Goals (SDGs) by the World Bank. Though access to finance has not been directly spelt, it is an important contributor (direct or indirect) in the achievement of most of these goals. In addition, access to financial services improves income opportunities and thus the possibility of obtaining health and education services. It contributes to gender equality by letting women have direct access, which also makes them financially independent. According to Demirguc Kunt et al. (2015), out of 143 economies, 63% have a mandate to promote financial inclusion, and more than 50 countries have set formal targets and goals for financial inclusion. Given the importance of financial inclusion for development, international institutions, including the G20 and the World Bank, have initiated strategies to promote financial inclusion. Improved financial services would lead to increased economic activities and employment opportunities for rural households, as more economic activities raise the disposable income, leading to more savings and a robust deposit base for the bank, resulting in inclusive economic growth (Khan, 2011). The role of financial institutions in addressing issues such as global poverty, income inequality, underdevelopment, and welfare are well documented. With more people coming under the purview of the financial system, their combined impact

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contributes to the faster development process. Further, formal financial services reduce the dominance of informal financial institutions, which are exploitative in nature, and access to formal financial services increases the efficiency of resource allocation and reduces the cost of capital (Sarma & Pais, 2011).

The iconic story of microcredit in Bangladesh continues to thrive as a force across the regions. Microcredit helps to narrow down the gender disparity in account ownership and advance financial literacy and capability among women. In India, the launch of the Pradhan Mantri Jan-Dhan Yojana (PMJDY) programme in 2014 has been one of the world's largest financial inclusion initiatives to date and is a prominent example of India's commitment to advancing financial inclusion. The PMJDY has dramatically expanded access to formal financial services. Beyond this traditional microfinance, the availability of technology has started to promote a new wave of branchless banking. African countries have made significant strides towards advancing financial inclusion through digital technology. Developing countries adopt Internet technology fast with several microfinance banks, mobile operators, and more recently, the commercial banks, pursuing the business very diligently. The rapid proliferation of digital financial platforms and services, particularly mobile money, has been a key driver of financial inclusion progress across the region. However, the main barriers to using mobile money services include limited mobile phone ownership as well as a lack of understanding surrounding mobile money.

Despite the rapid expansion of financial services, in absolute terms, ensuring access to financial services such as accounts, credit, remittances, and so on, to the people who are often excluded from the formal financial sector, financial inclusion remains limited and a significant gap prevails, including a quite prominent gender disparity, with women being excluded from formal financial services. Around a quarter of the accounts opened under PMJDY are dormant, indicating that the benefits of the initiative were unrealised. An earlier initiative, the Swabhiman Campaign ("self-respect"), introduced in 2004, also aimed at inculcating self-respect and confidence in people by making them aware of financial sectors and banking services. It focused especially on including rural people in banking services and linking them to the financial sector in an organised way. On its part, the RBI has advised all banks to open Basic Savings Bank Deposit (BSBD) accounts with minimum common facilities such as no minimum balance, deposit and withdrawal of cash at bank branches and ATMs, receipt/credit of money through electronic payment channels, and providing ATM cards. Further, it has relaxed and simplified KYC norms to facilitate easy opening of bank accounts, especially for a small amount. The RBI has also made it compulsory for banks to set up rural branches in un-banked villages, and banks are directed to allocate at least 25% of the total number of branches to the rural centres.

The extent of financial inclusion in India can be gauged from the trend in the sources of borrowing by the people over the years. Fig. 1, which depicts the trend of sources of borrowing, shows that in the initial phase, from the 1950s to 1970s, people were more susceptible to informal borrowings from sources like moneylenders, unauthorised lending services, and friends. After the nationalisation of banks and the opening of the economy, the trend of borrowing has been changing. The tendency of borrowing from formal sources increases whereas borrowing from informal sources has gone down. This change in the pattern of borrowing is an indication of financial inclusion, and such growth in financial services contributes to financial progress in the economy. With nearly 70% of the Indian population living in villages and a significant proportion of villages without a single bank branch, India's development hinges on this segment's growth - banking the unbanked population under the purview of financial services. In a place where poverty still affects 22% of the population, credit access in India is difficult for many of its people.

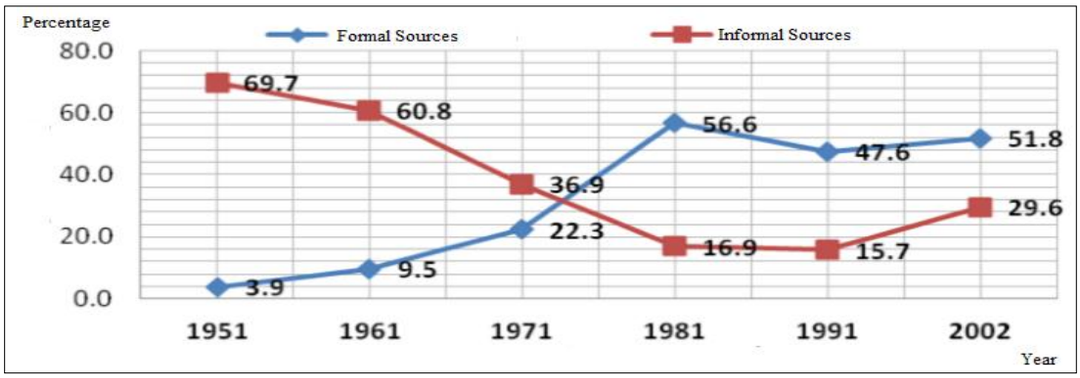

Fig. 1: Trend in Sources of Borrowing in India

Though financial inclusion has become the focus for policymakers, 40% of the people still lack access to basic financial services. While there are programmes formulated to improve access to credit in India, there remains a gender bias. Though loan approval or rejection is at an equal rate to both men and women, the latter tend to seek financial services less often. Therefore, this paper attempts to analyse the degree of financial inclusion in India. Specifically, this paper examines the factors influencing financial inclusion in India, in terms of account penetration and credit access in formal financial institutions. An added objective is to identify the determinants of the source of borrowing by individuals. The World Bank Financial Inclusion Index (Global Findex) micro-level data of 2014 pertaining to financial inclusion is used to address the objective. The data covers 3,000 individuals across India in different wealth classes, occupations, geographical locations, and gender. Among the various dimensions of financial services, account-holding in formal financial institutions and access to institutional credit are taken as two primary aspects of financial inclusion. Empirically, the logit and multinomial models are applied to analyse the account-holding status and source of borrowing, respectively.

REVIEW OF LITERATURE

The United Nations (2006), in its study on 'Building Inclusive Financial Sectors for Development', highlights the importance of inclusive financial sectors for developing countries. It is noted here that in many developing countries a majority are deprived of basic financial services. The providers of financial services consider certain factors while selecting the potential customers that include cultural norms, gender, age, legal identity, limited financial literacy, proximity to a formal financial institution, type of occupation, and level of income. The United Nations reports that retail financial institutions can serve the poor in a better way.

Similarly, the CGAP/World Bank (2009), in its report 'Financial Access Measuring Access to Financial Services around the World', observes the poor incidence of financial inclusion in developing countries. It notes that the number of bank deposits per adult and the value of bank deposits (% to GDP) are high in developed than in developing countries. However, the average bank deposit (% of GDP per capita) is higher in developing countries. Further, the amount of loan per capita in developing countries is a quarter of the loans per person in developed countries. Rich people have easy access to financial services even in poor countries. The poor are mainly served by non-bank suppliers of deposit and credit services, which mainly include cooperatives, specialised state financial institutions, and MFIs. The most common and convenient alternative source of credit for the poor are relatives, friends, vendors, money lenders, and savings clubs. The report reveals that some of the countries with a large proportion of population suffer from lower financial access in terms of deposit or loans (per 1,000 adults), lower outreach of bank branches, and low density of branches per 1,00,000 adults, in varying degrees.

Beck et al. (2007) find that financial inclusion not only reduces income inequality but also benefits the poor disproportionately and is strongly related to poverty alleviation. Financial inclusion enhances growth and reduces inequality through a trickle-down effect. Chen and Jin (2017) study the usage of credit by individuals in China using the 2011 China Household Financial Survey, applying the multinomial logit model. While over half of the sample (53.21%) reported using credit, about 20% only used formal credit. The use of formal credit is associated with socioeconomic characteristics of households. The findings suggest that promoting financial inclusion in China involves expanding access to formal credit among socially and economically disadvantaged households.

Ulwodi and Muriu (2017) explore the factors that determine an individual's account-holding in Sub-Saharan Africa, using the 2014 Global Findex data and multilevel regression analysis. The key variables used include debit card ownership, domestic remittances, and having borrowed and saved in the last year. This study is made in the SSA region. The multilevel regression analysis results show that owning a formal account is related to the level of income of an individual. From lowest to highest income quintiles, the impact turns from negative to positive. Gitaharie et al. (2014) analyse the access of household credit in Indonesia using the 2008 and 2012 Susenas data. The multinomial logit estimates on household access business credit from several sources, namely bank, non-bank, and individual sources, show that the probability of the household to obtain a business credit is affected by the demographic and social-economic factors, and the effectiveness of the implementation of banking public education programmes.

Fanta and Mutsonziwa (2016) examine the extent of financial inclusion of women in the South African Development Region, which includes Botswana, Swaziland, Mauritius, and South Africa, taking account-holding, and access to credit and savings penetration as measures of financial inclusion. The logit estimates of the gender gap in financial inclusion show that the gender gap in account usage is wider than account ownership, that is, women who own accounts do not keep the account active. Both descriptive statistics and economic analysis point out that financial inclusion is strongly related to income-generating capability. The suggestions are to promote financial literacy through financial education especially in rural areas, enabling women

to develop skills and mitigating risk related to informal services in order to provide safety.

Rajput (2017) attempts to measure the inter-state variations in access to finance using credit and deposit penetration ratios, and analyse the determinants of financial inclusion using panel data of 29 states spanning over the period 2006 to 2014 in India. The study corroborates the theory of the importance of regional economic conditions on the level of financial inclusion and suggests that access to finance by the poor is a prerequisite for poverty reduction and sustainable economic development of a country. Asare et al. (2016) study the determinants of household savings option in African households. The multinomial probit estimation shows that the highest probabilities that individuals would hold savings products are observed within informal savings mechanisms and a secret place or home, then through formal and semi-formal savings mechanisms. The financial service providers need to adopt market-led savings mobilisation strategies to attract micro-savers from informal savings mechanisms towards formal and semi-formal financial institutions.

In India, Dutta (2015) uses logit regression and correlation analysis to understand the impact of financial inclusion on financially deprived rural and semi-urban poor of West Bengal on two major factors, the dependency on bank loans and preferences for keeping savings in banks. In consonance with the greater amount of evidence that exists all over the world, the study finds that the poor in West Bengal lack access to basic financial services. On the supply side, the study points out that understanding of financial literacy is one of the requisites for dependency on bank loans, and on the demand side, safety is the major issue in keeping savings in the banks.

Sahoo and Gomkale (2015) aim to reason out the unaccounted unorganised sector in Gujarat, dealing with primary data on different parameters of financial inclusion pertaining to the unorganised sector of Gujarat and logit regression model. The study reveals that in Gandhinagar district, a significant proportion of respondents were out of the coverage of financial services and there was bias against women in terms of access to financial services. About 60% have taken credit from formal sources of finance and 25% from informal sources like local money lenders, relatives, family, and friends, while 15% have not taken any loan from any sources.

DATA AND METHODOLOGY

This paper analyses the socioeconomic determinants affecting financial inclusion in India. The proxies for financial inclusion have been taken as whether an individual holds an account in a formal financial institution and an individual's source of borrowing. The micro-level data on 3,000 individuals across India, from the World Bank Financial Inclusion Index (Global Findex) for the year 2014, has been used in the empirical analysis. Since the dependent variables are categorical in nature, the logit model of the probabilities of account-holding and sources of credit are estimated and the marginal effects calculated.

In order to analyse the determinants of account-holding, binary logistic regression has been used. A logit model is based on the cumulative logistic distribution function. For the basic regression function:

$$y_i = \beta x_i + u_i \tag{1}$$

$y_i = 1$, if the individual is an account holder in a formal financial institution and $y_i = 0$ if he does not. The probability of such a binary choice for all individuals is given by:

$$p_i = Pr(y_i = 1|x,\beta) = \Phi(\beta x_i) \tag{2}$$

where, p_i is the probability of an individual holding a formal institutional account. Therefore,

$$(1 - p_i) = Pr(y_i = 0|x,\beta) = 1 - \Phi(\beta x_i) \tag{3}$$

is the probability of an individual not holding an account in formal financial institutions. The logit model uses logistic cumulative distribution function Φ. The logistic curve resembles a sigmoid curve, as depicted in Fig. 2.

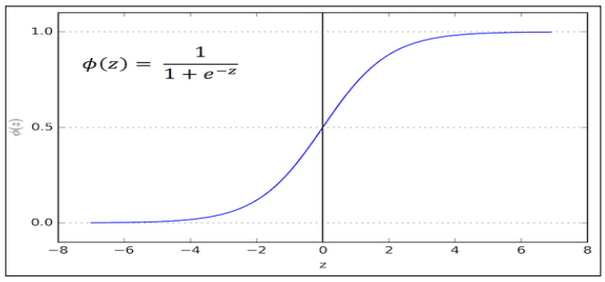

Fig. 2: The Logistic Distribution Curve

Given the logistic distribution, the probability can be specified as:

$$Pr(y_i = 1) = e^{\beta x_i}/(1 + e^{\beta x_i}) \tag{4}$$

The logistic function specifies the odds ratio as:

$$\frac{Pr(y_{i=1})}{Pr(y_{i=0})} = e^{\beta x_i} \tag{5}$$

Taking natural logarithm on both sides of equation (5) yields the log of odds ratio:

$$L_i = \ln\left(\frac{p_i}{1-p_i}\right) = lne^{\beta x_i} = \beta x_i \tag{6}$$

Since the logit model is in terms of probabilities, the model is estimated using maximum likelihood estimation method.

The multinomial logit model follows when there are various categories of the dependent variable in a model. The multinomial logit analyses a single decision among multiple alternatives ordered or unordered. (two or more). The way every category is being influenced by the factors is reflected by a multinomial logit model. For a random utility model:

$$U_{ij} = \beta z_{ij} + \varepsilon_{ij} \quad (7)$$

where, j is the choice alternative, the probability that choice j is made if the prob ($U_{ij} > U_{ik}$) for all $j \neq k$. Given that the J disturbances are independently and identically distributed (McFadden, 1973):

$$F(\varepsilon_{ij}) = \exp(e^{\varepsilon_{ij}}) \quad (8)$$

As in other forms of linear regression, the multinomial logistic regression uses a linear predictor function, $f(j, i)$ to predict the probability that observation i has outcome j:

$$f(j,i) = \beta_{0j} + \beta_{1j}x_{1i} + \beta_{2j}x_{2i} + \cdots\cdots + \beta_{mk}x_{mi} \quad (9)$$

One fairly simple way to arrive at the multinomial logit model is to imagine for J possible outcomes, running J–1 independent binary logistic regression models, in which one outcome is chosen as a pivot and then the other J–1 outcomes are separately regressed against the pivot outcome. If outcome K (the last outcome) is chosen as the pivot, the modelling is:

$$\begin{aligned}
&\ln\left[\frac{Pr(Y_{i=1})}{Pr(Y_{i=J})}\right] = \beta_1 x_i \\
&\ln\left[\frac{Pr(Y_{i=2})}{Pr(Y_{i=J})}\right] = \beta_1 x_i \\
&\ldots\ldots\ldots\ldots\ldots\ldots \\
&\ldots\ldots\ldots\ldots\ldots\ldots \\
&\ln\left[\frac{Pr(Y_{i=J-1})}{Pr(Y_{i=J})}\right] = \beta_{J-1} x_i
\end{aligned} \quad (10)$$

Taking exponential on both sides, and solving for probabilities:

$$\begin{aligned}
&\Pr(y_i = 1) = \Pr(y_i = j)\, e^{\beta_1 x_i} \\
&\Pr(y_i = 2) = \Pr(y_i = j)\, e^{\beta_2 x_i} \\
&\ldots\ldots\ldots\ldots\ldots\ldots \\
&\ldots\ldots\ldots\ldots\ldots\ldots \\
&\Pr(y_i = J-1) = \Pr(y_i = j)\, e^{\beta_{J-1} x_i}
\end{aligned} \quad (11)$$

Given that all J of the probabilities must sum to one:

$$\Pr(y_i = J) = 1 - \sum_{j=1}^{J-1} e^{\beta_j x_i} \quad (12)$$

$$\Pr(y_i = J) = 1/\left(1 + \sum_{j=1}^{J-1} e^{\beta_j x_i}\right) \quad (13)$$

The individual probabilities are then calculated as:

$$\begin{aligned}
&\Pr(y_i = 1) = \frac{e^{\beta_1 . x_i}}{1 + \sum_{j=1}^{J-1} e^{\beta_j . x_i}} \\
&\Pr(y_i = 2) = \frac{e^{\beta_2 . x_i}}{1 + \sum_{j=1}^{J-1} e^{\beta_j . x_i}} \\
&\ldots\ldots\ldots\ldots\ldots\ldots \\
&\Pr(y_i = J-1) = \frac{e^{\beta_{J-1} . x_i}}{1 + \sum_{j=1}^{J-1} e^{\beta_j . x_i}}
\end{aligned} \quad (14)$$

The model implies the log odds ratio as:

$$\ln\left[\frac{P_{ij}}{P_{iJ}}\right] = (\beta_j - \beta_j)x_i \quad (15)$$

EMPIRICAL ANALYSIS

Table 1 presents the definition and distribution of the variables used in the empirical analysis. About 55.6% of individuals reported having a formal account in financial institutions, whereas the rest do not hold an account. The reasons that respondents cite for not borrowing from formal institutions are lack of necessary documents, lack of money, distance, and so on. Among the borrowers, 13.1% borrow from formal sources like authorised banks, insurance companies, and financial institutions and 32.8% resort to informal borrowing, which includes store credit, family, friends, private lenders, pawn shops, and so on. Borrowing from informal or non-institutional sources involves a higher interest rate and high risk. A sizeable 40.2% have not borrowed from any source at all. A majority of the people have just primary level education (58.4%) and about 25.1% are poor; however, a sizeable 11.4% are rich. Only 41.4% reported savings in the past 12 months. The mean age is 37.50 years.

Table 1: Descriptive Statistics of Variables

Variable	Description	Frequency	%
Account holders	If owning an account in any bank or any financial institutions = 1, 0 otherwise	1332	44.4
Non-account holders		1668	55.6
Borrowed from formal sources only	Proxy for access to credit and borrowing	393	13.1
Borrowed from informal sources only		984	32.8
Borrowed from both formal and informal sources		417	13.9
No borrowing		1206	40.2

Variable	Description	Frequency	%
Female	If gender is female = 1, 0 otherwise	1655	55.2
Male		1345	44.8
No education	Highest level of education attained – no education, primary education, secondary education, and tertiary education	1	0.00
Primary education		1754	58.4
Secondary education		986	32.9
Tertiary education		259	8.6
Poor class	Economic status in five categories in quintiles – poorest 20%, lower-middle class (20%), middle class (20%), wealthy or upper middle class (20%), richest (top 20%)	343	11.4
Lower-middle class		578	19.3
Middle class		692	23.1
Wealthier class		635	21.2
Richest class		752	25.1
Non-saver	If saved in the past 12 months in a bank, financial institution, formal and informal, household savings = 1, 0 otherwise	1759	58.6
Saver		1241	41.4

The association of account holding status and source of credit with explanatory variables are tested with the chi-square test for the null hypothesis that the variables do not have any association. The chi-square test results presented in Table 2 rejects the null significantly.

Table 2: Association of Socioeconomic Status with Account-Holding Status and Source of Credit

Variable	Account Holding Status	Source of Credit
Gender	91.64*** (0.00)	170.77*** (0.00)
Education	167.45*** (0.00)	93.82** (0.02)
Income	99.04*** (0.00)	250.09*** (0.00)
Savings	196.77*** (0.00)	-
Wage earnings	34.03** (0.04)	-
Obs.	3000	

Note: $\chi 2$ (chi square) values in parentheses. *** Significant at 1% level. ** Significant at 5% level.

In the empirical analysis of the determinants, account-holding status is specified as a logit function:

$$\ln\left[\frac{\Pr(y_i=Having\ an\ account}{\Pr(y_i=Not\ having\ an\ account)}\right] = \beta_0 + \beta_1(age) + \beta_2(female) + \beta_3(primary\ education) + \beta_4(secondary\ education) + \beta_5(tertiary\ education) + \beta_6(lower\ middle\ class) + \beta_7(middle\ class) + \beta_8(upper\ middle\ class) + \beta_9(rich) + \beta_{10}(wage\ earner) + \beta_{11}(saver) + u_i \quad (16)$$

The maximum likelihood estimates of the binary logit regression on account holding status in formal financial institutions along with the calculated marginal effect and the change in probability of predictive margin, is presented in Table 3.

Table 3: Binary Logit Regression Estimates of Account Holding Status

Variable	Coefficient	Std. Error	p > z	Marginal Effect
Age	0.020*	0.07	0.003	0.005
Female	−0.540***	0.000	0.0475	-0.131
Primary education	−17.371***	0.000	0.007	-0.998
Secondary education	16.576***	0.000	0.012	0.995
Tertiary education	15.598***	0.000	0.002	0.802
Lower middle class	−0.083	0.547	0.127	-0.020
Middle class	−0.179	0.185	0.113	-0.044
Upper middle class	0.038	0.787	0.145	0.009
Rich	0.333**	0.018	0.019	0.080
Wage earners	0.332***	0.002	0.015	0.079
Savers	0.961***	0.000	0.022	0.228
Pseudo R2	0.592			

Note: *** Significant at 1% level. ** Significant at 5% level. * Significant at 10% level. Reference category variables are male, illiterate, poor, non-wage earners, and non-savers.

The results show that the probability of women having account ownership in formal financial institutions is significantly lower than that of men. As age increases, it is more likely that an individual owns an account. In terms of marginal effects, an extra year of age of individuals increases the probability of financial inclusion in formal financial markets by about half a per cent. All educational coefficients are statistically highly significant. People with only a primary education would be less likely to have an account. The relative probability of a poorly educated person owning an account compared to not owning an account is about 99% lower than the more educated person. Individuals

with secondary and higher level education would have a higher relative probability of being financially included and the effect rises by 99 and 80%, respectively. The income or economic status coefficients are not significant, except for the rich class. A negative influence has been observed in the middle classes, whereas the upper-middle class has a positive effect on account holding. The probability of holding a financial account increases by 8.02% for the rich class. The probability of financial inclusion significantly increases with wage earnings and savings, and the relative probability of account holding rises by 7.9% and 22.8%, respectively.

This study also analyses the factors which impact an individual's access and sources of borrowing using the multinomial logit method. The dependent variable is classified into four categories: (i) formal institutional source only, (ii) informal sources only, (iii) both formal and informal sources, and (iv) no borrowing at all.

The estimated empirical specification of the multinomial logit model is given as:

$$\ln\left[\frac{\Pr(y_i=Formal\ institution}{\Pr(y_i=No\ borrowing)}\right]=\sum_{j=1}^{4}\beta_j x_{j-1}$$

$$\ln\left[\frac{\Pr(y_i=Informal\ institution}{\Pr(y_i=No\ borrowing)}\right]=\sum_{j=1}^{4}\beta_j x_{j-1} \quad (17)$$

$$\ln\left[\frac{\Pr(y_i=Both\ sources}{\Pr(y_i=No\ borrowing)}\right]=\sum_{j=1}^{4}\beta_j x_{j-1}$$

Taking antilog on both sides and solving for probabilities:

$$\begin{aligned}\Pr(y_i=1)&=\Pr(y_i=4)\,e^{\sum_{j=1}^{4}\beta_j x_{j-1}}\\ \Pr(y_i=2)&=\Pr(y_i=4)\,e^{\sum_{j=1}^{4}\beta_j x_{j-1}}\\ \Pr(y_i=3)&=\Pr(y_i=4)\,e^{\sum_{j=1}^{4}\beta_j x_{j-1}}\\ \Pr(y_i=4)&=1/(1+e^{\sum_{j=1}^{4}\beta_j x_{j-1}}\\ \Pr(y_i=4)&=\frac{1}{1+\sum_{j=1}^{4}e^{\beta_j x_{J-1}}}\end{aligned} \quad (18)$$

The empirical specification of the multinomial logit model is specified as:

$$\begin{aligned}\ln\left[\frac{\Pr(Credit\ source=j}{\Pr(No\ borrowing)}\right]&=\beta_0+\beta_1(age)+\beta_2(female)+\beta_3(primary\ education)+\\ &\beta_4(secondary\ education)+\beta_5(tertiary\ education)+\beta_6(lower\ middle\ class)+\\ \beta_7(middle\ class)+\beta_8(upper\ middle\ class)+\beta_9(rich)+\varepsilon_i\end{aligned} \quad (19)$$

The estimation method used is maximum likelihood estimation, which maximises the likelihood function. The value of the estimated coefficient β reveals the direction of the relationship between *x* and logits of *y*. When β > 0, larger (or smaller) *x* values are associated with larger (or smaller) logits of *y* and the distribution curve will resemble an increasing sigmoid (or S-shape). Conversely, if β < 0, larger (or smaller) *x* values are associated with smaller (or larger) logits of *y* and are shown by a reverse sigmoid curve. In other words, an increase in *x* is associated with a decrease in logits of *y*, and vice versa.

Table 4 presents the estimated multinomial logit model along with the marginal effects. Age significantly and positively influences availing credit from the formal sector and not from informal sources. An individual's gender influences sources of borrowing considerably. Women have lesser access to borrowing, irrespective of the sources. Male dominance can be attributed to the very less penetration of bank branches in India, especially in rural areas and the male-dominated Indian patriarchal society. Further, women lack knowledge of the benefits of being financially included, since the literacy rate is lower among them. The relative probability of women borrowing from formal sources goes down by 9.21% compared to no borrowing if the individual is female. In the informal borrowing sources as well, women have lower access and the relative probability decreases by 2.22%. Compared to formal sector sources, women have a slightly higher tendency to borrow informally as these sources are closer to them and easily accessible.

Table 4: Multinomial Logistic Regression Estimates of Source of Credit

Variable	Formal credit		Informal credit		Both Formal and Informal Credits	
	Coefficient	Marginal Effect	Coefficient	Marginal Effect	Coefficient	Marginal Effect
Age	0.006**	0.0003	0.002	−0.0002	0.013***	0.004
	(0.004)		(0.003)		(0.004)	
Female	−1.264***	−0.092	−0.320***	−0.022	−1.162***	0.129
	(0.134)		(0.087)		(0.129)	
Primary education	−16.592***	−0.9994	0.303*	0.406	0.708**	0.311
	(0.365)		(0.176)		(0.311)	
Secondary education	−11.354***	−0.966	0.169***	0.356	1.078***	0.296
	(0.353)		(0.167)		(0.296)	

Tertiary education	4.110*** (0.385)	0.332	−0.044 (0.229)	−0.044	1.091*** (0.339)	0.339
Lower middle class	−0.669* (0.362)	−0.068	0.073* (0.146)	0.023	−0.226 (0.307)	0.307
Middle class	−1.551*** (0.337)	−0.170	.052** (0.145)	−0.115	1.115*** (0.278)	0.278
Upper middle class	2.026*** (0.337)	0.196	0.385** (0.152)	−0.118	1.851*** (0.275)	0.275
Rich	2.376*** (0.332)	0.268	0.239 (0.153)	−0.154	1.717*** (0.275)	0.275
Pseudo R2	0.473					

Note: Standard errors in parenthesis. *** Significant at 1% level. ** Significant at 5% level. * Significant at 10% level. Reference category variables are male, illiterate, and poor.

With regard to education, there is an interesting implication. As far as formal borrowing is concerned, only higher education has a positive impact, while the lower levels of education drift people towards non-institutional sources, due to lack of financial education. The relative probability that an individual would borrow from formal sector financial institutions than not to borrow increases by about 33% with higher education. However, the probability of the same goes down drastically if the person is not well-educated. Instead, people with basic education tend to go for informal borrowing, which apparently they find convenient. If an individual has only primary education, then the relative probability of informal borrowing increases by almost 40%. Similarly, educated people have a lower probability of resorting to informal sources of borrowing and this probability falls by around 4% compared to not having borrowed. Probability of people borrowing from both sources also decreases among people with a low level of education and increases with a higher level of education.

Similarly, the MNL estimates show that rich people borrow from formal financial institutions. As the people move from low-income class to high-income class, they tend to have credit from institutional finance. The relative probability that high-income individuals would have formal borrowing is almost double compared to low-income people. Rich people have an increased probability of almost 26% for formal borrowing from no borrowing, which drastically falls as income falls; this is negative for the poor. However, lower-middle class and the poor tend to borrow from informal institutions more than the rich. The probability of a rich individual borrowing informally falls by almost 15% from no borrowing. Limited income, therefore, is a major factor for such an adverse scenario. In poor households, limited assets restrict them from formal sector borrowing as they have insufficient assets to put up as collateral.

CONCLUSION

This paper analyses the determinants of financial inclusion in India, taking account holding and source of borrowing as proxies for financial penetration in India. The study uses the 3,000 observations from the World Bank Financial Inclusion Survey (Global Findex) for the year 2014. The binary logit model is applied to estimate the impact of various factors on account-holding status, while the multinomial logit model is applied to understand the choice of borrowing from formal and informal financial institutions. It is noted that through the initiatives of financial inclusion in India by the government through PMJDY and RBI, the usage of formal financial sources by people has been increasing. However, the extent of financial inclusion is quite severe and disproportionate in India, especially as there exists a gender divide. Financial inclusion is disproportionately low among relatively poor and lower education households, and among women. Even a significant percentage of rich households in India are financially excluded. The estimated results show that an individual's savings frequency and wage earnings influence their account-holding status in formal financial institutions. Women have lesser access to owning bank accounts, as well as borrowing from formal sources. People with only basic education and the poor mostly resort to informal borrowing, as they are not exposed to the financial market, and even if exposed, they do not have collateral security for formal institutional credit.

The initiatives taken by the government seem to have paid off and the flow of institutional credit has increased significantly in real terms. However, the presence of informal sources of borrowing is still intact, despite legal curbs and it is well known that their interest rates are high and there exists usury. Therefore, formal financial institutions should develop more flexible products and services that are less restrictive on the

poor, women, and the illiterate. Further, financial institutions should be more proactive in spreading financial literacy to overcome the hurdles posed by the lower level of education of the prospective borrowers. In addition, simplification of the procedures of lending and making credit accessible are required. The new initiative, Jan-Dhan Yojana, is expected to further improve financial inclusion in rural areas and such efforts need to be consolidated.

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