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Financial inclusion drivers, motivations, and barriers: Evidence from Ethiopia

Workineh Ayenew Mossie^{1*}

Abstract: Financial inclusion is a cornerstone for economic growth. However, the area is not well explored in the developing world. Therefore, this paper is motivated to examine the drivers, barriers and motivations associated with financial inclusion in Ethiopia. We used formal accounts, formal savings, and formal credits as financial inclusion indicators and applied a probit regression model using data from the World Bank's 2017 Findex database. The result of the study showed that the determinants, barriers, saving and credit motivations are different across individual characteristics. Involuntary exclusion (such as distance to financial services and lack of documentation) and voluntary exclusion (lack of funds, a family member has an account,) are significant barriers to formal account ownership. The study also found that the motives for using financial accounts for saving and lending differ among people with different sociodemographic characteristics. To promote financial inclusion, the author suggests that the concerned body take actions toward social inclusion (the poor, women and the youngst) and improve financial education . To enhance further adoption and expansion of financial technologies such as mobile banking and mobile money, there should be mechanisms to ensure the accessibility and usage of financial services.

Subjects: Statistics for Business, Finance & Economics; Economics; Banking

Keywords: Financial inclusion; Barriers; Motivations; Probit model; Ethiopia

1. Introduction

Financial inclusion has been recognized as a pillar of development for the global economy (Zins & Weill, 2016). Financially integrated individuals can invest in education, start or expand businesses, and thus play a critical role in reducing poverty and sustaining inclusive growth. (Bruhn & Love, 2014); and Ajide (2020) argued that finance would promote economic development by stimulating business development, reducing financial constraints on starting new businesses, and keeping existing businesses surviving and increasing employment. Better financial inclusion could also increase household consumption per capita and improves people's ability to live worthwhile lives (Abor et al., 2018). An inclusive financial system helps to initiate change and eliminate poverty traps (Li, 2018). Financial inclusion is a crucial component of the financial sector development, the importance of which to the economy is paramount. On the one hand, a developed financial sector reduces the credit constraint for business operators, smooths out consumption and provides opportunities to use resources for productive investments. On the other hand, a society with access to financial instruments invests in their education, finances projects and promotes their entrepreneurial skills and development (Demirguc-Kunt et al., 2017).

Despite the multifaceted contribution of financial inclusion to the economy, many adults around the world still have to wait to access financial services. In addition, households and companies are also excluded from the formal financial sector in emerging countries. According to Beck and Cull (2013), only 21% of businesses have a line of credit and 16 % of households have an account with a formal financial institution. This implies that companies in Africa are subject to credit restrictions, the barriers to financial services are enormous and the economic reach is still very small.

Virtually, there are recent advances in the financial sector such as the use of mobile banking and electronic payment systems are being expanded in Ethiopia. However, the financial system is yet flat and concentrated in the urban areas (Desalegn & Yemataw, 2017; National Bank of Ethiopia, 2019). In Ethiopia, where access to credit is particularly difficult for companies, the situation for companies is extremely turbulent. In a report by the European Development Bank on recent developments in the African banking sector, Kappeler et al. (2018) found that 70% of micro-enterprises and 40% of SMEs face difficulties in accessing credit in Ethiopia. Just under, 35% of the population over the age of 15 have accounts with formal financial institutions. The use of digital banking/payment systems is negligible, as less than 5% of the population has a mobile account, 70% of micro-enterprises and 40% of SMEs face difficulties in accessing credit in Ethiopia. Only 35% of the population over the age of 15 have accounts with formal financial institutions.

That is far less than in neighbouring east African countries like Kenya, Uganda and Tanzania. According to Demircuc-Kunt et al. (2017), 80% of the population in Kenya, and half of the population over the age of 15 in Uganda and Tanzania have mobile accounts or digital payment systems. In response to the underdeveloped financial system, the Ethiopian government recently issued guidelines on digital payment systems as part of efforts to transform the economy and digitalize the economy by 2025 (National Bank of Ethiopia, n.d).

Empirical studies on financial inclusion are scant and existing studies differ in the use of data and units of analysis. A study by Desalegn and Yemataw (2017) attempted to explore the determinants and barriers of financial inclusion using the Ethiopian socio-economic survey data (ESS 2015). In their study both involuntary (distance from the financial centre) and voluntary (lack of money and trust), barriers are identified as constraints to accessing financial accounts in Ethiopia. However, they did not examine behaviours related to financial inclusion (the motives of individuals to save and borrow) and the factors that influence these motivations. Similarly, Abdu et al. (2021) examined the determinants of financial inclusion in the Afar region using cross sectional data. The results of their study showed that around 68% of households were excluded from the financial sector. However, their study put aside the different motivations of households to save and borrow and overlooked how the different barriers to financial inclusion are associated with the different socio-demographic traits of individuals. Studies by (Chakravarty & Pal, 2013) for India, (Amari & Anis, 2021) for Tunisia, and (Fungáčová & Weill, 2015) for China overlooked the motives to save and borrow and the associated dynamics influencing these motivations. Furthermore, studies in Ethiopia have not adopted similar indicators and data, and the issue of financial inclusion is not well explored. Hence, we argued that in Ethiopia, the area of financial inclusion requires a rigorous study. Therefore, our motivation is to fill the knowledge gap and add to scant literature on financial inclusion. Furthermore, the study provides insights into the drivers, motives and barriers of financial inclusion in Ethiopia.

Methodologically, the study is built up on the extensive literature (Allen et al., 2016; Amari & Anis, 2021; Fungáčová & Weill, 2015; Soumaré et al., 2016; Xu, 2020; Zins & Weill, 2016) on the analysis of ownership structures, using formal financial inclusion, and socio-demographic variables. Our study is based on nationally representative individual-level data from the Global Financial Inclusion Index (Findex) database. Therefore, the contribution of our work is manifold. On the one hand, our study is an asset to the scant empirical literature on financial inclusion in developing countries like Ethiopia. It is essential to identify the key motivations and barriers to financial inclusion and thereby comment on the way forward to mitigate inclusion. Unlike previous studies

in Ethiopia, this study is carried out using the Findex data and the variable employment is included as a predictor variable. Therefore, it is one of the few studies in Ethiopia using nationally representative samples and standard financial inclusion measures used globally. Our study also provides a rigorous analysis on the area of financial inclusion i.e., drivers, dimensions (account ownership, saving and credit) and the barriers to it. Hence, it is a comprehensive study of financial inclusion. Furthermore, we also examined the voluntary and involuntary barriers to financial inclusion and therefore, reflections from the study could provide insights on the possible areas of intervention to expand inclusion in the financial sector.

The result of the study showed that the determinants, barriers, and saving and lending motivations are different across individual characteristics and both involuntary exclusion (such as distance to financial services and lack of documentation) and voluntary exclusion (lack of money, a family member has an account,) are significant obstacles to formal account ownership. The study also found that the motives for using financial accounts for saving and lending differ among people with different socio-demographic characteristics.

The rest of this work is divided as follows. Section 2 is the related literature; Section 3 presents the data and methodology of the study; Section 4 is dedicated to the econometric estimation and discussion of the results. Section 5 contains the main conclusions, and section 6 provides recommendations and policy implications.

2. Literature review and hypothesis development

2.1. Assessment of levels of financial inclusion

According to the new global data from the World Bank's Findex database in 2017, 69% of adults have accounts with financial institutions (banks, microfinance institutions and regulated institutions such as insurance companies and savings and credit associations) around the world. This figure shows that adult access to financial instruments has increased by 7% since 2014 and by 18% since 2011. Advances in financial inclusion are mainly related to the introduction of new financial services and payment systems through internet access and the development of mobile phones. However, the gap in account holdings by adults between the economies of the higher-income group (94%) and the lower-income group (63%) is huge (Demirguc-Kunt et al., 2017).

Demirguc-Kunt et al. (2017) further reported that over 1.7 billion adults do not have access to financial services, and almost all are from developing countries. 41% of adults in developing countries save money, compared to 71% in high-income countries. However, only 21% of adults save at formal financial institutions in developing countries, compared to 55% of adults using the same method in developed countries. The use of accounts for retirement is more common in advanced economies (more than half of adults), while in developing countries, particularly in sub-Saharan Africa, saving is primarily for business purposes, with over 29% of adults saving to earn money in Ethiopia have started operating or expanding a business.

In 2017, 48% of adults worldwide saved money in the last 12 months. In emerging markets, 43% of adults use their accounts to save, far less than their counterparts, i.e., 71 per cent (Demirguc-Kunt et al., 2017). Sixty-four percent of adults worldwide have used credits in the last 12 months. While 90% of adults in high-income economies receive credit from formal financial institutions, only 44% of adults in developing countries receive new credit through informal methods from family and friends and informal credit clubs. Financial inclusion is lowest in Ethiopia, where only 35% of the adult population has accounts with banks or other formal financial institutions and less than 5% of the adult population have a mobile bank account (Kappeler et al., 2018). Seventy per cent of micro-enterprises and 40% of medium-sized enterprises are financially constrained (European Investment Bank [EIB], 2020). Wealthier adults have twice as many accounts as their poorer peers. Furthermore, the account ownership gap is also manifested between men and women. Men have a 9% lead over women in accessing financial services

(Demirguc-Kunt et al., 2017). The reach of the financial institutions is also very small and the concentrations are high. The ratio of bank branches to residents is 1:15,702 and 34.1% of banks are located in Addis Ababa. 30% of bank branches and 51% of bank capital are shared by public banks (National Bank of Ethiopia, 2019).

2.2. The impact of socio-demographic characteristics on financial inclusion

Several have examined the individual determinants of financial inclusion, and many of these studies considered financial inclusion as an engine of economic growth and a tool to reduce poverty. Studies in the literature have confirmed the positive effects of financial inclusion on economic growth and job creation (Bruhn & Love, 2014), financial stability (Kappeler et al., 2018), improvement in saving behaviour (Morgan & Long, 2020), poverty reduction (Amari & Anis, 2021; Erlando et al., 2020)).

Demirguc-Kunt et al. (2013) confirmed the existence of a gender gap in formal account holding, formal saving, and access to formal credit. Women are more likely to be excluded from using financial instruments because of insufficient collateral, lack of financial literacy, poor husband creditworthiness, and little or no business experience. Using the World Bank's 2011 Findex database, Fungáčová and Weill (2015) examined financial inclusion in China. The result states that people with higher incomes, higher education, males and older people are more likely to have formal accounts and access to formal credit. Women are less likely to have and use legal accounts or access formal credit because they lack documentation and or someone else in the household has an account. Oji (2015) identified the supply and demand side challenges of financial inclusion in Africa. Accordingly, poor financial literacy, underdeveloped financial systems, the absence of credit reporting agencies, limited corporate capacity and inadequate infrastructure are barriers to financial inclusion. Camara and Tuesta, (2015) find that the likelihood of financial inclusion is most strongly influenced by being a woman and having an income from work.

Allen et al. (2016) examined the impact of individual determinants of financial inclusion for 123 countries using the 2011 Global Findex database. Their results showed that having a formal bank account was significantly related to income, education level, age, living in urban areas, and marital status. Individual saving behaviour has a strong link with individual characteristics. Aside from the impact on account holders and savings behaviour, individuals are more likely to have access to formal credit as they get older, more educated, wealthier, and married.

Zins and Weill (2016) examined the determinants of financial inclusion in 37 African countries using the World Bank's 2014 Findex database. The result showed that gender, age, income and education were strongly associated with financial inclusion. While gender have negatively and significantly associated with access to formal financial accounts, formal savings, and use of credit, education and wealth increase the likelihood of being financially included. Age has a non-linear effect on financial inclusion. Financial inclusion is higher among adults and lower among older age groups. Looking at the marginal effect of their probit estimate, education and income are the most important factors affecting financial inclusion. They also found that African countries have lower levels of financial inclusion compared to other countries in the world. (Soumaré et al., 2016) examined the determinants of financial inclusion in Central and West Africa using data from the World Bank's Findex database. They argued that individual characteristics such as gender, education, age, income, location, employment status, marital status, household size, and level of trust in financial institutions are the most important determinants of access to formal finance in the two regions. Being male and married is positively associated with formal financial account ownership. Whereas the impact of income varies from region to region.

Desalegn and Yemataw (2017) examined financial inclusion in Ethiopia using the Ethiopian Socio-Economic Survey and the World Bank Survey of Living Standards (LSMS). Their study finds that age has a non-linear impact on formal financial account ownership; that means older people are less likely to own and use financial accounts. Married people and people with college degrees

are also more likely to open up and use financial instruments. In India, female-headed households are 8% less likely to access formal finance and 6% less likely to access informal finance compared to male-headed households. In addition, female-headed households use 20% less formal credit than their male counterparts. The main mechanisms limiting women's use of and access to financial services are educational levels and prevailing wage rates (Ghosh & Vinod, 2017). Assume et al. (2019) conducted a comparative analysis of financial inclusion in 31 sub-Saharan African countries. Their result claimed that age, education, gender, wealth and presence of financial institutions, and GDP growth rate predict financial inclusion in Africa. Their result states that women are 4% less likely to have accounts and 2% less likely to have accounts with financial institutions compared to their counterparts. The existing gender gap in financial account ownership is due to the exclusion of women from the formal labour market. In line with other researchers, their study finding also found that younger groups of people are less likely to own and use financial accounts, as these groups find it more difficult to find jobs in SSA.

Motivated by lower levels of financial inclusion and the apparent gaps in financial inclusion in Africa (Chinoda et al., 2019), examined whether mobile phones, economic growth, banking competition and stability play a role in financial inclusion. Using data from 49 countries between 2004 and 2016 and applying a panel structure VAR model, they found that financial inclusion has a positive response to mobile phone shocks, economic growth, banking competition and stability. De Andrés et al. (2020) used a sample of over 80,000 businesses started by a sole proprietor and examined financial inclusion of the entrepreneurs using three indicators, i.e. Credit demand, credit approval rate and credit performance. According to their study, female entrepreneurs are less likely to apply for credit, and if they do take advantage of it, their likelihood of getting the credit is far lower than male entrepreneurs who apply for credit. However, those who receive the loan are less likely to default on their payments.

Abdu et al. (2021) examined the determinants of financial inclusion in the Afar region, Ethiopia using household data collected via a managed questionnaire. Their result showed that age, consumption, financial literacy and mobile banking are positively and significantly associated with financial inclusion in the region. Notably, their study shows the negative and significant impact of income on financial inclusion. Cruz-García et al. (2021) examined financial inclusion for the Mexican context and found that financially integrated communities have large populations and high levels of income and education.

2.3. The impact of the socio-demographic characteristics on the barriers related to financial inclusion

A large body of literature has been developed on the barriers to formal financial inclusion. (Soumaré et al., 2016) reported that the main barriers to accessing formal financial services in Central and West Africa are insufficient money, lack of required documentation, high cost of financial services, distance to formal financial institutions and lack of trust.

Adegbite & Machete (2020) find that financial literacy, lack of money, lack of documentation, and distance from financial institutions are important determinants of financial inclusion among adult Ghanaians. Tiwari et al. (2019) examined the use of digital financial products by ultra-poor women in northern Kenya. Their findings showed that illiteracy, innumeracy, and a lack of familiarity with technology were barriers to the full adoption of digital products. Allen et al. (2016) also reported that the main reason for non-account holders not to have an account is that individuals do not have enough money and banks/accounts are too expensive.

Amari and Anis (2021) studied the determinants of financial institutions in Tunisia and documented that individuals are excluded from using/accessing financial services due to voluntary barriers (lack of money or documents and for cultural reasons) and involuntary barriers caused by market failures are, difficult access, high costs, lack of documentation and lack of trust in financial institutions.

Fungáčová and Weill (2015) also examined financial inclusion for the BRICS countries and identified the top barriers hampering financial inclusion for the BRICS countries and China. Their research found that lack of money, family members with at least one account, distance and affordability of financial services pose the top challenges for adults in accessing financial inclusion. In China, 61% of adults are without a financial account due to a lack of money. Individuals without sufficient cash resources are unlikely to be able to cover the costs they will be able to bear through a bank account and will therefore choose to refrain from using financial services. Older people use financial services less often because their trust in financial institutions decreases over time. Aterido et al. (2013) also documented that lack of income and exit from the formal labour market are the reasons for the financial exclusion of women. In their study, they argued that gender disparities in financial inclusion are due to the low market participation of women. Using a sample of 65,000 adults from 64 countries, Demircuc-Kunt et al. (2013) found that there is a gender difference in account holdings, formal creditworthiness, and formal saving. Women are less involved in the financial system. In addition, in many countries, women are more likely to use informal financial services. Similarly, Fungáčová and Weill (2015) found that women are less financially involved, while wealthier, more educated, and older individuals are more likely to access and use formal accounts.

Based on the review of the empirical literature, we have developed the following hypotheses:

Hypothesis 1: Financial inclusion is strongly associated with the socio-demographic characteristics of individuals such as age, gender and employment

Hypothesis 2: The barriers that hinder individuals from accessing financial services/products are associates with the individual's characteristics

Hypothesis 3: The saving and credit-seeking motivations of individuals have a strong link with the gender, employment status and income level.

3. Methodology of the study and data

3.1. Data description

This study is carried out using data from World Bank's 2017 Global Findex database. The database contains survey data collected in partnership with Gallup, Inc. through a structured questionnaire from randomly selected national representative samples of more than 150,000 adults in over 140 countries. The unit of analysis includes adults 15 years and older, all civilians and non-institutionalized groups of the general population. One thousand samples used for Ethiopia, focusing on the three indicators of financial inclusion (formal accounts, formal savings and formal credit accounts). In addition, the global Findex database contains a larger number of financial inclusion interventions, allowing to assess the level, use, motivations, alternatives and barriers to formal financial inclusion. It represents individual socio-demographic information such as age, gender, income, education and labour market status that we used in our estimates. Because the database consists of a variety of financial inclusion measures, motivations and barriers, we decided to use the Findex database. In addition, the data we use is nationally representative and the data collected is managed homogeneously in more than 140 countries worldwide through a structured questionnaire. Thus, the results from using this data help to make international comparisons.

In addition, recent literature on financial inclusion (Allen et al., 2016; Amari & Anis, 2021; Fungáčová & Weill, 2015; Soumaré et al., 2016; Xu, 2020; Zins & Weill, 2016), used this database.

Therefore, we use these micro-datasets to analyse the drivers, motivations, and barriers to financial inclusion in Ethiopia.

3.2. Methodology

3.2.1. Estimation methodology

Our study uses three indicators of financial inclusion: formal account holdings, formal saving, and formal credit use. In the empirical literature, it is common to see the use of probit models to estimate the determinants of financial inclusion due to the dichotomous nature of financial inclusion indicators. While some authors such as (Allen et al., 2016; Desalegn & Yemataw, 2017; Fungáčová & Weill, 2015; Zins & Weill, 2016), used the probit model, others such as (Koker & Jentzsch, 2013; Potrich et al., 2015; Sanderson et al., 2018; Abdu et al., 2021) applied the Logit model.

Therefore, in this study, we applied the following probit model estimations following the empirical literature.

$$y_i^* = X_i\beta + \epsilon_i, y = \begin{cases} 1 & \text{if } y_i^* > 0, \\ 0 & \text{if } y_i^* \leq 0 \end{cases} \quad (1)$$

Where, y_i^* is the latent variable and y_i is the probability that an individual is financially included, X_i refers to a set of individual characteristics for individual i . Since equation (1) is non-linear in both parameter and variable, we estimated the linearized form of Eq (1), which takes the following equation form.

$$p_r(y = 1|x) = \Omega\{x^T\beta\} \quad (2)$$

The dependent variable $p_r(y = 1|x)$ in equation (2) refers to probability, and Ω is the cumulative density function (CDF) of the standard normal distribution. The parameter beta (β) is estimated by maximum likelihood technique.

Consistent with the recent financial inclusion literature (Allen et al., 2016; Amari & Anis, 2021; Fungáčová & Weill, 2015; Soumaré et al., 2016; Zins & Weill, 2016) we used individual level socio-demographic variables as explanatory variables.

$$\text{Fininc} = \alpha' + \beta_1\text{Age}_i + \beta_2\text{Age}_i^2 + \beta_3\text{Gender}_i + \beta_4\text{Education}_i + \beta_5\text{Income}_i + \beta_6\text{Empt}_i + \epsilon_i \quad (3)$$

The right-hand side variables in eq (3) are the individual characteristics, which are covariates used in the estimation of the model. Whereas, $\beta_1, \beta_2 \dots \beta_5$ are coefficient parameters, ϵ_i is the error term, α constant term and i represents a given person.

We applied the same methodology to analyse the impact of individual characteristics on the behaviour of individuals about barriers to financial inclusion. Barriers are a set of reasons for an individual not to own, save or use accounts from formal financial institutions (such as banks, MFIs, etc). Thus, the model for barriers of financial inclusion is specified as follows:

$$\text{Barriers} = \alpha' + \beta_1\text{Age}_i + \beta_2\text{Age}_i^2 + \beta_3\text{Gender}_i + \beta_4\text{Education}_i + \beta_5\text{Income}_i + \beta_6\text{Empt}_i + \epsilon_i \quad (4)$$

The dependent variable barriers¹ in equation(4) refers to lack of money, lack of trust, lack of documentation, distance, too expensive, religious reasons, family member has account, and no need for financial services. The estimated model for saving motivation and credit motivation is as follows in equation (5) and (6), respectively.

$$\text{Savingmotive} = \alpha' + \beta_1\text{Age}_i + \beta_2\text{Age}_i^2 + \beta_3\text{Gender}_i + \beta_4\text{Education}_i + \beta_5\text{Income}_i + \beta_6\text{Empt}_i + \epsilon_i \quad (5)$$

$$\text{Creditmotive} = \alpha' + \beta_1 \text{Age}_i + \beta_2 \text{Age}_i^2 + \beta_3 \text{Gender}_i + \beta_4 \text{Education}_i + \beta_5 \text{Income}_i + \beta_6 \text{Empt}_i + \epsilon_i \quad (6)$$

credit motive refers to the fact that the individual borrowed from financial institutions in the past 12 months for home/apartment/ or land, for medical purpose, or for farm/business purpose.

3.2.2. Variables, definitions and expected signs

Table 1 presented the sociodemographic variables predicting our models (eq(3) to eq(6) above. The table describes how these variables are measured and their expected relationship with financial inclusion. Following the description of predictor variables in table 1, we presented the description of the dependent variables in Table 2.

4. Estimation and discussion of results

4.1. Descriptive statistics of the dependent and the associated covariates

In this section, we have presented the most important empirical results. First, we discussed the summary statistics of both the dependent and independent variables, and then next we showed the results of the estimated model (Equation 3 above, which presents the determinants of financial inclusion as measured by the three indicators discussed above). Likewise, we presented the determinants of financial inclusion barriers (Equation 4). Finally, we discussed the determinants of the motivation to save (Equation 5) and to borrow (Equation 6) using individual characteristics, i.e. Age, education, income and gender as model covariates.

Table 2 shows the descriptive statistics of financial inclusion indicators, barriers to financial inclusion and motivations for saving and borrowing. 43.2 percent of adults have accounts with formal financial institutions, 67.5 percent of adults have saved in accounts with formal financial institutions in the past 12 months, and 10 percent of the adult population have borrowed from financial institutions in the past 12 months. The savings and loan question is directed to those who already have an account in the formal institutions.

The first major barrier to financial inclusion is the lack of money to open financial accounts. Eighty-five point three (85.3) percent of people do not have an account because they do not have enough money. Additionally, 78% of adults in Africa and 59% of adults worldwide cite a lack of financial resources as the top reason for not having a financial account. Other barriers are too far away 19.1%, missing documents 9.5%, family member already has one 7.7%, no need for financial services 6.4%, too expensive 4.8%, lack of trust and religious reasons 2.1%, respectively.

The data shows that people save for farming/business purposes and for retirement. While 29.8% of individuals save to start a new business or operate or expand their existing farm/business, only 11.1% save for retirement. Entrepreneurial motivation to save is twice as high as in developing countries (14 per cent). According to Demircuc-Kunt et al. (2017), business purposes are the main reason for saving in Africa. However, these saving methods are mainly through informal channels, through assets such as livestock and valuable goods (Jewellers) and savings. This shows that one's own savings are an essential source for starting a new business or expanding existing ones in Ethiopia and Africa.

Ten per cent of adults borrow from financial institutions during the last 12 months. The reason for borrowing is for farm/business purposes (12.7 % of adults), for medical purposes (8.4 % of adults), and home, land, or apartment (4.9% of adults). As a developing economy, the primary source of borrowing is not the formal financial institution in Ethiopia.

Table 3 table explains the definitions and descriptive statistics of each feature that we use to estimate our model. For example, Table 3 explains that 60.2% of the samples are female, the mean age of the samples is 33 years, 28.7% of individuals have a high school diploma, 30.4% of

Table 1. Description of variables		
Variables	Definitions	Expected sign
Gender	Dummy variable which takes 1 if female, 0 otherwise	Negative
Age	Continuous variable, measured in life expectancy at birth.	Positive
Age squared	Continuous variable, measured in life expectancy at birth, squared	Negative
Education	Dummy variable which is 1 if completed secondary education, 0 if primary completed or less	Positive
Income-second 20%	Dummy variable which is 1 if individual income is in the second 20% quintile, 0 otherwise	Positive
Income-third 20%	Dummy variable which is 1 if individual income is in the third 20% quintile, 0 otherwise	Positive
Income-fourth 20%	Dummy variable which is 1 if individual income is in the fourth 20% quintile, 0 otherwise	Positive
Income- richest 20%	Dummy variable which is 1 if individual income is in the richest 20% quintile, 0 otherwise	Positive
Employment	Dummy variable which is 1 if the individual is in the workforce, 0 otherwise	Positive

Table 2. Summary statistics of the dependent variables

Variable	Obs	Mean	Std.Dev.
Financial inclusion indicators			
Has an account at a financial institution	1000	.432	.496
Saved in past 12 months: using an account at a financial institution	999	.353	.469
Borrowed in past 12 months: from a financial institution	999	.1001	.300
Barriers to financial inclusion			
too far away	570	.191	.394
too expensive	566	.048	.213
lack documentation	569	.095	.293
lack trust	567	.021	.144
religious reasons	568	.021	.144
lack of money	571	.853	.355
family member already has one	570	.077	.267
b/c no need for financial services	566	.064	.244
Motivations of seeking a loan			
Has loan from a financial institution for a home, apartment, or land	1000	.049	.216
Borrowed in past 12 months: for medical purposes	999	.084	.278
Borrowed in past 12 months: for farm/business purposes	999	.127	.333
Motivations to save			
Saved in past 12 months: for farm/business purposes	998	.298	.457
Saved in past 12 months: for old age	999	.111	.314

individuals are in the wealthiest 20% income quintile, and 77.5% of individual samples are in the workforce.

4.2. The socio-demographic factors explaining financial inclusion

Table 4 displays the results of the marginal effects of the probit estimations for the three indicators of financial inclusion. The result shows that all socio-demographic characteristics of individuals significantly influence financial inclusion. Being a woman is negatively and significantly associated with formal account ownership and use of accounts for savings. This implies that women are more likely to have lower account penetration. Women are 30.8 % less likely to open accounts with formal financial institutions than their male counterparts are and are 35.5 % less likely to save from their accounts. The main argument for the exclusion of women from financial access is that they are not included in economic inclusion for a number of reasons. Women make up the largest share of the informal economy, while commercial banks and microfinance institutions focus on the

Table 3. Summary statistics of explanatory variables

Variables	Definitions	Obs.	Mean	St.D	Min	Max
Gender	Dummy variable which takes 1, if female, 0 otherwise	1000	.602	.49	0	1
Age	Continuous variable, measured in life expectancy at birth.	1000	32.98	13.92	15	98
Education	Dummy variable which takes on 1, if completed secondary education, 0 if primary completed or less	1000	.287	.45	0	1
Income-second 20%	Dummy variable, which takes on 1, if income is in the second 20% quintile, 0 otherwise	1000	.162	.37	0	1
Income-third 20%	Dummy variable, which takes on 1, if income is in the third 20% quintile, 0 otherwise	1000	.172	.38	0	1
Income-fourth 20%	Dummy variable, which takes on 1, if individual income is in the fourth 20% quintile, 0 otherwise	1000	.211	.41	0	1
Income-richest 20%	Dummy variable, which takes on 1, if individual income is in the richest 20% quintile, 0 otherwise	1000	.304	.46	0	1
Employment	Dummy variable, which takes on 1, if the individual is in the workforce, 0 otherwise	1000	.775	.42	0	1

Table 4. Results of the probit model estimation (marginal effect)

VARIABLES	Has account at financial institution	Saved in the past 12 months	Borrowed in the past 12 months
Female	−0.308*** (0.0935)	−0.355*** (0.0943)	−0.171 (0.118)
age	0.0917*** (0.0148)	0.0708*** (0.0153)	0.0857*** (0.0256)
Age ²	−0.000968*** (0.000172)	−0.000771*** (0.000180)	−0.00106*** (0.000326)
Secondary education	0.914*** (0.115)	0.624*** (0.113)	−0.145 (0.151)
Income-second 20%	0.0985 (0.162)	0.359** (0.179)	−0.161 (0.191)
Income-Middle 20%	0.371** (0.158)	0.442** (0.176)	−0.185 (0.192)
Income-fourth 20%	0.554*** (0.150)	0.686*** (0.166)	−0.0382 (0.178)
Income-richest 20%	1.096*** (0.150)	1.167*** (0.164)	−0.141 (0.181)
In the work force	0.278** (0.112)	0.410*** (0.119)	0.255 (0.157)
Constant	−2.793*** (0.336)	−2.803*** (0.354)	−2.760*** (0.512)
Observations	1,000	999	999
Pseudo R-squared	0.203	0.173	0.0417
Log likelihood	−544.98158	−521.13139	−311.4251
Hosmer–Lemeshow chi2	11.96	10.42	3.78
Prob > chi2	0.1529	0.2368	0.8764

Standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

formal economy. Another explanation is that women tend to contribute the largest share of their income towards household consumption than men, working in low-paid and or undervalued jobs. In the same vein, women are likely to frequently conduct transactions and often manage day-to-day expenses and smooth out household financial risk. Fungáčová and Weill (2015) also stated the gender gap in financial inclusion is due to unequal opportunities, laws and regulations that pose an additional barrier to women's ability to open a bank account. Thus, women's financial literacy is critical to understanding how to use, manage, budget, and save money with a transactional account. Furthermore, our results agree with the results of (Fungáčová & Weill, 2015; Zins & Weill, 2016; Asuming et al., 2019; Amari & Anis, 2021).

Table 4 displays the Probit estimations of determinants of financial inclusion in Ethiopia. The dependent variables are formal saving; formal account, formal credit, and explanatory variables are gender, age, education, and income. The coefficients are marginal effects, and standard errors are in parenthesis.

Age is another important variable affecting financial inclusion. We found a positive and negative coefficient for age and age-square for all indicators of financial inclusion. Therefore, we found a non-linear impact of age on financial inclusion. Increasing age of individuals increases the likelihood of formal account ownership and use of the account for savings and lending purposes.

Later, after a certain age limit, aging significantly reduces financial inclusion. This could be due to individuals retiring from the labour market as they age, or engaging in fewer income-generating activities. They may also prefer to hold cash to reduce the frequency of trips to withdraw funds from financial institutions in retirement Fungáčová and Weill (2015) explained this effect as a “generation effect,” derived from either the demand or the supply side of the financial system. The fall in account ownership at old age is because banks may not attract older clients. The youngest is less likely to be financially included because they have less money to save and get loans or do not have enough income to save and no collateral or guarantee to secure credit. Asuming et al. (2019) reasoned that younger people are less involved in the formal financial sector as they are less likely to be in the formal labour market. Our result agrees with the result of Abdu et al. (2021) for the Afar region, Allen et al. (2016), and Zins and Weill (2016). However, Desalegn and Yemataw (2017) for Ethiopia did not confirm a significant association between age and the use of accounts for credit.

Education influences financial inclusion through access to financial information, financial decision-making and financial literacy. Therefore, in theory, we expected a positive and significant effect of education on indicators of financial inclusion. In line with the literature, the result shows that higher education significantly increases the likelihood of having formal accounts and using the account for savings. Analogous to our study result, Mndolwa and Alhassan (2020) also found that education reduces the likelihood of individuals’ exclusion from the financial sector, especially for women. Education influences financial inclusion through access to financial information, financial decision-making and financial literacy. Therefore, in theory, we expected a positive and significant effect of education on indicators of financial inclusion. In line with the literature, the result shows that higher education significantly increases the likelihood of having formal accounts and using the account for savings. A study by Desalegn and Yemataw (2017) also found that financially literate individuals are more likely to hold accounts with formal financial institutions. However, we are unable to infer a significant association between education and the use of financial accounts for lending because credit is dependent on the borrower’s ability to post collateral, not education. Similar to our study result, other studies in the literature have confirmed the positive impact of education on financial inclusion (Fungáčová & Weill, 2015; Allen et al., 2016; Zins & Weill, 2016; Desalegn & Yemataw, 2017; Asuming et al., 2019).

Income is having a positive and significant association with financial inclusion. People in the wealthiest income bracket are more likely to have an account. A person in the top 20% of the income group is 109% more likely to have a financial account than a person in the bottom 20% of the income group. Thus, high-income individuals have enough income to open accounts and fewer barriers to accessing financial inclusion. The main reason given in the literature for not having an account was lack of money. Therefore, the wealthiest have fewer financial constraints as many business activities require them to open accounts for transactions. Our result is no exception, in fact Demirgüç-Kunt and Klapper (2013) also found a positive relationship between income and account ownership. Allen et al. (2016) and Zins and Weill (2016) also found a positive association between income and formal account ownership. This result is consistent with the findings of (Abdu et al., 2021) for the Afar region, Ethiopia.

We also find that employment has a positive impact on financial inclusion when accounting for having a formal account and saving by individuals in the workforce, which increases the likelihood of having a formal account and savings accounts with a financial institution to use by 27% and 41% respectively. Our result is consistent with the results of (Amari & Anis, 2021).

4.2.1. The socio-demographic characteristics of individuals and barriers to financial inclusion

Here we analyse whether individual characteristics affect barriers to having a formal account. The various barriers that we used as the dependent variable are self-reported barriers to financial inclusion that were collected in the survey. Using these restrictions (column headings of Table 5)

VARIABLES	lack of documentation	too far away	too expensive	religious reasons	lack of money	A family member has one account	No need for financial services
Female	0.0367 (0.172)	-0.0726 (0.135)	-0.358* (0.200)	-0.379 (0.284)	-0.00641 (0.146)	0.309 (0.191)	-0.159 (0.182)
Age	-0.0839*** (0.0267)	-0.0451** (0.0189)	-0.0215 (0.0339)	-0.0379 (0.0399)	0.0378* (0.0203)	-0.00826 (0.0268)	-0.0507* (0.0265)
Age-square	0.000710** (0.000334)	0.000503** (0.000217)	4.12e-05 (0.000441)	0.000469 (0.000457)	-0.000446* (0.000234)	7.25e-05 (0.000324)	0.000498 (0.000307)
Secondary education	-0.0990 (0.214)	-0.0678 (0.189)	-0.125 (0.266)	-0.437 (0.458)	-0.0763 (0.194)	0.0666 (0.235)	0.0942 (0.236)
Income-second 20%	-0.375	-0.368*	-0.467	-0.743*	0.373*	0.358	0.218
Income-Middle 20%	(0.239)	(0.189)	(0.368)	(0.415)	(0.224)	(0.310)	(0.260)
	-0.537**	-0.194	0.0918	-	0.152	0.216	0.0665
	(0.253)	(0.184)	(0.290)		(0.214)	(0.324)	(0.273)
Income fourth 20%	-0.0887	-0.230	0.274	-0.752*	-0.158	0.765***	0.136
	(0.224)	(0.186)	(0.278)	(0.441)	(0.199)	(0.294)	(0.269)
Income-the richest 20%	-0.267	-0.348*	0.0787	0.0205	-0.404*	0.949***	-0.0631
	(0.246)	(0.207)	(0.307)	(0.326)	(0.210)	(0.301)	(0.302)
Employment	0.0324	-0.0718	-0.141	0.0200	-0.00308	0.284	0.173
	(0.179)	(0.141)	(0.215)	(0.326)	(0.153)	(0.195)	(0.205)

(Continued)

Table 5. (Continued)

VARIABLES	lack of documentation	too far away	too expensive	religious reasons	lack of money	A family member has one account	No need for financial services
Constant	0.619 (0.499)	0.273 (0.390)	-0.753 (0.627)	-0.794 (0.775)	0.437 (0.419)	-2.211*** (0.575)	-0.662 (0.542)
Observations	569	570	566	451	571	570	566
Pseudo R-squared	0.0991	0.0200	0.0656	0.107	0.0447	0.0741	0.0333
Log likelihood	-160.82589	-272.58638	-101.3825	-49.411239	-227.8214	-143.47155	-129.55328
Hosmer and Lemshow chi2	3.17	7.70	8.49	12.67	5.61	4.96	4.62
Prob > chi2	0.3666	0.4633	0.3871	0.1239	0.6910	0.7618	0.7971

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

on accessing financial accounts as an outcome variable, we examine how individual characteristics affect these barriers.

Table 5 displays the determinants of barriers to financial inclusion in Ethiopia. Each column headings are the dependent variable (financial inclusion measures), and individual characteristics are covariates we use in estimation.

From the estimation result, we find that gender does not have a strong association with barriers to financial inclusion. Gender has been significantly influenced by the cost of financial services. The implication is that the existing gender gap in financial inclusion is due to involuntary barriers. The rise in the price of financial services tends to be cited as an obstacle by men. A lack of documentation is mentioned much more frequently as an obstacle by the youngest and poorest. As an individual's age increases beyond a certain threshold, involuntary exclusions, such as distance and cost of financial services, prevent individuals from accessing and using financial accounts. The result agrees with the results of (Soumaré et al., 2016; Zins & Weill, 2016).

Distance is the most significant barrier to financial inclusion for old and poor adults, who may find it unaffordable and difficult to travel long distances to access financial services. One important solution to reduce the impact of distance as a barrier to financial inclusion rests on adopting appropriate and less costly digital financial technologies such as mobile banking and internet banking. The use of mobile money is a critical element of financial inclusion that could break the distance barrier by making payments, transfers, and saving possible from a distance. Besides this, digital technologies are less expensive for banks to install compared to establishing new branches (Senou et al., 2019). Chinoda et al. (2019) also argued that mobile money is a tool meant to reduce socioeconomic and geographic barriers for the poor and clients in remote areas. It reduces the travel cost to make payments and purchases to customers and improves the profitability of banks. Therefore, we advise policymakers to aggressively work on increasing the penetration of accessible, affordable digital financial systems. However, the extension of a strong telecommunication system is at the heart of digital systems.

Income is associated with distance, religious reasons, lack of money, and lack of documentation. While religious reasons are less problematic for the poor, lack of money and distance are major barriers to accessing financial accounts. One major reason for the richest adults' choice not to have a formal account is that they perceive a family member have an account. Our finding revealed that those in the top 20% of richest individuals are 94.9% more likely not to have formal accounts because their family member has an account. The youngest individuals cite "No need for financial service" as a barrier to financial inclusion.

To sum up, from the significant drivers of financial inclusion in Ethiopia, gender, and income are associated with different barriers in a different direction and age is found non-linear. This result is also similar to the findings of (Allen et al., 2016; Fungáčová & Weill, 2015; Zins & Weill, 2016).

4.3. Saving motivations and individual characteristics

Table 6, displays that saving behaviour is significantly related to gender, age, and income characteristics. Females are less likely to save for farming or business, or old age purposes. Being female substantially reduces the likelihood of saving for farm or business and old age purposes by 29.6 per cent and 30.3 per cent, respectively. This indicates that women and men have different savings behaviours. It is consistent with the findings of (Zins & Weill, 2016). Being older is associated with both types of saving motivations. As people become older increases the likelihood of saving for old age security. Education increase the probability of saving for old age purpose by 37.4 per cent and the top 20% richest are motivated to keep for business and old age security. Being rich induces saving motivation for old age by 89.7% and are 34.7% more likely to save for farm/business purposes. Poor individuals are more likely to save for daily expenses while the high-income groups are motivated to save for retirements and growth purposes. The results are

Table 6. Socio-demographic characteristics and saving motivations

	(1)	(2)
VARIABLES	Save for farm/business purpose	Save for old age security
Female	−0.296*** (0.0906)	−0.303** (0.118)
Age	0.0168 (0.0155)	0.0757*** (0.0240)
Age-square	−0.000273 (0.000187)	−0.000800*** (0.000293)
Secondary education	−0.0816 (0.111)	0.374*** (0.141)
Income-second 20%	−0.0367 (0.157)	0.128 (0.259)
Income-Middle 20%	0.0900 (0.154)	0.196 (0.253)
Income-Fourth 20%	0.170 (0.147)	0.593*** (0.225)
Income—the richest 20%	0.347** (0.144)	0.897*** (0.220)
Employment	0.578*** (0.119)	0.398** (0.171)
Constant	−1.169***	−3.556***
Observations	(0.327) 998	(0.518) 999
Pseudo R-squared	0.0527	0.130
Log likelihood	−575.56022	−303.15319
Hosmer–Lemeshow chi2	11.67	3.8
Prob > chi2	0.1667	0.8750

Standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

consistent with the theoretical expectations and with empirical findings of (Zins & Weill, 2016). Employment is also positively associated with the two saving motivations. Those employed or in the workforce are 57.8 % and 39.85 more likely to save for farm/business purpose and old age security, respectively. The implication is that employment prompts people to consider starting a business from their own savings

4.4. Credit motivations and individual characteristics

We discussed how the different credit motives are associated with individual characteristics of the sample using three loan-taking motivations, which are for medical purposes, for farm or business purposes, and home, apartment, or land purposes as dependent variables. Table 7 explains such a relationship between credit motivations and individual covariates.

The first column shows that only education has a significant relationship with taking a loan for medical purposes. Those who pursued primary education are more likely to seek credit for medical purposes and for business purposes. Being educated significantly reduce the likelihood of taking loans for medical purpose by 43.4% and by 26.5 % to start business.

Male has 21.6% more likelihood to borrow for farm or business, while gender has no significant effect on the other two credit motivations. The result shows males are requesting loans aimed at

Table 7. Socio-demographic characteristics and loan taking motivations

VARIABLES	borrowed for home/ apartment/land	borrowed for Medical purpose	borrowed for farm/ business purpose
Female	−0.183 (0.148)	−0.174 (0.124)	−0.216* (0.111)
Age	0.126*** (0.0427)	0.0286 (0.0245)	0.0826*** (0.0244)
Age square	−0.00168*** (0.000584)	−0.000521 (0.000322)	−0.00113*** (0.000322)
Secondary education	0.111 (0.177)	−0.265* (0.158)	−0.434*** (0.146)
Income-second 20%	0.258 (0.281)	0.143 (0.194)	−0.365** (0.180)
Income-Middle 20%	0.154 (0.289)	0.0845 (0.195)	−0.206 (0.173)
Income-Fourth 20%	0.477* (0.259)	−0.138 (0.199)	−0.207 (0.167)
Income—the richest 20%	0.362 (0.258)	−0.126 (0.196)	−0.207 (0.167)
Employment	0.106 (0.196)	−0.106 (0.146)	0.214 (0.144)
Constant	−4.065*** (0.802)	−1.410*** (0.467)	−2.211*** (0.469)
Observations	1,000	999	999
Pseudo R-squared	0.0558	0.0298	0.0556
Log-likelihood	−359.36103	−279.74087	−184.65238
Hosmer-Lemeshow chi2	3.50	4.83	6.05
Prob > chi2	0.8993	0.7753	0.6418

Standard errors in parentheses

*** p < 0.01, ** p < 0.05, * p < 0.1

easing financial constraints to start or expand businesses. However, we did not find significant gender gaps to loans for medical purposes, and for the purchase of home, apartment or land. Our finding is consistent with the finding of (Zins & Weill, 2016)

Age and income have a significant impact on the probability of taking a loan to purchase a home, apartment, or land. Age is positive and age square is negative for credit motivations of for farm/business purpose and for the purchase of home, apartments or land. The result is appealing because with age, people tend to save more and when too old people become less motivated to save. The wealthiest individuals are more likely to borrow for having assets such as homes, apartments, or land. Age has non-linear association with credit motivations. Our findings are consistent with the findings of (Zins & Weill, 2016; Dar & Ahmed, 2021).

Similarly, the richest are more motivated to borrow to purchase a home, apartment, or land while they are less interested in borrowing for business purposes, which may be because they have own assets to start or expand businesses or do not like to borrow.

5. Conclusion

In Ethiopia, financial inclusion is at its lowest level compared to sub-Saharan African countries. As financial inclusion is a pillar of development by boosting economic growth and reducing poverty, it is paramount to examine the status and its drivers, and different motives.

Therefore, this work examines the association between different individual characteristics and financial inclusion for 1000 randomly selected representative individual samples from Ethiopia using the World Bank database Findex 2017. From the study, we have drawn following the conclusions.

First, financial inclusion, as measured by formal account holdings, formal savings, and formal credit, is low. The study found that only 43.2% of individuals have accounts in the formal accounts. People may turn to informal sources of credit and not having access to formal sources of finance could reduce financial inclusion. Second, adults' decision not to have a formal account is mainly voluntary (lack of money and family member has accounts), but involuntary exclusions such as distance and lack of documents are also significant barriers. Individuals in remote areas of financial centres and/or undocumented are likely to be excluded.

Third, barriers to financial inclusion differ based on individual characteristics. For example, while income and age are significantly associated with different barriers, there is no evidence of an association with any of the barriers to education.

Fourth, the existing gender gaps in financial inclusion are due to differences in the real economic sector, such as employment, and not differences in the financial sector.

Fifth, older, to some extent wealthier, educated and male individuals are more likely to access the financial sector. Education such as financial literacy is key for people to make financial decisions, and process information and investment opportunities.

6. Recommendations and policy implications

Generally, our study attempts to bring public interest to devise policies that could mitigate financial inclusion. In addition, the study identifies financially excluded groups of the population and related barriers to their exclusion.

Based on the findings, we strongly recommend that policies that aim to foster financial inclusion should target the poor, young, less educated, and women population groups because they are the most excluded from the financial sector. In Ethiopia, the proportion of youth groups in the population is huge but they are not yet financially included for several reasons. However, with the specialization, and advancement in technologies, the demand for accessible and affordable financial products and payment systems is inevitable. Besides this, distance to financial service points is a significant challenge to the poor, old and less educated portions of the population. Therefore, policymakers and other stakeholders should design convenient and less expensive financial products and payment systems to increase the inclusion of the poor and youth particularly those in remote areas. One such means is improving the role of digital financial systems such as mobile and internet banking. Policies should also focus on mitigating the distance, cost, and documentation barriers to financial inclusion. We also recommend the authorities design policies and programs that improve the participation of females in formal employment, education and income-generating activities because most barriers to gender gaps in financial inclusion rest on differences in the non-financial sector.

Our study is not free from limitations such as the lack of most recent data on many variables such as residence (rural/urban) and marital status, and we analysed the demand side of financial inclusion. Therefore, we suggest further research to study financial inclusion based on a comprehensive set of indicators i.e., both the demand and supply sides. Since we did not look into the role of informal financial sources whether it complements or substitutes the formal financial system, it would be great if other researchers study on the area.

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Notes

1. Only the unbanked persons, i.e., those who did not have formal accounts were asked about their perceived barriers to financial inclusion. Therefore, the sample size is smaller due to the lack of data on each barrier for those who already have accounts with financial institutions. As a result, we dropped observations with missing information from the estimate.

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