

Financial Inclusion and Household Well-being: Evidence from Ethiopia

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Abstract

This study investigates the impact of the level of financial inclusion on poverty reduction using Round Four of the Ethiopian Socioeconomic Survey. We constructed a Financial Inclusion Index using a standard counting method and employed an Instrumental Variable (IV)-Probit model, using knowledge of financial service use as the instrument to address endogeneity. The average poverty rate among Ethiopian households is 25.9%. The empirical results confirm that financial inclusion positively affects household well-being: a one-unit increase in the Financial Inclusion Index is associated with a 0.336 percentage-point reduction in the likelihood of being poor, holding other factors constant. We also examine effects by gender and location: male-headed and urban households show a statistically significant effect individually, but a formal test finds no significant difference between subgroups, so we treat this heterogeneity as inconclusive. Governments should improve access to technology-driven financial services to address exclusion caused by limited knowledge and distance from formal financial institutions.

Keywords: Financial inclusion, Poverty Reduction, Gender, Location, Ethiopia

JEL Classification: D12, D14, G21, I32

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1. Introduction

Financially included households have access to affordable financial services that help them meet needs such as paying bills, saving, and obtaining credit (Koomson and Ibrahim, 2017). Financial inclusion (FI) refers to both access to and use of selected financial services (Sarma, 2008; Abimbola et al., 2018), including ownership of a deposit or transaction account at a formal institution. FI has become central to development agendas in emerging economies, promoting financial access for unbanked households to reduce poverty (Churchill and Marisetty, 2020) and aiming to give households from all socioeconomic backgrounds equal opportunity to benefit from financial services.

As a policy measure, FI is expected to drive inclusive growth, reduce inequality, create jobs, and improve productivity through savings. It also provides access to monetary facilities at the community and government levels, increasing savings, payment convenience, credit access, and transfers, thereby improving household welfare through stronger commercial activity (Pazarbasioglu et al., 2020). Governments and development initiatives have long focused on expanding financial access to the unbanked by improving previously limited basic banking services.

In developing countries, microfinance institutions primarily aim to promote FI. Financial market liberalization has enabled the rapid expansion of non-bank financial institutions and microfinance. These institutions have significantly affected the lives of millions, including how marginalized groups borrow and manage credit, although their reach extends beyond the poorest of the poor (Koveos and Randhawa, 2004). Since poverty is largely a rural phenomenon (Tambunan, 2009; Akhtar et al., 2015), expanding FI can improve household living standards by creating credit and savings opportunities that support consumption smoothing and productive investment.

FI affects not only access but also individuals' financial well-being and broader development. Many people in developing countries lack access to banking services; if included, they could save, invest, accumulate wealth, and expand economic activity, thereby contributing to national growth (Claessens, 2006). Microfinance can generate an additional \$1 in income for every \$1 invested in a client, supporting low-income livelihoods. Formal financial institutions promote FI by providing credit access to low-income groups. Winters (2003) notes that despite economic growth and poverty reduction since the mid-twentieth century,

limited access to financial markets among low-income households remains a major constraint.

Several studies show that greater availability of financial facilities improves economic performance, placing FI at the center of debates on economic growth (Ang, 2008; Zhuang et al., 2009; Seck et al., 2017; Fowowe, 2020; Shen et al., 2021). However, understanding FI's full impact remains difficult due to the complex relationship between FI and economic expansion, as well as limited data on access to financial services in many developing countries (Arestis and Sawyer, 2016).

In Ethiopia, FI remains challenging because the financial sector is still developing and has limited outreach. A large share of the rural population is economically excluded; approximately 78% of Ethiopians live in rural areas, down from earlier estimates as urbanization continues. Access to basic financial services remains restricted, limiting households' ability to open bank accounts, pay bills, access credit, and save (Baza and Rao, 2017; Abdu and Adem, 2021; Achew et al., 2021; Hundie and Tulu, 2021). Consequently, the unbanked majority face high transaction costs for payment services and cannot easily use savings services to smooth income or build assets. Existing Ethiopian studies have treated account ownership as both a component and determinant of FI (Baza and Rao, 2017; Desalegn and Yemataw, 2017). Others, such as studies on the Afar region, have limited sample size and geographic scope and overlook potential endogeneity and heterogeneity issues (Abdu and Adem, 2021).

This study examines whether financial inclusion significantly affects household poverty in Ethiopia. It uses the latest available household- and individual-level datasets covering both rural and urban households. Methodologically, the study accounts for endogeneity using instrumental variable regression and addresses heterogeneity by estimating models by household head gender and place of residence, comparing rural and urban households. The remainder of the paper is organized as follows: Section 2 reviews the literature; Section 3 presents the data and econometric methodology; Section 4 reports and discusses the results; and Section 5 provides concluding remarks.

2. Literature Review

Recent studies highlight financial inclusion (FI) as a driver of economic growth. Ozili (2021) noted FI's positive impact on sustainable development goals and

poverty reduction, prompting widespread financial sector reforms. Domestic banking expansion can reduce inequality, though socioeconomic infrastructure must support it. Evidence points to a negative correlation between banking expansion and income inequality across Italian municipalities. Corporate banks appear to reduce local income inequality more than commercial banks, and FinTech may help the poor access the benefits of monetary policy despite market imperfections.

On poverty reduction, Anwar et al. (2016) found that FI reduces poverty by 8.17% across Indonesian provinces. Seck et al. (2017) found that access to finance positively affects household consumption in Nigeria. Abdu and Adem (2021) confirmed that finance companies are effective poverty-reduction tools, with age, financial literacy, and mobile banking correlating with FI among low-income groups. In Ghana, FI reduces the likelihood of poverty by 32% and further reduces poverty risk by 31% (Koomson et al., 2020), with similar effects in Peru (Schmied and Marr, 2016). Joan et al. (2022) noted that financial services support business growth, education, and poverty avoidance.

FI is critical for household well-being and reducing inter-group inequalities (Adebowale and Dimova, 2017), though some studies find limited impact in Africa (Chibba, 2009; Fowowe and Abidoye, 2013; Jahan et al., 2019). Formal financing instruments have less impact on household inequality than infrastructure such as road access, whereas bank proximity and urban residence are positively correlated with FI (Adebowale and Dimova, 2017). FI broadly reduces poverty in developing nations (Nelson and Nelson, 2010; Omar and Inaba, 2020), particularly in Sub-Saharan Africa (Nsiah et al., 2021); however, microfinance borrowers unable to repay loans risk asset loss and broader hardship (Kura et al., 2017), often due to low financial literacy.

Regarding determinants of FI, Kumar Vaid et al. (2020) identified distribution, affordability, technology, financial awareness, and institutional trust as key factors in India; in Kenya, adult financial illiteracy and limited technology experience are primary barriers (Tiwari et al., 2019). In Ethiopia's Afar region, barriers include lack of credit, collateral requirements, high interest rates, financial illiteracy, and low income (Abdu and Adem, 2021). Baza and Rao (2017) categorized supply-side determinants as psychological and sociocultural factors and literacy, and demand-side barriers as physical infrastructure and documentation issues; Ethiopian-specific obstacles include insufficient income,

distance from institutions, fixed pricing, and lack of documentation (Desalegn and Yemataw, 2017; Dinku, 2021).

Hundie and Tulu (2021) found a significant gender gap in credit access, with age, education, income, and employment positively influencing access. Women-headed households remain more financially excluded (Dinku, 2021; Girón et al., 2021). Ethiopians remain unbanked primarily due to low income and remote banking locations (Desalegn and Yemataw, 2017).

In summary, low income, distance from institutions, financial illiteracy, and education levels consistently hinder FI. Ethiopia's rural isolation and limited digital literacy remain unresolved challenges. FI strategies cannot succeed without government and stakeholders unlocking broader enabling systems.

2.1. Why are the majority of Ethiopian adults financially disadvantaged?

Ethiopia's FI strategy aimed to reduce poverty by 2025 through universal financial access and quality services, supported by a national FI council and enabling infrastructure such as telecommunications and electricity. About two-thirds of adults remain financially excluded due to affordability barriers, institutional distrust, account-opening costs, and geographic distance, with some rural institutions nearly 70 kilometers from residents. Baza and Rao (2017) found only 22.3% of Ethiopian adults financially eligible, below the 28.9% Sub-Saharan African average. Achew et al. (2021) identified demand-side barriers (limited awareness, distrust, low perceived value, and distance) alongside supply-side constraints, including weak institutional capacity, poor digital infrastructure, and restrictive legal and competitive frameworks.

2.2. Conceptual framework

Financial inclusion (FI) may affect poverty through multiple channels; this study treats the direction of that effect as an empirical question rather than a foregone conclusion. FI can reduce poverty directly, for example, by increasing proximity to financial institutions, which lowers the cost of saving, borrowing, and receiving remittances, thereby supporting consumption smoothing and productive investment. It could also increase household vulnerability where credit access outpaces financial literacy or repayment capacity, leading to over-indebtedness among low-income borrowers (Kura et al., 2017). As illustrated in

Figure 1, the conceptual framework maps both channels, and Section 4 presents the empirical evidence on which effect dominates for Ethiopian households.

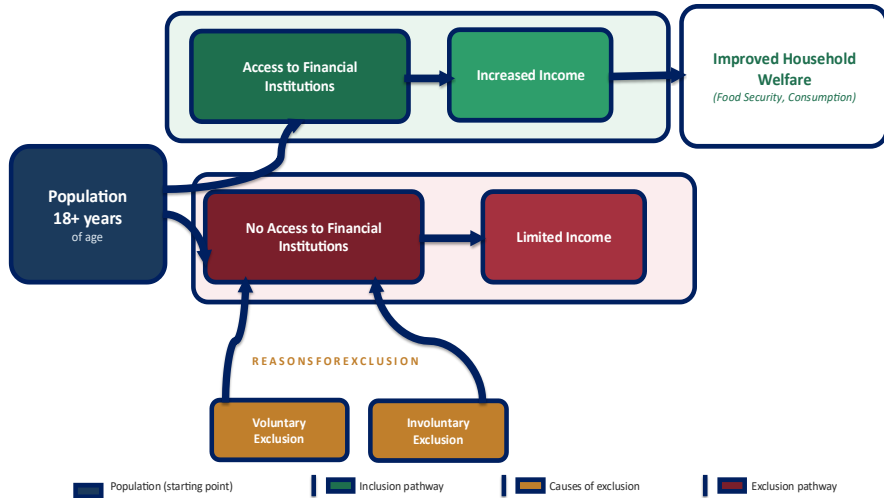


Figure 1: Conceptual framework: Financial inclusion, exclusion, and household welfare

Source: Authors' elaboration

3. Data and Methodology

3.1. Description of data

We used data from the Ethiopian Socioeconomic Survey, which is conducted every three years by the Ethiopian Statistics Service and the World Bank, as it is the Ethiopian version of the Living Standard Measurement Survey⁴. Whilst the survey has five waves, we use data from the fourth round, which was collected in 2018-19. This round, unlike previous surveys, includes a full-fledged module on financial inclusion. ESS4 is not a continuation of previous ESS waves and serves as a baseline for successive ESS waves. It is composed of two administrative cities and nine regional states⁵. The ESS4 is implemented in 565 census areas, of which 316 are rural and 219 are urban. A total of 6770 households were interviewed. The survey collected a wide range of household demographic and socioeconomic variables, classified as household, agriculture, and community, through multiple questionnaires and visits. The FI module is

⁴ Available at <http://microdata.worldbank.org/index.php/catalog/3823>.

⁵ The two municipal governments are Addis Ababa and Dire Dawa.

included in the household questionnaire and focuses on saving, insurance, credit, banking practices, financial knowledge, and financial capability.

3.2. Model specification

Poverty and financial inclusion (FI) are likely reciprocally related, and unobserved factors, such as financial literacy, may jointly affect both; Section 3.3 discusses this endogeneity concern and the choice of instrument in detail. Here, poverty (binary: poor = 1, non-poor = 0) is the dependent variable, and the Financial Inclusion Index (continuous, 0-1) is the endogenous regressor.

To analyze the impact of financial inclusion on household well-being, we employ an instrumental variable (IV) probit model. This model is suitable for a binary dependent variable (poverty) together with a continuous endogenous regressor (the FI Index), while addressing potential endogeneity concerns. The model is estimated using a two-step procedure. In the first stage, FII is regressed on the excluded instrument Z_i and control variables X_i . The predicted values of FII are then used in the structural equation to estimate the effect of financial inclusion on household well-being.

3.3. Identification

The relationship between poverty and financial inclusion (FI) is subject to endogeneity due to reciprocal causation (Imai et al., 2010): FI can reduce poverty, while poverty may also affect a household's likelihood of financial inclusion. This reciprocal relationship, together with the omitted-variable concerns discussed in Section 3.2, is what motivates the IV-probit approach rather than an ordinary probit. Despite progress in financial sector development, distance from the nearest bank remains one of the most significant obstacles to FI (Demirguc-Kunt and Klapper, 2012). However, distance to the nearest bank is highly correlated with poverty (pairwise correlation of 0.327), which fails the exclusion restriction that an instrument must not be directly associated with the model's error term. We therefore use knowledge of financial service use as the instrumental variable to address potential endogeneity between poverty and FI (Imai et al., 2010; Wooldridge, 2010): this variable is far less correlated with poverty (pairwise correlation of -0.097) while remaining strongly predictive of FI take-up in the first stage, so it satisfies both the exclusion restriction and the relevance condition. Following Cameron and Trivedi (2010), this identification strategy is tested in the first stage of the two-stage IV-Probit using the Wald

endogeneity test and standard F-test. The first-stage regression rejects weak instrumentation at the 0.01 significance level.

3.4. Estimation procedure

Before analyzing the mechanisms through which financial inclusion affects poverty, it is essential to first establish whether FI has a statistically significant poverty-reducing effect. We then estimate sub-sample models to examine how FI affects poverty among rural, urban, male-headed, and female-headed households. The relationship between poverty and the key components of the FI index is also examined separately, including access to credit, insurance, mobile and bank accounts, and remittances.

Poverty is measured as a binary variable using the headcount index based on a poverty line of ETB 10,471. This poverty line is derived from Household Income, Consumption, and Expenditure (HICE) survey rounds from 1995/96, 2010/11, 2015/16, and 2018/19. Households with total consumption above the poverty line are classified as non-poor, while those below are classified as poor. The food poverty line was updated to ETB 7,178, and the total poverty line, covering both food and non-food expenditure, was estimated at ETB 10,471. This adjustment reflects consumption growth over time and maintains consistency in real terms, although inflation and consumption-growth adjustments rely on an assumed growth rate.

Financial inclusion is measured as a continuous index ranging from 0 to 1. The index captures the number of financial products or services used by each household out of nine possible services. A household using none receives a score of 0, while one using all nine receives a score of 1. Intermediate scores indicate partial use of available services. The nine services include savings accounts, credit or loan accounts, insurance, mobile money, fixed deposits, cooperative financial services, remittance services, pension schemes, and formal microfinance services.

3.4.1. Main IV-probit specification

Following Cai et al. (2011), the IV-Probit method is used to estimate the effect of FI on poverty reduction, given the potential endogeneity of FI indicators. Poverty is the dependent variable, while FI is the primary explanatory variable, alongside socioeconomic and demographic controls that affect poverty.

First Stage (Reduced Form Equation - Linear Regression)

The relationship between FI and its determinants can be represented as follows. This stage explains the variation in financial inclusion (FI) using the instrumental variable (knowledge of financial services use - *finknowledge*) and other control variables (X_{ij}).

$$FI_j = F(finknowledge_j, X_{ij}, \varepsilon_j) \quad (1)$$

Where,

FI_j the financial inclusion score (continuous, 0 to 1) is the financial inclusion indicator,

finknowledge_j is knowledge of financial services use (categorical)

X_{ij} captures a set of control variables: household demography, resource endowment, access to institutions, etc.,

ε_j is an area or regional fixed effect.

Second Stage (Structural Equation - Probit Model)

The second stage estimates the causal impact of financial inclusion (FI) on poverty (Pov) using the predicted financial inclusion (FI_hat) from the first stage and other control variables (Xs).

$$P(h_j = 1|FI_j, X_{ij}) = G(\beta * FI_j, X_{ij}, \epsilon_j) \quad (2)$$

Where,

$$G(z) = \exp(z) / (1 + \exp(z))$$

$P(h_j = 1|FI_j, X_{ij})$ indicates the probability that poverty is 1 given financial inclusion and other central variables.

Since FI is potentially endogenous and poverty the second-stage (structural equation) dependent variable is binary, the IV-probit approach is used. In accordance with Section 3.3, we use “knowledge of financial service use” as an IV. Knowledge of financial services and product usage is considered an independent variable in the first stage of estimation, and a probit model is used to estimate the probability of poverty in the second stage.

The reduced form (1st stage) equation can be written as:

$$FI_i = \sigma_0 + \sigma_1 Knfsuse_i + \sigma_2 Age_i + \sigma_3 Hhsiz_i + \sigma_4 Hhsiz^2_i + \sigma_5 Gender_i + \sigma_6 Residence_i + \sigma_7 Edu_i + \sigma_8 Marital_i + \sigma_9 Reg_i + \lambda_i \quad (3)$$

Second stage Structural equation

$$P(h_j = 1 | FI_j, X_{ij}) = \exp(z) / (1 + \exp(z)) \quad (4)$$

Were,

$$Z = \beta_0 + \beta_1 FI_i + \beta_2 age_i + \beta_3 hhsiz_i + \beta_4 hhsizsq_i + \beta_5 female_i + \beta_6 rural_i + \beta_7 educ_i + \beta_8 married_i + \beta_9 region_i + \lambda_i \quad (5)$$

Second stage equation expanded from the first stage:

$$\Pr(PVT_i = 1 | X_i) = \Phi(\beta_0 + \beta_1 \widehat{FI}_i + \beta_2 Ag_i + \beta_3 Hhsiz_i + \beta_4 Hhsiz^2_i + \beta_5 Gender_i + \beta_6 Residence_i + \beta_7 Edu_i + \beta_8 Marital_i + \beta_9 Reg_i) \quad (6)$$

where $\Phi(\cdot)$ represents the cumulative distribution function (CDF) of the standard normal distribution.

3.4.2. Supplementary specification: Decomposed FI components

In addition to the main IV-probit specification above, we separately assess the individual (decomposed) FI components, such as mobile banking, bank account ownership, and ATM use, each of which is an inherently binary usage indicator, using a standard, non-instrumented probit model. This is necessary because valid, separate instruments could not be identified for each individual component. Because endogeneity is not addressed in this specification, its results (reported in Table 9) should be interpreted as descriptive/robustness evidence on the relative association of each FI component with poverty, and not as causal estimates in the same sense as the main IV-probit results in Table 6.

4. Results and Discussion

4.1. Summary of variables

The Financial Inclusion (FI) Index is built from nine binary component indicators, covering both access to and usage of financial services. Table 1 lists

each component, its description, the share of households reporting it, and whether it reflects access or usage dimension.

Table 1. Components of the Financial Inclusion Index

FI Component	Description	Proportion (%)	Dimension
ATM Banking	Access to ATM services	15	Access
Online Banking	Use of online banking	3	Usage
Mobile Banking	Use of mobile banking	6	Usage
Agent Banking	Access to agent banking	1	Access
Interest-Free Banking	Use of interest-free banking	6	Usage
Owns Account	Bank account ownership	46	Access
Credit Access	Access to credit facilities	12	Access
Remittance	Receipt of remittances	27	Usage
Savings	Regular savings	41	Usage
Insurance	Access to insurance services	36	Usage

Source: Own calculation using ESS round four data standard. ATM: Automated Teller Machine

Table 1 presents the FI Index as a raw count (0-9) of the nine categorical components a household uses; this count, divided by nine, is the continuous (0-1) index used as the endogenous regressor in the IV-probit specifications in Section 3.4.1 the same variable is never converted to a dummy at either scale. Account ownership stands at 46%, reflecting moderate formal inclusion. Savings (41%) and insurance (36%) show some engagement with formal systems, while remittances (27%) and credit access (12%) reveal gaps in investment-supporting products. Digital and modern banking remain marginal: ATM (15%), mobile (6%), interest-free (6%), online (3%), and agent banking (1%). Components are classified by dimension of use (savings, remittances, insurance, mobile, online, interest-free banking) and by access (account ownership, credit, ATM, agent banking), distinguishing availability from active participation to provide a more nuanced picture of financial inclusion.

We retain agent banking (1%), online banking (3%), and mobile/interest-free banking (6% each) in the composite FI Index for completeness, since dropping them would require re-estimating every downstream model; we note their limited variation here as a caveat for interpretation, and flag a sensitivity analysis excluding them as a natural extension for future work.

4.2. Measurement of the FI index

The FI index is computed for poor and non-poor households by counting the number of financial services used from an affordable list, categorized into access and usage dimensions consistent with Sarma (2008) and Demirguc-Kunt and Klapper (2012), who define FI as access to and utilization of a limited range of financial services. Figure 2 illustrates component-level differences between the two groups prior to normalization.

Table 2: Two-Sample t-Test of the Financial Inclusion Index by Poverty Status

Group	Obs	Mean	Std. err.	Std. dev.	[95% conf. interval]	
Non poor	4,946	2.214	0.026	1.835	2.162	2.264
Poor	1,733	0.888	0.027	1.125	.835	.941
Combined	6,679	1.870	0.022	1.777	1.827	1.912
diff		1.326	0.047		1.233	1.417
diff = mean(Non poor) - mean(Poor)					t = 28.2721	
					Degrees of freedom = 6677	
H0: diff = 0						
Ha: diff < 0 Ha: diff != 0					Ha: diff > 0	
Pr(T < t) = 1.0000					Pr (T > t) =	
Pr(T > t) = 0.0000					0.0000	

Source: Authors' computation

A t-test confirms a statistically significant difference in FI between groups. Non-poor households report a substantially higher mean FI index (2.21) than poor households (0.89), a difference of 1.32. The large t-statistic ($t = 28.27$, $p < 0.01$) confirms this is not attributable to chance, reflecting systematic disparities in access and usage. These findings underscore the need for targeted policies to improve financial inclusion among poor households, thereby helping reduce poverty and promote equitable access to financial services.

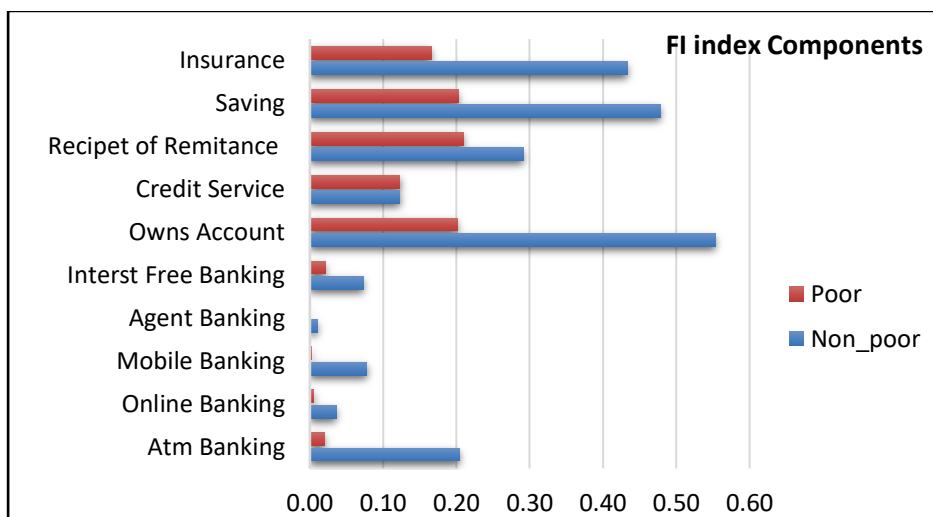


Figure 2: Financial inclusion indicators among poor and non-poor households

Source: Authors' computation

4.3. Estimating the poverty head count index

Poverty data for this study are drawn from the aggregate consumption dataset of the 2018-19 socioeconomic survey (ESS round four). We adopted the Ministry of Finance (MoF) national poverty line, estimated from the HICE survey conducted by the Central Statistics Agency and adjusted for inflation to the 2018-19 level, with consumption measured in adult-equivalent terms. Applying this line to the ESS consumption data yields the headcount index the share of individuals whose annual per capita consumption falls below the poverty threshold. Full methodological details are provided in Table A2; we acknowledge the limitations of externally estimated poverty lines and recommend future studies adopt independent methods.

4.4. Summary statistics

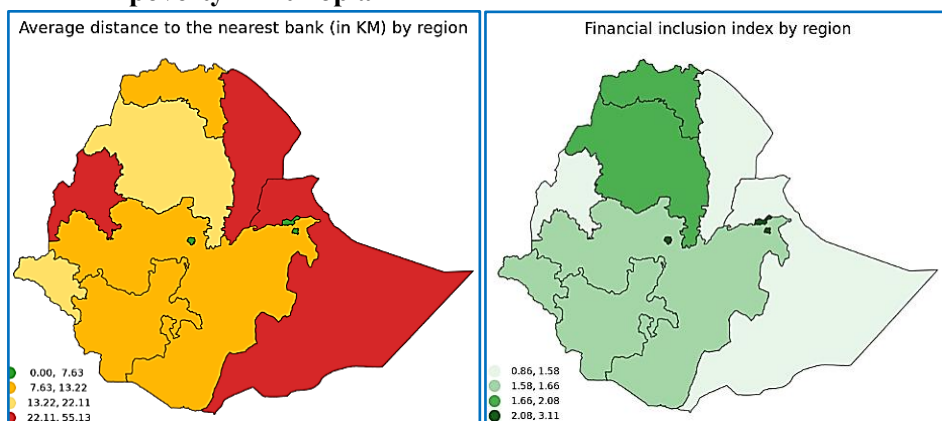
This study revealed that Ethiopia's updated poverty rate is approximately 25.9 percent. Poverty appears to be more prevalent in rural areas than in urban areas, with 48 percent of rural residents living in poverty compared to 14 percent of urban residents. Likewise, households headed by women are less prosperous than those headed by men (Annex 1).

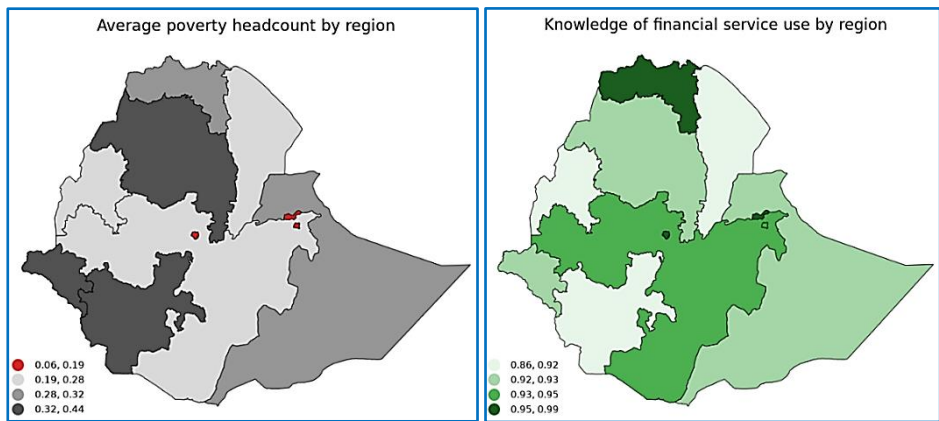
The ownership disparity is approximately 48% for male-headed households and 40% for female-headed households. The location also revealed a significant difference: rural households owned accounts at a rate of 21%, while urban households did so at 66%, indicating a 45-percentage-point gap in urban areas, likely due to factors such as affordability and the accessibility of financial institutions and products. Female-headed households receive more remittances than male-headed households. As expected, urban households receive more remittances than their rural counterparts. In addition to owning insurance policies, families headed by men are more likely to save money and to have bank accounts, but they receive fewer remittances.

4.5. Characteristics of selected indicators across regions

Figure 3 illustrates regional variation in financial access, financial inclusion, financial knowledge, and poverty headcount across Ethiopia. Significant disparities are evident, with households in Afar and Somali traveling approximately 2.48 km and 2.80 km, respectively, to reach formal financial institutions, compared with only 0.50 km in Addis Ababa and 0.77 km in Dire Dawa. Financial inclusion, measured by the number of financial products used, is higher in more urbanized regions, including Harari, Addis Ababa, Dire Dawa, Amhara, and Tigray. These regional differences in financial access and knowledge provide descriptive support for the IV-Probit identification strategy.

Figure 3: Regional variation in financial access, inclusion, knowledge, and poverty in Ethiopia





Authors' computation

The regional correlations among the three indicators reveal a consistent pattern: regions with greater average distance to financial institutions tend to exhibit lower levels of financial inclusion and higher poverty incidence. This suggests that geographical barriers to financial access and limited participation in formal financial services are closely associated with household vulnerability to poverty.

Table 3: Descriptive statistics of household characteristics and financial inclusion indicators

Variable	Mean	Std. Dev.	Min	Max
Poverty incidence	0.259	0.383	0	1
Account ownership	0.457	0.498	0	1
Access to credit	0.121	0.326	0	1
Remittance	0.266	0.442	0	1
Savings	0.405	0.491	0	1
Insurance	0.359	0.48	0	1
Household size	4.238	2.289		
Education (years)	1.206	3.168		
Land size (hectares)	0.197	0.699		
Livestock holdings	1.427	1.654		

Authors' computation

Table 3 presents descriptive statistics for the main variables used in the analysis. Approximately 25.9 percent of households are classified as poor. Financial inclusion remains limited, with 45.7 percent of households reporting ownership of a formal account, 40.5 percent reporting savings, and only 12.1 percent having access to formal credit. Insurance coverage is also relatively low, with approximately 35.9 percent of households reporting access to insurance services. The average household consists of 4.2 members, while household heads have, on average, only 1.2 years of formal education, reflecting the relatively low educational attainment of the study population.

Table 4: Household characteristics and financial inclusion by gender and residence

Variable	Full sample	Male-headed	Female-headed	Rural	Urban
Poverty	0.259	0.305	0.267	0.48	0.14
Account ownership	0.457	0.481	0.406	0.21	0.66
Credit access	0.121	0.124	0.115	0.13	0.12
Remittance	0.266	0.225	0.358	0.24	0.29
Savings	0.405	0.436	0.333	0.22	0.55
Insurance	0.359	0.401	0.268	0.18	0.5

Authors' computation

Table 4 highlights important differences in financial inclusion and poverty outcomes across gender and residence categories (Table A3). Urban households exhibit substantially higher ownership of formal bank accounts than rural households (66 percent compared with 21 percent), indicating persistent geographical disparities in access to formal financial services. In contrast, rural households report slightly higher access to credit and remittance receipt, although these differences are relatively small. Savings and insurance participation remain considerably higher among urban households.

Poverty incidence varies substantially by location. Nearly half of rural households are classified as poor compared with only 14 percent of urban households. These differences suggest that geographical constraints remain an important dimension of economic vulnerability.

Gender differences are also evident. Male-headed households report higher levels of account ownership, savings, and insurance coverage than female-

headed households, whereas female-headed households have higher participation in receiving remittances. These patterns indicate persistent gender differences in access to and utilization of formal financial services.

Table 5: Descriptive statistics of household characteristics and financial inclusion indicators by gender and residence

Variable	Full		Gender				Location			
			Male		Female		Rural		Urban	
	Mean	Std.Dev	Mean	Std.Dev.	Mean	Std.Dev	Mean	Std.Dev	Mean	Std.Dev
Poverty	0.259	0.383	0.305	0.460	0.267	0.443	0.48	0.50	0.14	0.34
Account ownership	0.457	0.498	0.481	0.500	0.406	0.491	0.21	0.41	0.66	0.47
Access to credit	0.121	0.326	0.124	0.329	0.115	0.319	0.13	0.33	0.12	0.32
Remittance	0.266	0.442	0.225	0.417	0.358	0.480	0.24	0.43	0.29	0.45
Saving	0.405	0.491	0.436	0.496	0.333	0.471	0.22	0.41	0.55	0.50
Insurance	0.359	0.48	0.401	0.490	0.268	0.443	0.18	0.39	0.50	0.50
Gender	1.318	0.466					1.27	0.44	1.36	0.48
Age of household head	42.188	15.122	41.9	14.6	42.9	16.2	44.44	15.38	40.31	14.65
Education in years	1.206	3.168	1.2	3.2	1.2	3.2	0.32	1.45	1.99	3.97
Married	0.667	0.471	0.840	0.367	0.296	0.457	0.73	0.44	0.61	0.49
Household size	4.238	2.289	4.626	2.291	3.408	2.053	4.79	2.29	3.78	2.18
Access to Radio & TV	0.459	0.498	0.476	0.499	0.421	0.494	0.23	0.42	0.65	0.48
Agriculture sector	0.85	0.357	0.860	0.347	0.827	0.378	0.98	0.15	0.74	0.44
Residence	0.455	0.498	0.489	0.500	0.381	0.486				
weekly market access	0.678	0.467	0.667	0.471	0.701	0.458	0.55	0.50	0.78	0.41
Land area in hectare	0.197	0.699	0.206	0.716	0.165	0.631	0.16	0.61	0.22	0.75
livestock	1.427	1.654	1.631	1.717	0.953	1.396	2.50	1.52	0.51	1.13

Authors' computation

Table 5 presents descriptive statistics of household characteristics and financial inclusion indicators by gender and location. The results show substantial differences in financial inclusion and poverty outcomes across household groups. Urban households have considerably higher access to formal financial services, with higher rates of account ownership (66 percent), savings (55 percent), and insurance coverage (50 percent) compared with rural households. In contrast, rural households experience a higher poverty incidence (48 percent) compared with urban households (14 percent). Gender differences are also evident: male-headed households report higher levels of account ownership, savings, and insurance coverage, while female-headed households have higher rates of remittance receipt. Male-headed households are also more likely to be married and have larger household sizes, whereas urban households have higher education levels and greater access to communication services.

4.6. Econometric results

Before examining the effect of FI on poverty reduction, we conducted weak-instrument and endogeneity tests (Table A4), which confirmed endogeneity at the 5% level. Thus, rejection of the null hypothesis of endogeneity supports the incompatibility of the standard Probit model for analyzing the effect of FI on poverty reduction. Compared with the simple Probit model used to examine FI's role in reducing poverty in Ethiopia, the IV-Probit model shows that the standard Probit substantially underestimates the impact of FI. Moreover, all F-statistics exceed 10, indicating an issue with instrument reliability (Balanay et al., 2014).

Consistent with the literature, when a household is financially included, its likelihood of being poor decreases by about 33.6%, showing that households benefit from FI expansion (Swamy, 2014; Demirgüç-Kunt et al., 2018). In line with Alemu (2006), the results highlight the importance of demand- and supply-side constraints on digital payment services in Ethiopia and show that distance from financial institutions substantially affects the FI-poverty relationship. The findings are consistent with financial development theories and the Maya Declaration of 2010 (King and Levine, 1993; Pazarbasioglu et al., 2020): improved FI strengthens household business capacity, increases income and consumption, and helps households escape poverty. Education is another channel: skilled household heads are 1% more likely to be poor than uneducated counterparts, and larger households (particularly with more employed members) see poverty probability decline by about 15%.

Table 6: IV probit regression of the effect (ME) of FI on poverty

Variables	(1) Probit	(2) IV Probit
FI Index	-0.22*** (-0.02)	-0.336*** (-0.06)
Gender (1 if female, otherwise 0)	0.15** (-0.05)	-0.17** (-0.08)
Age of HH head	0.03*** (-0.01)	0.03*** (-0.01)
Age of HH head Squared	-0.00*** (-0.00)	-0.00*** (0.00)
household head education (in years)	-0.05*** (-0.01)	0.01 (-0.01)
Married (no=0; yes=1)	-0.04 (-0.05)	-0.05 (-0.05)
Household size	0.23*** (-0.01)	0.15*** (-0.03)
Access to Radio & Television	-0.40*** (-0.05)	0.05 (-0.12)
Agriculture sector	0.31 (-0.09)	-0.13 (-0.08)
Rural (urban=0; rural=1)	0.51*** (-0.05)	0.05 (-0.12)
weekly market access	-0.01 (-0.04)	0.08* (-0.04)
Land area in hectare	0.02 (-0.03)	0.03 (-0.02)
Livestock	-0.04** (-0.02)	-0.05*** (-0.01)
Regional Dummy	Yes	yes
Chi2 statistic	LR chi2(23) = 2107.81***	Wald chi2(23) = 2849.48***

Instrumented: FI index Instrument: Knowledge of Financial Service Use
Robust standard errors in parentheses *, ** and *** level of significance at 10%, 5% and 1 respectively
IV Probit: Instrumental Variable Probit

Source: Authors' estimates

A robustness check confirms consistency with prior studies: applying our identification strategy to MHHs, FHHs, and rural/urban samples, financial inclusion significantly reduces poverty across all estimation methods. We also test robustness using individual FI components (e.g., bank account, internet banking, ATM use) against poverty (see Table 9).

4.6.1. *Heterogeneity analysis*

In the previous section, it has been shown that FI can reduce poverty in Ethiopia. In the following section, we conducted an analysis of heterogeneity by comparing the impact of FI indexes on rural and urban male-headed households (MHH) and Female-headed households (FHH). Tables 7 and 8 show the results.

4.6.2. Gender gap

In developing nations, FHHs are generally believed to be more financially excluded than MHHs. With FI instrumented by knowledge of financial service use, the poverty-reducing effect is statistically significant for male-headed households (-0.45, $p < 0.01$, $N = 4,225$) but not for female-headed households (-0.14, $N = 1,891$). A two-sample test of equality between the two coefficients does not reject the null hypothesis ($z = -1.41$, $p = 0.16$), so this gender difference is not statistically robust and likely reflects the smaller female-headed subsample rather than a genuine gap; we report the pooled estimate as the primary finding.

Table 7: Role of FI on poverty in FHH and MHH – IV probit and probit estimations

Variables	Male		Female	
	(1) Probit	(2) IV Probit	(3) Probit	(4) IV Probit
FI Index	-0.37*** (-0.03)	-0.45*** (-0.10)	-0.38*** (-0.06)	-0.14 (-0.19)
Age of household head	0.03** (-0.02)	0.02** (-0.01)	0.11*** (-0.02)	0.05*** (-0.01)
Age of household head squared	-0.00* (0.00)	-0.00** (0.00)	-0.00*** (0.00)	-0.00*** (0.00)
Education in years	-0.08*** (-0.03)	-0.02 (-0.02)	-0.12*** (-0.04)	-0.07** (-0.03)
Married (no=0; yes=1)	0.08 (-0.13)	-0.04 (-0.08)	-0.22 (-0.15)	-0.12 (-0.09)
Household size	0.37*** (-0.02)	0.19*** (-0.02)	0.48*** (-0.04)	0.29*** (-0.02)
Access to radio & TV	-0.62*** (-0.1)	-0.12 (-0.13)	-1.09*** (-0.17)	-0.65*** (-0.17)
Sector (Agriculture=1; other=0)	0.38* (-0.21)	0.01 (-0.12)	0.00 (-0.25)	0.00 (-0.17)
Residence (1 if Rural, otherwise 0)	0.83*** (-0.12)	0.26* (-0.15)	0.94*** (-0.16)	0.59*** (-0.12)
Access to the weekly market	0.02 (-0.09)	0.05 (-0.06)	-0.08 (-0.14)	-0.00 (-0.09)
Area of land in ha	0.05 (-0.06)	0.01 (-0.03)	0.08 (-0.09)	0.01 (-0.06)
livestock	-0.05 (-0.03)	-0.05** (-0.02)	-0.11** (-0.05)	-0.06* (-0.03)
Region (Base=Tigray)				
Other ten regional dummies	Yes	Yes	Yes	Yes
Knowledge of financial service use		0.78*** (-0.11)		0.57*** (-0.10)
Observations	4263	4225	4263	1891

*Robust standard errors in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively. Instrumented: FI index; Instrument: Knowledge of financial service use (IV Probit specifications only)*

4.6.3. Does where households live affect how financial inclusion helps reduce poverty?

Formal financial services are more accessible in Ethiopia's urban areas. We estimate separate IV Probit models to examine whether the poverty-reducing effect of financial inclusion differs by household location. Financial inclusion significantly reduces poverty among urban households (-0.42, $p < 0.01$, $N = 3,265$), whereas the effect in rural households is negative but insignificant (-0.16, $N = 2,851$). However, the equality test does not reject the null hypothesis of no difference between the two coefficients ($z = -1.17$, $p = 0.24$). Thus, there is no statistically significant evidence of location-based heterogeneity, and the pooled estimate remains the main finding.

Table 8: Probit estimations of the impact of poverty in rural and urban households

Variables	Rural households		Urban households	
	(1) Probit	(2) IV Probit	(3) Probit	(4) IV Probit
FI Index	-0.28*** (-0.04)	-0.16 (-0.20)	-0.47*** (-0.05)	-0.42*** (-0.10)
Age of household head	0.05** (-0.02)	0.02** (-0.01)	0.08** (-0.02)	0.04*** (-0.01)
Age of household head squared	-0.00* (0.00)	-0.00* (0.00)	-0.00* (0.00)	-0.00*** (0.00)
Education in years	-0.09** (-0.04)	-0.08** (-0.03)	-0.09*** (-0.03)	-0.02 (-0.02)
Married (no=0; yes=1)	-0.14 (-0.12)	-0.07 (-0.08)	-0.12 (-0.16)	0.01 (-0.09)
Household size	0.42*** (-0.03)	0.25*** (-0.02)	0.37*** (-0.03)	0.20*** (-0.02)
Access to radio and TV	-0.50*** (-0.11)	-0.29** (-0.14)	-0.19*** (-0.14)	-0.39** (-0.15)
Sector (Agriculture=1; other=0)	0.82* (-0.25)	0.46* (-0.23)	0.08* (-0.19)	-0.16 (-0.11)
Access to a weekly market	0.02 (-0.09)	-0.01 (-0.06)	0.14 (-0.16)	0.12 (-0.09)
Area of land in ha	-0.12 (-0.08)	-0.08* (-0.05)	-0.18 (-0.06)	0.05 (-0.04)
livestock	-0.13 (-0.04)	-0.08*** (-0.02)	-0.03 (-0.05)	0.01 (-0.03)
Region (Base=Tigray) Other ten regional dummies	Yes	Yes	Yes	Yes
Knowledge of financial service use		0.44*** (-0.07)		1.12*** (-0.15)
Observation	3311	2851	3311	3265

Source: Author's computation

4.6.4. FI indicators and poverty in Ethiopia

This study examines the relationship between FI indicators, mobile banking, formal bank accounts, credit access, remittances, and poverty. FI facilitates access to financial resources that support long-term investment and consumption decisions, helping households participate in productive economic activities and informing the design of anti-poverty programs (Park and Mercado, 2015). Consistent with Suri and Jack (2016), mobile banking ownership, bank account ownership, and remittances are all significantly associated with a lower likelihood of poverty.

Female-headed, larger, and rural households are more likely to experience poverty, reflecting structural disparities in access to economic opportunities. Education reduces the probability of poverty, and married household heads benefit from shared economic resources. Access to credit shows no significant effect, while remittances, mobile banking, and formal bank account ownership significantly reduce poverty risk. These results support targeted policy interventions on financial inclusion, education, and gender/rural-urban disparities.

Table 9: Results from regression on the effects of FI indicators on poverty

Poverty	ME	Std. Err.
Mobile Banking ownership	-0.269***	0.067
Bank Account Ownership	-0.13***	0.012
Access to Credit	-0.015	0.015
Receipt of Remittance	-0.056***	0.012
Age of HH head	0.001**	0
HH Size	0.113***	0.007
HH Size Square	-0.005***	0.001
Gender	0.058***	0.014
Residence	0.101***	0.013
Education in years	-0.015***	0.003
Marital status	-0.028*	0.014
Region (Base=Tigray)		
Observation	6130	
LR chi2(22)	2148.03	
Prob>chi2	0	
Pseudo R2	0.2869	

Source: Author's computation

5. Conclusion and Recommendations

Financial inclusion has recently emerged as a key pillar for economic development, aiming to reduce income disparities and poverty through access, usage, infrastructure, and affordability. Using round-four Ethiopian socioeconomic survey data, we employed an instrumental-variable probit model, instrumented with knowledge of financial service use, to examine how the FI index affects poverty. According to our findings, Ethiopia, like other African developing countries, has a low level of FI. Increasing access to formal financial institutions and making financial regulations more affordable can help people escape poverty: FI has the potential to reduce poverty by approximately 33.6% across the population. Male-headed and urban households show a statistically significant effect individually, while female-headed and rural households do not; a formal test of the difference between subgroups ($z=-1.41$ for gender, $z=-1.17$ for location) does not reject equality in either case, so we treat the population-wide effect, rather than subgroup comparisons, as the paper's robust finding. Greater financial inclusion strengthens the productive assets of disadvantaged households and boosts entrepreneurial activity, thereby justifying the National Bank of Ethiopia's financial inclusion strategy. Given that FI is one of the policy pillars for reducing inequality, government efforts should prioritize removing barriers that prevent communities from adopting financial products, including integrating them with digital applications such as mobile banking.

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Appendix

Table A1: Average distance to the nearest commercial bank across regional states

Region	Mean	Std. Err.	[95%_Conf	Interval]
TIGRAY	1.547032	.0549921	1.43923	1.654834
AFAR	2.48744	.0778287	2.334872	2.640009
AMHARA	2.238503	.053491	2.133644	2.343362
OROMIA	1.478664	.0516118	1.377489	1.57984
SOMALI	2.804146	.0790735	2.649137	2.959155
BENISHANGUL	2.290993	.0799446	2.134277	2.44771
SNNP	2.049175	.0487505	1.953608	2.144741
GAMBELA	1.479003	.0748144	1.332343	1.625663
HARAR	1.052589	.0409231	.9723672	1.132812
ADDIS ABABA	0		(omitted)	
DIREDEWA	.771998	.0558038	.6626049	.881391

Table A2: Poverty headcount calculation

Year	CPI	Based on the annual baseline	2018/19 baseline			2015/16	2018/19
2009/10	42.9	43.4	29.7	Inflation	Poverty line	3,781	5,515.49
2010/11	59.2	59.8	41.0	38.0	Absolute Poverty line	7,178	10,470.82
2011/12	71.5	72.3	49.6	20.8			
2012/13	76.8	77.6	53.2	7.4			
2013/14	83.3	84.2	57.7	8.5			
2014/15	92.0	93.0	63.8	10.4			
2015/16	98.9	100.0	68.6	7.5			
2016/17	107.2	108.4	74.3	8.4			
2017/18	125.2	126.5	86.7	16.8			
2018/19	144.3	145.9	100.0	15.3			
2019/20	175.8	177.7	121.8	21.8			

Source: Own computation

Table A3: Chi-square test of the financial inclusion index by location

FI index	Urban	Rural	Total
0	575	1,350	1,925
1	605	895	1,500
2	626	406	1,032
3	695	229	924
4	608	102	710
5	302	43	345
6	142	10	152
7	57	3	60
8	24	0	24
9	6	1	7
Total	3,640	3,039	6,679
Pearson $\chi^2(9) = 1,400$			Pr = 0.000

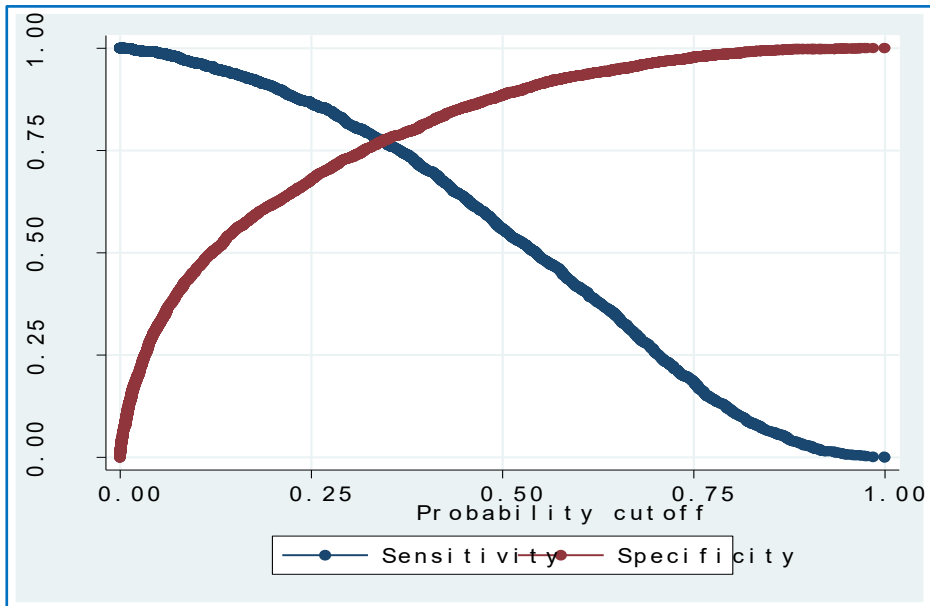
Figure A1: Sensitivity analysis

Table A4: Endogeneity tests

	1	2	3
	Ownership of Bank Account	Ownership of Mobile Banking	ATM Banking
Poverty			
Gender (1 if female)	0.24*** (0.06)	0.25*** (0.05)	0.21*** (0.06)
Age_ head of HH	0.01*** (0.00)	0.01*** (0.00)	0.01*** (0.00)
Education_ head of HH (in years)	-0.04*** (0.01)	-0.04*** (0.01)	-0.03*** (0.01)
Married (no=0; Yes=1)	0.02 (0.06)	0.02 (0.06)	0.01 (0.06)
Household size	0.25*** (0.01)	0.24*** (0.01)	0.24*** (0.01)
Agriculture sector	0.10 (0.09)	0.08 (0.09)	0.07 (0.09)
Residence (1 if Rural, otherwise 0)	0.31*** (0.06)	0.31*** (0.06)	0.29*** (0.06)
Weekly market access	-0.06 (0.04)	-0.06 (0.04)	-0.06 (0.04)
Land area in hectare	-0.01 (0.03)	-0.00 (0.03)	-0.01 (0.03)
Livestock	-0.09*** (0.02)	-0.09*** (0.02)	-0.09*** (0.02)
Asset Index	-0.26*** (0.02)	-0.27*** (0.02)	-0.26*** (0.02)
Regional Dummy	Yes	Yes	Yes
Ownership of Bank Account	-0.12 (0.13)		
Fowns	-0.11** (0.06)		
Ownership of Mobile Banking		-0.70* (0.36)	
Fmobank		-0.05 (0.06)	
ATM banking			-0.68*** (0.19)
Fatmbank			0.06 (0.05)
_cons	-2.21*** (0.21)	-2.24*** (0.17)	-2.07*** (0.18)
N	6116.00	6116.00	6116.00

Standard errors in parentheses

Source: own calculation using 2018/19 LSMS-ISA ESS data

*, ** and *** level of significance at 10%, 5% and 1 respectively