Determinants of Women's Financial Inclusion: Evidence from NFHS

1. Introduction

According to the UN 2030 Agenda for Sustainable Development, financial inclusion is crucial to achieving the Sustainable Development Goals (SDGs), which include eradicating gender inequality. Males are more likely to be financially active than females, since women are restricted from ownership, access, and use of productive resources in many economies (Swamy 2014; Ghosh and Vinod 2017). For example, access to finance enables the poorest members of society to increase their production and productivity, thereby reducing poverty levels (SDG 2), investing in human capital (education) and health (SDGs 3 and 4), promoting gender equality (SDG 5), and meeting the decent work and innovation goals (SDGs 8 and 9). 'While the Sustainable Development Goals do not directly target financial inclusion, it is a critical facilitator for several of them' (Klapper *et al.* 2016; Kuada 2019; Chibba 2009). Women's financial inclusion helps to achieve a variety of sustainable development goals in addition to SDG 5. Female-controlled resources are more likely to be spent on basic needs of necessities like food and water, as well as child welfare, such as school fees and health care (Duflo 2012). Given these advantages, it's not surprising that women are more willing than males to relinquish some household income in order to receive financial transfers (Almas *et al.* 2018). In addition, field studies proved that insurance has aided female farmers in higher yield and managing food insecurity and shocks from climatic changes (Delavallade *et al.* 2015). Further, FAO (2011) found that, if women had equal access to financial and other productive resources as males, they might maximize farm productivity by 20% to 30%.

If women have access to credit, they may have more influence over their household budget and negotiating power, which will help to reduce gender inequality, which is a focus of SDG 5. As women are more likely to be self-employed than males, they are reported to be in more need of financial services than males (Demirgüç-Kunt *et al*, 2013). Women make about 40% of the global workforce, while female-owned SMEs (Small and Medium Enterprises) account for about 34% of all SMEs in developing countries (Isaac 2014). At the same time, Demirgüç-Kunt and Klapper (2013) found that 42% of women

in the world do not have access to the financial system. Women may have more financial control and bargaining power at home if they have access to money, reducing gender inequality (Aker and Mbiti 2010; Ashraf and Karlan 2010). Savings accounts can give women a secure and formal platform to create a credit history and save their earnings for future investments in the lack of easy access to formal and informal loans (Anderson and Baland 2002; Dupas and Robinson 2013; Karlan and Morduch 2010).

Financial markets have grown rapidly during the last few decades. The role and functioning of financial marketing have been created significantly in terms of intermediary efficiency, institution quality, and market depth (Krishnan 2011). For example, in the least developed countries, average credit-to-GDP ratios have more than doubled since the 1990s, rising from 10% in the 1990s to 24 percent in 2010-2018. Emerging economies like China and India have gone through similar transformations, with 92 percent and 24 percent in the 1990s and 142 percent and 51 percent in the 2010-18 period, respectively. Previous research suggests that financial development has a number of positive impacts on growth, savings, and a number of macroeconomic indicators (Levine 2005; Rajan and Zingales 1998). Nevertheless, while the recent explosion of financial development has aided investments, risk sharing, growth, and industrialization, there have been concerns that the pattern of financial development has been lopsided, and that while it has transformed economies and contributed to their growth, the benefits have not trickled down to the most vulnerable households, resulting in a "discernible gap between the availability of finance and its accessibility and use" (Ghosh and Vinod 2017: 60).

Financial inclusion has been increasingly important in recent policy debates in this context. Financial inclusion is gaining in significance as it is understood that the ability to participate in financial markets and have access to cheap, that goods may have significant welfare effects on people. Financial inclusion has been found to raise household savings, boost employment, improve economic and environmental resilience, and reduce poverty (Ellis *et al.* 2010; Ruiz 2013; Swamy 2014). Despite its many advantages, a few studies have highlighted inequities in financial access. In developing economies, where societies have long been characterised by interlocking social and economic gradients, major barriers to accessing financial services for households from socially marginalised backgrounds still exist (Kumar and Venkatachalam 2019; Kumar 2013; Ghosh and Vinod 2017; Henderson *et al.* 2015; Asiedu *et al.* 2012; Demirgüç-Kunt *et al.* 2013; De Andrés *et al.* 2020; Aristei and Gallo 2016).

It is with this background that this paper studies the determinants of women's financial inclusion in India based on household level evidence drawn from the latest available round of the National Family Health Survey (NFHS-4). The focus on understanding women's access to finance is important for two reasons. First, there exist large gender differentials in economic opportunities, mortality, nutrition, education, and a whole range of crucial indicators of well-being (Duflo 2012; Pande 2003; Osmani and Sen 2003; Sen 1989; Demirgüç-Kunt, *et al.* 2017; Ghosh and Vinod 2017). The persistence of such inequalities erodes the agency of women and thus constrains their ability to participate fully in social and political life. Eliminating such gaps holds immense intrinsic value and is a prerequisite for building democratic and sustainable societies[1]. It is precisely in recognition of this that gender empowerment has become a central plank in today's development discourse, perhaps best reflected in the UN's Sustainable Development Goals which has established, as one of its aims, the goal to "achieve gender equality and empower all women and girls". Improving women's financial inclusion can contribute to this goal because access to financial markets has been shown to reduce women's economic vulnerabilities, encourage entrepreneurship and promote women's autonomy over financial decision making (Fareed *et al.* 2017; Pitt *et al.* 2006; Suri and Jack 2016).

The focus on financial inclusion as an instrument of women's empowerment then brings us to a second point. There is a widespread belief that economic growth tends to dilute the importance of identities, and thus the most effective guarantee of eliminating gender inequalities may simply lie in the promises of development rather than specific gender oriented policies (Duflo 2012). Valuable as these insights are, the very fact that gender differences have been so persistent and the very fact that they continue to shape contemporary societies, points to the complex entanglements between economic development and gender. This was precisely what the wave of feminist scholarship that emerged in the 1970s, and that paved the way for bringing gender into the forefront of academic debates, insisted when they first began analyzing deep rooted structural causes of gender differentials and cultural biases in society (Federici 1975; Smith 1974; Pateman 1988). These studies emerged as a reaction to the dominant post-War discourse which either

[1] Additionally, it is worth noting that women's empowerment has also come to be seen as a powerful instrument of development, as a number of studies have asserted that women's status in society can have powerful spill-over effects on educational and nutritional outcomes for children, the overall human capital for the economy and its aggregate savings and growth as well (Prina 2015; Duflo 2003, 2012; Seguino and Floro 2003; Klasen and Lamanna 2009).

ignored gender inequalities altogether or recognized them only to dismiss them as a temporary, and hence relatively unimportant, phenomenon (Boserup 1974). Feminist scholarship instead asserted the central role of women in shaping modern day economies (Amsden 1988, 1990; Friedan 1963). It noted the multiple ways in which women contributed to value creation through their unpaid work as caregivers and child bearers, much of which was rendered invisible and, hence, underestimated by society (Vogel 1983; Federici 1975). This underestimation was, in turn, seen as being part and parcel of broader patriarchal values that were deeply ingrained in society, and which even shaped academic discourse. By asserting the socially constructed nature of gender differences and by indicating the centrality of women's economic contributions, this scholarship critiqued the simplistic view that had held sway until then, which treated gender inequalities as temporary aberrations in an otherwise linear teleological development journey. Today, of course, the centrality of gender and its complex entanglements with development have come to be widely recognized and this has resulted in an enormous new literature that has been shaped by feminist concerns (Duflo 2012; Pande 2003; Osmani and Sen 2003; Sen 1989; Aterido *et al.* 2013; Demirgüç-Kunt, *et al.* 2017). Concomitantly, there has been increasing stress on the fact that gender inequalities may be persistent and may need active policies oriented towards ending gender differentials (Eckhoff *et al.* 2019; Hendriks 2019). Here financial inclusion may provide a powerful instrument towards this important goal.

Given the crucial importance of women in the development process, this paper focuses on exploring the determinants of women's financial inclusion in India. In doing so it makes two central contributions. First, it draws on the fourth round of NFHS which consists of a women specific questionnaire containing information on key dimensions of women's status in the country, including data on women's access to bank accounts and microfinance loans. To the best of our knowledge, this is the first paper to utilize the NFHS survey to analyze the question of financial access in the context of India (See Table 1). Second, previous studies which have analyzed financial inclusion-especially in the context of India- have largely focused on household-level determinants (Ghosh and Vinod 2017; Chavan 2020; Kaur and Kapuria 2020; Rajeev *et al.* 2011). While such studies can be valuable in unearthing formal structural barriers to women's financial inclusion, they may miss the informal structural forces that are equally, if not more, significant (Sen 1987; Holvoet 2005; Agarwal 1997). One may, for example, want to know how economic outcomes

differ between female and male-headed households but one may also want to ask how women within male-headed households fare. This is important because women's access to financial services may be affected by household income/assets, its size or geographical location, and so on, but it is also likely to be shaped by the intra-household bargaining power of women, norms that govern their freedom of mobility, their economic autonomy vis-a-vis male members of the household and so on (Eckhoff 2019; Gammage *et al.* 2020). From a gendered perspective, therefore, households may prove to be "over-aggregative" since "females and males in the same family may well have quite divergent predicaments" (Sen 1987: 2, 3).

It is with this background in mind that the rest of the paper is structured as follows: the next section outlines a brief literature review in section 2, followed by a detailed description of the data and methodology in section 3. Section 4 explains the results and the final section provides some concluding remarks.

2. Literature Review

Financial inclusion has been defined as "a process that ensures the ease of access, availability, and usage of the formal financial system for all members of an economy" (Sarma and Pais 2011: 613). Its importance has come to be recognized by policy makers because even as financial markets in developing countries have experienced a sea change in their scope and efficiency, these transformations have not always gone hand in hand with balanced, equitable access to financial markets for households (Kumar 2013; Dymski 2005; Ghosh and Vinod 2017). Socially marginalized households, in particular, have lagged, leading scholars to suggest "that it is not enough to assume that FI [financial inclusion] will happen on its own…the onus has come onto the policymakers to provide the same" (Swamy 2014: 2).

Given these findings, a large body of literature has emerged that has explored the determinants of financial inclusion. Some studies have looked at household level determinants of financial inclusion in the context of developing countries (Zins and Lauren 2016; Soumare *et al.* 2016; Asuming *et al.* 2019), while others have focused on cross country evidence and have emphasized the role of macroeconomic, social, and human development indicators in influencing the levels of financial inclusion (Sarma and Pais 2011; Datta and Singh 2019; Alber 2019). Within this emerging body of work, several studies have emphasized the

gendered nature of financial inclusion and have pointed to evidence of wide gender gaps in access to financial services (Demirgüç-Kunt *et al.* 2013; Asiedu *et al.* 2012; De Andrés *et al.* 2020; Aristei and Gallo 2016).

In the Indian context, gender gaps in access to finance have received substantial attention (Table 1). Drawing on household level data from the 70th round of NSSO's All India Debt and Investment Survey (AIDIS), Ghosh and Vinod (2017) look at the determinants of financial inclusion using probit as well as double hurdle models. After controlling for household and state-level variables their analysis finds a statistically significant relationship between financial inclusion and gender, with female-headed households being less likely to be financially included than male-headed households. In a similar vein Kaur and Kapuria (2020) utilize the Situational Assessment Survey (SAS) from the same NSSO round using multinomial logit and find that female-headed households tend to have lesser access to formal credit than male-headed households (but that in the case of informal credit that situation is reversed). These results are also confirmed by the exploratory analysis of Rajeev *et al.* (2011) who analyze the 59th round of NSSO's AIDIS and its Situational Assessment Survey (2003). NSSO rounds provide rich household level data to analyze these questions and have thus been widely used but studies have come to similar conclusions utilizing other datasets as well. The empirical studies conducted by Chavan (2020), Chaudhuri *et al.* (2020), and Ghosh and Chaudhury (2019) use the CMIE consumer pyramid's survey (2014-15), 4th round of Indian Micro, Small and Medium Enterprises (2006-07) and Global Findex of 2017 respectively, to confirm the gender gap that has been widely noted. Chavan (2020), in particular, notes how even though women's access to banking services in India has increased over time, women still lag behind men on crucial dimensions like bank account usage and credit access.

Table 1: Gender as a Determinant of Financial Inclusion in India

Author(s)	**Data Source**	**Methodology**	**Remarks**
Ghosh and Chaudhury (2019)	World Bank's Findex - 2017	Fairlie nonlinear decomposition technique	Explains gender gaps in FI to be the result of socio-economic differences between men and women
Ghosh and Vinod (2017)	NSSO 70th Round AIDIS (2013)	Probit and Double	Uses three different measures of FI and shows that the gender of

		Hurdle model	the household head significantly affects FI.
Chaudhuri *et al.* (2020)	4th Round of the Indian MSME Survey (2006–07)	Logit estimation; Oaxaca Decomposition	Firm-owner's gender influences access to credit from formal institutional sources.
Rajeev *et al.* (2011)	NSSO 59th Round AIDIS & SAS (2003)	Exploratory statistics	Female-headed households have lower access to credit (especially poorer and self-employed)
Kaur and Kapuria (2020)	NSSO 70th Round SAS (2013)	Multinomial logistic regression	Female-headed households have greater access to non-institutional finance and have relatively lesser access to institutional finance. Females from socially disadvantaged groups have lower access to institutional finance.
Chavan (2020)	BSR (from 1996) and CMIE (2014-2018)	Linear probability model	Points to gender gaps in access to credit.

Note: AIDIS-All India Debt and Investment Survey and SAS-Situational Assessment Survey, BSR-Basic Statistical Returns of Scheduled Commercial Banks of RBI (Reserve Bank of India), MSME-Micro, Small and Medium Enterprises, and CMIE–Center for Monitoring Indian Economy.

3. Data and Methodology

As is evident much of the work that has been done in India has focused on household determinants of financial inclusion and how gender in particular shapes it. This paper by contrast seeks to specifically understand the determinants of women's access to finance. Towards this end, we draw on the NFHS-4 (National Family Health Survey) dataset which provides a wealth of evidence on household assets, fertility practices, nutrition, education, social and behavioral norms, and so on. To the best of our knowledge, this is the first paper that utilizes the NFHS survey to analyze financial inclusion in the Indian context. The fourth round of the Survey, which is the most recent, was conducted in 2015-16, in 17 different languages and was based on a two-stage stratified sampling strategy that identified 28,586 primary sampling units (of which 28,522 were finally completely surveyed corresponding to 601,509

households). For our purposes, we make use of the fact that NFHS-4 has collected data on two crucial dimensions of women's access to finance. The NFHS questionnaire has gathered information regarding women's ownership and use of bank or savings accounts. This is our primary proxy for the indicator of financial inclusion. In a separate question, surveyed women were also asked if they were aware of any microcredit programs in their vicinity and if they did, whether they took loans from it for their businesses. We use this binary response variable as our second measure for women's financial inclusion.

To statistically analyze the determinants of financial inclusion, we estimate the regression model given below:

$$FI_{is} = \alpha + \beta X_i + \eta J_s + \varepsilon_{is} \text{ ---------- (1)}$$

Where FI refers to our measure of financial inclusion for household i in state s; X_i is a matrix of explanatory variables which include household-level variables; J_s consists of state-level variables; ε_{is} is the error term.

Coming to our primary measure, which is women's access to bank/savings accounts, we estimate equation (1) using probit as it is a binary response variable. Additionally, we try to account for the hierarchically clustered nature of NFHS sampling by using a multi-level probit regression as a robustness check. Although we are focusing on the determinants of women's financial inclusion, women are nested in households, which in turn are nested in primary sampling units within states (Dey and Raheem 2016). To eliminate potential bias that may arise due to correlations across these levels, we add a multi-level probit regression that incorporates 2 levels (household and state-level).

We use a probit regression to analyze the second measure of financial inclusion as well, but the estimates may be biased because this measure of financial inclusion is incidentally truncated as it can only be observed for women who have knowledge about microfinance programs in the first place. Analyzing women's participation in microfinance loan schemes while ignoring their selection into the sample can lead to biased estimates because of the inherent selectivity bias (Heckman 1979; Winship and Mare 1992). To overcome this issue, we utilize a bivariate probit model with a Heckman style correction

which incorporates explicitly the truncated nature of our binary outcome variable (Greene 2009; Maddala 1983). The procedure involves estimation by two stages in which, first, the selection mechanism is considered and then the regression for the outcome variable is analyzed considering only those who have been selected into the sample.

As mentioned above, we use bankaccess and tookloan as the main dependent variables. Bankaccess refers to the question "has bank or savings account that respondent uses". Tookloan refers to the question "ever taken a loan, cash or in kind, from these programmes, to start or expand a business" as asked in the NFHS questionnaire. Knowloan refers to the question "knows programme in this area that gives loans to women to start or expand a business". 122,351 observations give information about both bankaccess as well as knowloan. While 52% of the women in our sample have access to a bank account, 48% don't have one. Only 37% of women know of microcredit options while the rest do not. Of the total sample, only 15.5% have ever taken a loan through microcredit programmes. Table A1 shows the number of women who did or did not take loans by bankaccess and knowloan. Those who knew of credit programmes have a higher percentage of women taking loans than those who have bankaccess. Those who do not know about the credit programmes have not taken loans. Table A2 shows the distributions of those with a bankaccess by education and wealth. We use bankaccess and tookloan for the regressions. We use tookloan with respect to knowloan (as the selection variable) for our Heckman selection probit model. The regressions use the following independent variables and in this, we follow the lead of previous studies that use micro-level data:

- Age**:** *Age* refers to the age of the woman at the time of the survey. The average age of the women in our sample is 29.89 years. We expect a positive effect on the dependent variable (i.e., financial inclusion). Agesq is the squared term of age which we include to capture the quadratic effect of age (Zinn and Weill 2016; Dar and Ahmed 2020). We expect that as age increases, its effect on the dependent variable will initially increase and eventually decrease beyond a certain limit.
- Literacy*:* ***Educ*** refers to the highest educational level attained by women. There are four categories, namely no education, primary, secondary, and higher education. We expect that those with higher education would have higher access to bank accounts. Previous studies have indicated the importance of literacy as a determinant of financial inclusion (Ghosh and

Vinod 2017; Wang and Guan 2017; Dar and Ahmed 2020). Female literacy is closely related to women's bargaining power within families (Wang *et al.* 2020).

- Gender of Household Head: ***Hhgender*** refers to the gender of the household head. In the sample, 84.5 % are male-headed households and the remaining 15.5% are female-headed households. If women lack sufficient bargaining power within households, we expect women who are a part of male-headed households will be less likely to be financially included. As mentioned in the previous section, there is considerable evidence of a gender gap in financial inclusion and while much of this work has focused on extra-household forces that constrain women's access, intra-household bargaining dynamics may also matter (Gammage *et al.* 2020; Eckhoff *et al.* 2019).
- Wealth: ***Wealthindex*** is a categorical variable that is divided into five categories ranging from poorest to richest with each category being represented equally in our data. NFHS does not report the actual income of those interviewed. It reports an index of wealth based on household ownership of certain consumer goods and utilities. This is divided into five wealth quintiles. We expect that women from wealthier households are more likely to open and use bank accounts (Ghosh and Vinod 2017). However, we also expect women from lower wealth quantiles to be more likely to seek loans from microfinance organizations given the general structure of MFI models which target low-income women (De Aghion and Morduch 2010).
- Autonomy**:** Autonomy (**auto**) has been shown to play an important role in women's wellbeing (Rizkianti *et al.* 2020; Duflo 2012; Abadian 1996; Bloom *et al.* 2001). In our regressions, we use two measures of autonomy. To measure economic autonomy, we use **Labpart** which measures women's labour participation in labor markets (Duflo 2012; Andersen and Eswaran 2009; Murthi *et al.* 1995; Paul 2016). The questionnaire asked is if the "respondent is currently working". About 23% of the women were working in our sample. We expect those with jobs are more likely to have bank accounts and take out loans. Table A3 shows that of the 18,869 female-headed households, only 19% are working at the time of the survey and had a bank account. For male-headed households, this number is 12%. For those female-headed households, women with no work or bank account are 31% while for male-headed households it is 39%. We also use women's freedom of

mobility to incorporate non-economic dimensions of female autonomy which can play a very important role in determining outcomes for women (Hanson 2010). A question in the NFHS questionnaire asks women if they are "usually allowed to go to the market". The respondents are asked to choose from "not at all", "alone" and "with someone else only". We use "not at all" as the base category. **1.auto** refers to "with someone else only" and **2.auto** refers to "alone".

- Religion: **Relig** refers to the religion of the respondent. We use 4 categories, namely, Hindu, Muslim, Christian, and Others (Sikh, Buddhist, Jain, Jewish, Parsi, other, and those who report "no religion"). In our sample, 73.3% of those interviewed are Hindus, 14.9% are Muslim, 7.2% are Christian and the remaining are Others. We expect that those belonging to the dominant religion are more likely to have bankaccess, as previous studies have pointed to the existence of persistent discrimination against religious minorities in India (Basant 2007; Jamil 2017).
- Caste: Caste, like gender, is an important marker of social hierarchies in India**.** The questionnaire divides respondents into four categories, namely Scheduled Caste (18.3%), Scheduled Tribe (19.2%), OBC (40.7%), and Others (21.8%). We treat Others as forward castes for this analysis. **Castedum** is a dummy variable consisting of two categories, namely, upper caste and lower caste, with the lower caste as the base category for the purpose of this paper. Past studies (Kumar and Venkatachalam 2019; Kumar 2013; Kaur and Kapuria 2020) have noted barriers to financial inclusion for lower castes and thus we may expect to find significant differences between upper and lower caste households.
- Urban-Rural Effect: Previous studies have shown wide urban-rural gaps in economic outcomes; thus, we incorporate **Residencetype,** which refers to the type of place of residence, which is either rural or urban. 70% are from rural areas and 30% are from urban areas (Anand and Thampi 2016).
- State Level Variables: For the multilevel regressions we use some state level variables. **LSDPPC** refers to the log of State Domestic Product per capita. **Female** refers to female literacy rates (%), **CDR** refers to the Credit deposit ratio as per sanction (%) while branch refers to the number of bank branches at the state level. **EDBrank** refers to the ease of doing business rank for the year 2016. CDR has been used as a proxy

for financial development in previous studies, while EDBrank is widely used as a measure of institutional quality (Guru and Yadav 2019; Corcoran and Gillanders 2015). **Sexratio** refers to the sex ratios, and lastly, **rateofcrime** refers to the rate of crimes against women in each state. In the context of India, where sex-ratios have been historically low (indicating more men per 1000 women in the population), Sexratio can be interpreted as a measure of discriminatory social norms or "son-preference" at the state level (Murthi *et al.* 1995; Sen 1992). All the state level variables are taken for the year 2016. The descriptive statistics for the state level variables are given in Table A4. Data for LSDPPC, Female, CDR, branch, and Sexratio are drawn from the EPW time series data set. We draw rateofcrime from the National Crime Records Bureau (NCRB). EDBrank is drawn from the Reserve Bank of India website.

4. Results

The probit and multilevel probit estimates for both bankaccess and tookloan as dependent variables are shown in Table 2. Firstly, we will go through the bankaccess probit results. At the 1% level, we find that age, education, wealthindex, labpart, and auto are all positive and highly significant. An increase in any of these variables would increase the projected probability of backaccess, we may claim. According to the average marginal effects, the probability of having bank access improves by 0.937 as we increase in education. For wealthindex and labpart, the increase in probability is 0.37 and 0.73, respectively. These results, which indicate the importance of education and wealth are in line with much of the previous literature (Zins and Weill 2016; Fungácová and Weill 2015; Ghosh and Vinod 2017). The importance of women's autonomy is reflected in our results for the dummy variables we have taken for women's freedom of mobility. These results are statistically significant and show that women who tend to have more freedom of mobility have higher predicted probabilities of owning bank accounts. Women who have full autonomy to go to markets and by proxy handle money have a 0.17 increased probability of owning bank accounts. This variable gives us the strongest effect in our regression. The positive effect of labpart can be explained partially by the fact that female labour force participation can increase women's bargaining power within households which positively impacts their financial autonomy (Andersen and Eswaran 2009, Murthi *et al.* 1995; Wang *et al.* 2020). In South Asian nations, where women are often seen

as financial burdens on their families, market employment might help them improve their social status by minimising dowry demands (Makino 2021). This finding is consistent with earlier research that shows a link between labour participation and financial inclusion (Aterido *et al.* 2013).

In terms of age-related factors, we observe that age is positive, however agesq is highly significant and negative. The results indicate an inverted-U relationship between age and indicators of financial inlcusion, in which women get more financially integrated as they become older, but their likelihood of using bank accounts drops beyond a certain point. The household head's gender is significant but negative, meaning that women in male-headed families are less likely to get loans. For hhgender, the average marginal effects are 0.07. This might be because women in male-headed households are less likely to have financial autonomy for themselves or their families. In India, there is vast evidence that has been unearthed on gender gaps in financial inclusion (Table 1). Our findings are consistent with previous research, but they also reveal that power dynamics at the household level may impact women's access to financial markets, implying that "informal structural domains" may be important driving forces behind gender gaps in financial inclusion (Eckhoff *et al.* 2019: 974).

With respect to religion, we find that Muslim and Christian women have lower predicted probabilities than Hindu women to have bankaccess. Muslim and Christian women have (-)0.056 and (-)0.01 lesser probability of having bank accounts as compared to Hindu women. The caste dummy shows that as we move from lower to upper caste women, we get lower predicted probabilities of having bankaccess. This result seems to be unexpected given that considerable evidence has pointed to a caste gap in financial inclusion (Kumar 2013; Kumar and Venkatachalam 2018; Kaur and Kapuria 2020; Ghosh and Vinod 2017; Chavan 2020). However, the complicated "intersectionality" of caste and gender in India, which can be missed by research that employs households as their unit of study, may explain our findings. The persistence of caste systems in Indian society, according to Ambedkar (2014), is based on patriarchy. He emphasised that caste hierarchies were based on feudal notions of purity and prestige, which could only be maintained by adhering to stringent endogamy laws and thereby tightly limiting women's reproductive labour. As a result, accumulating status was predicated on reinforcing patriarchal bonds. In the context of India, several studies have found that the women in upper caste families are in many ways far more constrained due to the status seeking behavior of their families which foster segregation, discourage women’s labour

force participation, and so on (Eswaran *et al.* 2013; Makino 2021). Women in higher caste households are more likely to engage in status production within their households than market work, as per studies, indicating that status is acquired at the cost of women's earning capacity and hence financial autonomy (Das 2006). According to these studies, "perceived collective advantage to house-holds by way of family status may come at the price of women's individual status, particularly among the higher castes" (Eswaran *et al.* 2013: 330). We can speculate that this explains why the caste dummy's findings take the shapes they do in the table below. Finally, the residencetype variable indicates that women from urban regions are more likely to have a bank account, which is consistent with the evidence of major urban differences in India (Anand and Thampi 2016).

Estimation (2) examines at tookloan as a dependent variable with same independent variables as estimation (1). The only variables that have a similar influence on tookloan, as in estimation (1), are age, agesq, labpart, and castedum. In contrast to estimation (1), we find that those with higher education and those from wealthier households had lower chances of taking up microfinance loans (0.006 and 0.12 marginal probability, respectively). This is attributable to the fact that microfinance programmes are typically targeted at individuals from lower-income households, particularly women (NABARD 2019; De Aghion and Morduch 2010). It is important to note that the gender of the household head seems to have no effect on the results, implying that programmes aimed at the poor and women, as many microfinance programmes do, may be beneficial in overcoming at least some of the intra-household barriers to financial inclusion. Religion has very little statistical significance, except for individuals who belong to the "other" religions, who do have lower estimated probabilities of getting a bank account. Only when considering complete mobility does freedom of movement have a favorable influence on tookloan, with a marginal probability increase of 0.015. In this regression, residencetype seems to have no significance. As a result, microfinance programmes that are specifically targeted to the needs of vulnerable households alleviate many, if not all, of the statistically significant barriers in n estimation (1). The LR tests yielded p-values less than 0.01 for all the estimations in Table 1, indicating that at least one of the coefficients is different from 0.

We also run logit regressions in estimates (9) and (10) in Table A5 in the Appendix to validate that the model was robust and that the choice of link

functions had not impacted the results significantly. We find that the majority of the logit estimate findings are consistent with those in Table 2. Just for brevity, state dummies were included in all regressions but are not reported here.

Table 2: Probit and multi-level probit regressions for Bankaccess and tookloan dependent variables

	(1)	(2)	(3)	(4)
	Probit	Probit	Multi-level Probit	Multi-level Probit
VARIABLES	bankaccess	Tookloan	Bankaccess	tookloan
Age	0.0513***	0.147***	0.0498***	0.144***
	(0.00278)	(0.00656)	(0.00282)	(0.00666)
Agesq	-0.000509***	-0.00183***	-0.000486***	-0.00179***
	(4.40e-05)	(9.78e-05)	(4.45e-05)	(9.94e-05)
Educ	0.273***	-0.0297***	0.274***	-0.0258**
	(0.00511)	(0.00995)	(0.00518)	(0.0102)
Hhgender	-0.212***	0.0290	-0.215***	0.0278
	(0.0110)	(0.0214)	(0.0112)	(0.0219)
Wealthindex	0.111***	-0.0604***	0.110***	-0.0625***
	(0.00398)	(0.00833)	(0.00402)	(0.00846)
Labpart	0.215***	0.206***	0.209***	0.199***
	(0.00970)	(0.0172)	(0.00982)	(0.0175)
relig2	-0.163***	-0.0349	-0.166***	-0.0235
	(0.0133)	(0.0297)	(0.0134)	(0.0301)
relig3	-0.0305	-0.0585	-0.0402*	-0.0409
	(0.0233)	(0.0413)	(0.0234)	(0.0412)
relig4	0.0810***	-0.132***	0.0793***	-0.126***
	(0.0220)	(0.0465)	(0.0220)	(0.0462)
Castedum	-0.0603***	-0.0949***	-0.0599***	-0.100***
	(0.0105)	(0.0216)	(0.0105)	(0.0217)
Residencetype	0.0276***	-0.0115	0.0329***	0.0114
	(0.0100)	(0.0194)	(0.0102)	(0.0197)
1.auto	0.0815***	-0.000502	0.0800***	-0.0158
	(0.0146)	(0.0312)	(0.0149)	(0.0321)

2.auto	0.498***	0.0752**	0.495***	0.0638**
	(0.0145)	(0.0297)	(0.0147)	(0.0306)
LSDPPC			0.394***	0.0308
			(0.119)	(0.130)
Female			-0.0174**	-0.00748
			(0.00701)	(0.00763)
CDR			0.000447	0.00426
			(0.00243)	(0.00269)
edbrank			0.0141**	0.00765
			(0.00677)	(0.00734)
SexRatio			0.00231**	0.00397***
			(0.00104)	(0.00116)
Rateofcrime			0.00125	0.00107
			(0.00151)	(0.00166)
branch			1.44e-05	7.45e-06
			(1.52e-05)	(1.64e-05)
var(_cons[stateid])			0.0578***	0.0650***
			(0.0152)	(0.0175)
Constant	-1.398***	-4.064***	-7.721***	-7.638***
	(0.0820)	(0.192)	(1.683)	(1.840)
Observations	115,925	43,373	113,078	42,008
Number of groups			31	31

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In estimations (3) and (4) we run multilevel-probit regressions. Explanatory variables at the state level are included to determine if they contribute to the variation. The results at the household level are essentially the same as in the previous two estimations. For both the LR and Wald tests, the p-values are less than 0.01. We find that LSDPPC has a positive and significant influence on bankaccess at the state level. Female literacy has lower predicted probabilities than male literacy, just as it does at the household level. The ranking of ease of doing business has a positive impact on bankaccess. As one might expect, states with higher sex ratios have had more women with bank accounts. Surprisingly, the dependent variable is unchanged by CDR and branch, both of which can be used as indicators of financial development. Overall State variables have a marginal explanatory power (only 7%), suggesting that

household level determinants are more relevant than state level variables. This has important implications because it shows that effective financial inclusion strategies should focus on addressing household barriers that hinder women from having greater access to finance.

When we look at estimation (4), we see that explanatory variables at the household level have similar results to those in estimation (2) Only sex ratios are significant at the 1 percent level in terms of state-level explanatory variables. That is, when the sex ratio rises, the probability of women having bank access rises. Since sex-ratios have been understood in the Indian context as measures of "son preference," this finding suggests that the less biased gender norms at the state level, the more likely women will have access to banks (Sen 1992). Unlike bankaccess, the CDR, in this case, is positive and significant at the 10% level, indicating that overall financial progress is a key factor for women seeking microfinance loans. In terms of sign and significance, the multi-level logit regressions in estimations (11) and (12) in Table A5 demonstrate that these results are stable.

Table 3: Probit estimations with Heckman selection for tookloan.

	(5)	(6)	(7)	(8)
VARIABLES	tookloan	Knowloan	Tookloan	knowloan
Age	0.119***	0.0135***	0.142***	0.0439***
	(0.0278)	(0.000442)	(0.00905)	(0.00282)
Agesq	-0.00155***		-0.00176***	-0.000536***
	(0.000314)		(0.000124)	(4.43e-05)
Educ	-0.108***	0.184***	-0.0438**	0.154***
	(0.0364)	(0.00468)	(0.0171)	(0.00506)
Hhgender	0.0171		0.0294	-0.00681
	(0.0178)		(0.0213)	(0.0109)
wealthindex	-0.0611***	0.0301***	-0.0666***	0.0715***
	(0.00662)	(0.00320)	(0.0101)	(0.00403)
Labpart	0.0820	0.249***	0.181***	0.257***
	(0.0888)	(0.00895)	(0.0313)	(0.00950)
relig2	-0.119***		-0.0291	-0.0565***
	(0.0328)		(0.0301)	(0.0134)
relig3	-0.0146		-0.0460	-0.134***

	(0.0279)		(0.0430)	(0.0229)
relig4	-0.289***		-0.135***	0.0344
	(0.0625)		(0.0463)	(0.0216)
Castedum	-0.185***		-0.0941***	0.000121
	(0.0382)		(0.0215)	(0.0104)
residencetype	0.00698		-0.0117	0.00447
	(0.0156)		(0.0193)	(0.00994)
1.auto	-0.0994**	-0.0433***	-0.00265	0.0283*
	(0.0416)	(0.0140)	(0.0311)	(0.0148)
2.auto	-0.0815***	0.0653***	0.0543	0.222***
	(0.0249)	(0.0137)	(0.0364)	(0.0146)
Athrho	-0.696*		-0.143	
	(0.412)		(0.142)	
Constant	-1.906*	-1.205***	-3.758***	-1.746***
	(0.996)	(0.0198)	(0.383)	(0.0783)
Observations	119,950	119,950	115,925	115,925

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Now given that tookloan is incidentally truncated, the probit estimates may be biased. As a result, we use a Heckman selection probit model to validate our results (Table 3). We used the model to analyze the factors that affect women's access to microfinance loans based on their knowledge of such programmes. We specify the selection equation in Table 3 estimation (6), where we assume that tookloan is impacted by age, educ, wealthindex, labpart, and auto. With the exception of auto, all of the factors are positive and significant. This means that a one-unit increase in any of these factors leads to a one-unit increase in the predicted probability of respondents having knowledgeable of microcredit programmes. In the case of auto, women with limited control over mobility decisions are less likely aware of these programmes, while women with full autonomy are more likely to be aware of them. The base category for auto is women who have no autonomy.

The probit estimate for this selection mechanism is shown in Estimation (5). Age, agesq, and labpart all remain positive, but only the age variables are statistically significant at the 1% level. The probability of taking microcredit decreases when educ, wealthindex, and autonomy increase. Given the nature

of microcredit programmes, this result is not surprising. This kind of programmes is mostly aimed at women from lower socioeconomic backgrounds who would benefit from participation (De Aghion and Morduch 2010; Chavan 2020). HHgender, labpart, and residencetype did not affect the outcome. The results for religion and caste are consistent with previous estimates and seem to be robust to all specifications.

We have the probit estimation and selection model with state dummies and the complete variable specification in estimations (7) and (8). Except for religion, where Muslim and Christian women are less likely to know regarding loan programmes than the base group of Hindu women in the selection model but are insignificant in the probit estimation, the results are similar to those in estimations (5) and (6). When compared to Hindu women, there is still a strong result suggesting that women from marginal groups are at a disadvantage. The estimations pass the Wald test once again. The Heckman probit regressions give our prior results more robustness.

5. Conclusion

This paper draws on the NFHS-4 survey from India to understand the factors that influence women's access to finance. We employ probit estimations but also check the robustness of these results by comparing them to multi-level probit and Heckman probit. Broadly speaking there are two important conclusions that we can make. First, micro-level determinants seem to be far more powerful inclusion drivers than general state-level factors. Economic indicators at the household level, such as wealth and rural-urban location, are major predictors of financial inclusion. Nevertheless, the findings suggest that informal structural forces, many of which operate inside families, have a significant influence in determining women's access to financial services. More specifically, women's mobility, economic autonomy as assessed by female labour market involvement, and the gender of the household head appear as major factors determining women's access to finance.

Related to this is a second point. The above findings highlight the "intersectionality" of gender and other social identities. Gender is socially constructed and as a result, it is not an undifferentiated, homogenous category. Our findings show that women's access to money is influenced not just by their gender identities, but also by their intersecting religious and caste roles in society. Being a member of a religious minority might increase gender-based

limitations on financial services. Caste, on the other hand, has a more complex impact, as we have shown, because while women lower down the caste ladder endure the worst forms of deprivations, upper caste women may face more financial restrictions. We have speculated that this result may be driven by the fact that constraints on women's autonomy become more binding in status-seeking upper caste families.

Finally, the findings imply that when financial services are more household specific, such as microfinance loans, which primarily target women from low-income households, some, though not all, of the barriers that women confront become less constraining. Of fact, microfinance loans account for a relatively modest percentage of total credit in India. Furthermore, profit-driven microfinance institutions have been criticized for charging high interest rates and recouping loans through coercion (Chavan 2020). Despite the pitfalls and limitations of microfinance, our findings suggest that in order for financial inclusion programmes to be effective, they must be responsive to both supply-side and informal structural barriers that women face often inside their households. Because the household is a key site of gender inequalities, policies designed to increase women's financial inclusion must go beyond restructuring financial markets, improving the quality and accessibility of financial services, and so on. Instead, policies must focus on changing household characteristics that prevent women from becoming financially included.

Appendix

Table A1. Bank Access and Took Loan

	Tookloan -Yes	Tookloan-No
Bankaccess – Yes	5,106	23,461
Bankaccess – No	2,000	15,227
Knowloan – Yes	7,106	38,688
Knowloan - No	-	-

Table A2. Education and Wealth Index

Wealth index						
Educational level	poorest	poorer	middle	richer	richest	Total
No education	3,929	3,766	3,112	2,004	803	13,614

Primary	1,016	1,630	1,799	1,484	819	6,748
Secondary	2,228	5,091	7,482	9,042	8,341	32,184
Higher	140	529	1,391	2,827	6,575	11,462
Total	7,313	11,016	13,784	15,357	16,538	64,008

Table A3. Bank Access, Gender and LabPart

	Hhgender-Female	Hhgender-Male
Bankaccess – No		
Labpart-No	5,996	40,442
Labpart-Yes	1551	10,354
Bankaccess- Yes		
Labpart-No	7,594	39,681
Labpart-Yes	3728	13,005

Table A4. Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
LSDPPC_2016	121,616	11.31072	.525501	10.25481	12.73097
Female_2016	121,049	65.11477	9.195225	52	91
CDR_2016	122,351	56.95879	23.84408	10.5	113.7
edbrank_2016	122,351	14.35611	8.6264	1	31
SexRatio	121,049	940.4074	43.91499	618	1084
rateofcrime	122,351	51.8716	27.22021	9.2	160.4
branch_2016	121,517	6472.02	4836.332	13	16264

Table A5 Logit and multi-level Logit regressions for bankaccess and tookloan dependent variables

VARIABLES	(9) bankaccess	(10) tookloan	(11) bankaccess	(12) tookloan
age	0.0838***	0.288***	0.0813***	0.284***
	(0.00460)	(0.0126)	(0.00465)	(0.0128)
agesq	-0.000828***	-0.00361***	-0.000790***	-0.00356***

	(7.26e-05)	(0.000185)	(7.35e-05)	(0.000189)
educ	0.448***	-0.0446**	0.449***	-0.0380**
	(0.00848)	(0.0178)	(0.00858)	(0.0183)
hhgender	-0.349***	0.0541	-0.354***	0.0500
	(0.0183)	(0.0386)	(0.0185)	(0.0395)
wealthindex	0.182***	-0.109***	0.180***	-0.113***
	(0.00656)	(0.0151)	(0.00662)	(0.0154)
labpart	0.349***	0.359***	0.340***	0.348***
	(0.0160)	(0.0306)	(0.0162)	(0.0313)
relig2	-0.270***	-0.0809	-0.275***	-0.0574
	(0.0220)	(0.0553)	(0.0223)	(0.0561)
relig3	-0.0545	-0.0990	-0.0704*	-0.0682
	(0.0386)	(0.0730)	(0.0387)	(0.0730)
relig4	0.129***	-0.235***	0.127***	-0.223**
	(0.0361)	(0.0882)	(0.0361)	(0.0875)
castedum	-0.102***	-0.179***	-0.101***	-0.190***
	(0.0173)	(0.0401)	(0.0174)	(0.0405)
residencetype	0.0470***	-0.0272	0.0556***	0.0181
	(0.0166)	(0.0352)	(0.0168)	(0.0359)
1.auto	0.137***	-0.0197	0.135***	-0.0474
	(0.0242)	(0.0562)	(0.0247)	(0.0579)
2.auto	0.821***	0.107**	0.816***	0.0867
	(0.0240)	(0.0529)	(0.0245)	(0.0548)
LSDPPC			0.649***	0.0366
			(0.197)	(0.239)
Female			-0.0287**	-0.0116
			(0.0116)	(0.0140)
CDR			0.000852	0.00720
			(0.00402)	(0.00495)
edbrank			0.0232**	0.0126
			(0.0112)	(0.0135)
SexRatio			0.00384**	0.00730***
			(0.00172)	(0.00214)
rateofcrime			0.00198	0.00214
			(0.00249)	(0.00304)
branch			2.38e-05	1.47e-05
			(2.50e-05)	(3.01e-05)

var(_cons[stateid])			0.157***	0.218***
			(0.0415)	(0.0589)
Constant	-2.290***	-7.655***	-12.74***	-14.11***
	(0.138)	(0.384)	(2.779)	(3.386)
Observations	115,925	43,373	113,078	42,008
Number of groups			31	31

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

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