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Impact of financial inclusion on household welfare in Ethiopia

Mohammed Seid Hussen^{1*} and Mustafe Abdi Mohamed²

Abstract

Despite the overwhelming consensus on the positive effect of financial inclusion on economic outcomes, there is limited rigorous micro-econometric evidence on the causal impact of financial inclusion on household welfare in Ethiopia. This study uses the 2018 Ethiopian Socioeconomic Survey data and an endogenous switching regression model to investigate the determinants and the causal impact of financial inclusion on multiple measures of household welfare. The results suggest that households headed by older, more educated, wage or self-employed people in the non-agricultural sector are more likely to access financial services, as are those headed by non-Muslims. In addition, greater financial access appears to be associated with membership in a local social group (*iddir*), ownership of mobile phones, credit information, and knowledge of how to open bank accounts, but negatively associated with the distance from the household's residence to the nearest formal financial institution. This study further indicates that financial inclusion has a positive and statistically significant impact on multiple household welfare indicators. The most considerable impact of access to formal financial institutions is on utility spending, followed by total expenditure, food expenditure, and education spending. These findings thus suggest that policies geared toward improving household access to formal financial institutions are essential to enhance household welfare in Ethiopia.

Keywords Financial inclusion, Household welfare, ESR, Ethiopia

JEL Classification G21, G51, G53, I30

Introduction

Financial inclusion (FI) refers to the availability and efficient use of various suitable financial services by individuals and businesses. Although FI encompasses access, cost, and quality aspects, it starts with having a deposit or account at a bank or other financial institution or through a mobile money service provider [14]. FI has drawn more attention from researchers and development actors in the past 3 decades. Numerous studies have demonstrated that FI boosts national economic growth

and increases industry and firm productivity [10, 12]. It has also been shown to be linked to poverty reduction, as it enables poor people to move money over time and mitigate shocks, enhance their economic opportunities, and access to goods and services [1, 2, 26, 38, 41].

The literature in the field of finance and development suggests that FI has a positive impact on development outcomes; however, its empirical findings are disputed. For example, Banerjee et al. [7] used randomized control trials to find that access to microcredit programs did not significantly improve consumption and other human development outcomes such as health and education. Conversely, Koomson et al. [24] found that FI reduces households' likelihood of being poor and prevents households' exposure to future poverty. Similarly, Jawara [20] found that access to savings significantly increases household total spending, health spending, and ownership of durable assets. In a study of 130 economies from 1991 to

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2019, Magazzino and Santeramo [30] found that access to credit had a marginal impact on productivity in less developed countries. Therefore, the mixed evidence from previous studies implies that the effect of FI on development outcomes is ultimately an empirical question depending on many local contexts. Additionally, the literature has neglected its impact on other measures of household welfare such as investments in education and expenditure on utility, to name a few. In this regard, little empirical evidence has been generated to substantiate the possible relationship between FI and multiple measures of household welfare in African countries [20].

Ethiopia's financial sector has undergone several reforms in the last few decades. However, it is still in its infancy compared with the averages of sub-Saharan African economies and many other low-income economies. For example, according to the 2017 Global Findex database, only 35% of the population aged 15 years and over had accounts at formal financial institutions, whereas in Kenya, approximately 82% of adults have an account. In addition, around 70% of micro-enterprises and 40% of medium-sized enterprises are financially constrained [34]. The low level of FI restricts the opportunities for firms and savings options for the poor, making them more vulnerable to shocks.

Understanding the effect of access to finance on household welfare in the Ethiopian economy and the determinants of access to finance is essential to steer policy toward improving access to finance. This study examines the determinants and impact of FI on household welfare, including total spending, food spending, utility spending, and educational spending, using nationally representative survey data covering more than 6000 Ethiopian households. We used the 2018 Ethiopian Socioeconomic Survey (ESS) data as the main source for this study and employed an endogenous switching regression (ESR) model to investigate the causal impact of FI on multiple measures of household welfare.

The study results indicate that households headed by older, more educated, wage or self-employed individuals in the non-agricultural sector are more likely to get access to financial services, as are those headed by non-Muslims. In addition, greater financial access appears to be associated with membership to a local social group (*iddir*), ownership of mobile phones, credit information, and knowledge about opening bank accounts. Still, it is negatively associated with the distance from where the household lives to the nearest formal financial institution. This study further indicates that FI has a positive and statistically significant impact on household welfare. Utility spending has the most considerable impact on access to formal financial institutions, followed by education spending. These findings suggest that policies geared

toward improving household access to formal financial institutions are essential for enhancing household welfare in Ethiopia.

This study contributes to the literature in several ways. First, we provide an estimate of the causal impact of FI on household welfare in Ethiopia, which has limited rigorous evidence. Second, unlike previous studies that used propensity score matching (PSM), we used an ESR model that accounts for both observable and unobservable factors, providing a more accurate estimate of the causal impact of FI on household welfare. Third, we examined the impact of FI on different dimensions of household welfare, providing a more comprehensive understanding of the impact of FI on household welfare.

The rest of the article is organized as follows: the next section reviews the literature, “Data source and empirical methodology” section presents the data and description of the variables employed and the empirical strategy, “Results and discussion” section discusses the empirical results of the study, and the final section highlights the main conclusions and policy implications of the study.

Literature review

FI is defined as the availability of valuable and affordable financial products, such as transactions, payments, savings, credit, and insurance, to individuals and businesses that may not have previously had access to such services.¹ This concept emphasizes not only the overall depth of the financial system, or how much credit is pumped into the private sector by the financial industry, but also the actual access to financial products and services by a greater number of people and businesses. FI is essential for those who have traditionally been excluded from these systems, such as low-income populations or those living in remote or rural areas.

Although the past decade has seen a rapid increase in finance growth and poverty literature, there has been little agreement on the positive effects of financial sector development on growth and poverty. Several studies have shown that an efficient, well-functioning financial system is necessary for long-term economic growth. Using a sample of 80 countries from 1960 to 1989, King and Levine [23] concluded that financial development is strongly associated with real per capita GDP growth. A seminal study by Levine [25] also argued for the positive impact of various measures of financial development indicators on countries' economic growth. In the same vein, Beck and Levine [9] documented that stock markets and banks positively influence economic growth using a panel data set for the period 1976–98 and applying Generalized

¹ <https://www.worldbank.org/en/topic/financialinclusion>.

Method of Moments (GMM) techniques. Using the GMM approach for 29 sub-Saharan African countries from 1980 to 2014, Ibrahim and Alagidede [18] present the growth effect of financial development. Similarly, Asteriou and Spanos [4] found similar results in 26 European countries from 1990 to 2016. Other studies have indicated that financial development might promote economic growth but worsen income distribution if it only increases the income of the rich [5].

Studies have also shown that financial development is linked to poverty reduction. It enables poor people to move money over time, mitigate shocks, enhance economic opportunities, and access goods and services. In this regard, Beck et al. [8] find that 30% of the variation in rates of poverty reduction can be attributed to cross-country variation in financial development. In the same vein, N'dri and Kakinaka [36] find a significant role of FI in alleviating poverty in Burkina Faso. Inoue [19] also found a negative relationship between the poverty ratio and FI in India using panel data from 1973 to 2004. Dogan et al. [16] analyzed the impact of FI on energy poverty in Turkey. The empirical findings indicate that FI significantly reduces energy poverty, with its effects being more pronounced for female-headed households. They contend that FI affects energy poverty through important channels such as income and health. Using a larger dataset from India, Churchill and Marisetty [13] found that FI had a significant poverty-reducing effect. A study by Munyegera and Matsumoto [35] also indicates that FI—use of mobile money—significantly contributes to household welfare in Uganda. In a recent survey of the impact of access to formal savings by households in the Gambia, Jawara [20] finds that access to savings significantly increases total household spending, health spending, and ownership of durable assets.

Although the literature in the field of finance and development asserts that FI has a significant positive impact on development outcomes, its empirical findings are disputed because the relationship shows correlations, not causation [28]. For instance, a randomized control trial by Banerjee et al. [7] found that access to microcredit programs did not significantly boost consumption and other human development outcomes such as health and education. Similarly, Ozili [37] highlighted that FI contributes to poverty reduction when it is inclusive of women and the poor. A study by Manja and Badjie [31] showed that households were better off after accessing formal finance than before in terms of expenditures on non-food items and improvements in income. However, formal finance has no impact on food consumption, education expenditure, and subjective poverty at the 5% significance level.

Magazzino et al. [29] used an innovative artificial neural networks experiment to show that credit access is

more prominent for the Organization for Economic Cooperation and Development (OECD) countries and less important for countries with a lower level of economic development. The authors argued that credit access significantly affects production in developing countries, whereas in developed countries, it also impacts productivity. A recent study by Magazzino and Santeramo [30] also found that access to credit had a marginal impact on productivity in less developed countries.

In conclusion, the empirical evidence on the impact of FI on development outcomes is mixed. While some studies have found positive effects, others have found no effects or even negative effects. More research is needed to understand the causal relationship between FI and developmental outcomes.

Data source and empirical methodology

Data source and description of variables

The data source for this study is the Ethiopian Socioeconomic Survey (ESS), collected between September 2018 and August 2019 by the Central Statistics Agency of Ethiopia (CSA) in collaboration with the World Bank, using a multi-stage sampling design. In the first stage, 565 primary sampling units—CSA enumeration areas (EAs)—were selected based on probability proportional to each region's total number of EAs. In the second stage, 6700 households living in both rural and urban areas were selected from the EAs. Multiple questionnaires over multiple visits were used to collect various household demographic and socioeconomic variables, categorized as Agriculture, Household, and Community. The household questionnaire gathered information on education, health, FI, ownership of and user rights in assets, food and non-food expenditures, household non-farm activities and entrepreneurship, food security and shocks, safety nets, housing conditions, physical and financial assets, time use and labor, credit, tax and transfer, and other sources of household income.²

Table 1 presents the variable names, descriptions, and descriptive statistics for households with and without access to finance. Households with access to finance are characterized by larger per capita expenditures (total, food, education, and utility) than households without access to finance. They also tend to have higher ownership of mobile phones, a higher level of education, a lower age, and either wage or self-employment in non-agricultural sectors. In addition, male-headed households and households with married household heads are more likely to have access to finance. In contrast,

² Raw data is available online <https://microdata.worldbank.org/index.php/catalog/3823>.

Table 1 Variable names, descriptions, and descriptive statistics for those who have access and not. Source: Author's computation from ESS

Variable	Description of variable	Access to finance	No access to finance	Difference
Intot	The logarithm of annual total expenditure PAE	10.02	9.396	0.624***
Infod	The logarithm of annual expenditure on food PAE	9.662	9.18	0.482***
Ineduc	The logarithm of annual expenditure on education PAE	3.706	2.748	0.958***
Inutility	The logarithms of annual expenditure on utilities PAE	6.189	3.302	2.887***
Mobile_own	1 if owns a mobile phone, 0 otherwise	0.741	0.369	0.372***
educ	Highest level of education	1.954	0.467	1.487***
iddir ^a	1 if a member of iddir, 0 otherwise	0.47	0.431	0.039***
Marital	1 if married, 0 otherwise	0.683	0.705	-0.022*
Religion	1 if Muslim, 0 otherwise	0.245	0.485	-0.24***
Age	Age in years	39.33	44.72	-5.39***
Ag2	The square of the age	1.731	2.251	-520***
Gender	1 if male, 0 otherwise	0.721	0.651	0.07***
Hh_size	Household size	3.856	4.575	-0.719***
hh_size2	Household size square	19.51	26.43	-6.92***
Know_account	1 if the HH knows how to open a bank account, 0 otherwise	0.886	0.22	0.666***
wage_self	1 if wage or self-employed in non-agriculture, 0 otherwise	0.551	0.211	0.34***
credit_info	1 if the HH has information about credit, 0 otherwise	0.294	0.0581	0.235***
Urban	1 if the household is located in urban area, 0 otherwise	0.793	0.336	0.457***
Indis	The logarithms of the distance from where the household lives to the nearest formal financial institution	1.283	2.539	-1.256***
bank_com	1 if there is a formal bank in the community, 0 otherwise	0.642	0.225	0.417***
educ_com	the average highest educational qualification in the community	1.647	0.724	0.923***
Observation		3040	3615	

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

^a Iddir is defined as "An association made up by a group of persons united by ties of family and friendship, by living in the same district, by jobs, or by belonging to the same ethnic group, and has an object of providing mutual aid and financial assistance in certain circumstances ... In practice, the iddir is a sort of insurance program run by a community or a group to meet emergency situations." [32]

Muslim-headed households are less likely to have access to finance. As expected, knowledge of the household head about finance variables, such as the ability to open a bank account and having credit information, has a positive association with access to finance. Infrastructural variables such as the presence of banks in the community and living in urban areas have a positive association with access to finance, but the distance to the nearest formal financial institution has a negative relationship.

Empirical methodology

Investigating the impact of FI on household welfare is a complex task, as it requires constructing a counterfactual, which is a hypothetical scenario in which the financially included households had been excluded, and the excluded households had been included. Constructing a counterfactual is challenged by the potential presence of selection bias. Selection bias occurs when the financially included households differ systematically from the characteristics of the excluded households. These observed and unobserved factors can affect

households' access to finance and welfare. Therefore, it is necessary to take corrective measures to account for selection bias.

From a methodological point of view, the preferred approach to address this problem is to use a randomized control trial (RCT). RCTs have been used by several researchers, including Breza and Kinnan [11], Fink et al. [17], Meager [33], Banerjee et al. [7], Angelucci et al. [3], and Augsburg et al. [6]. In RCT, the researcher randomly assigns a certain percentage of eligible households as treatment, which allows them to participate in the program, while the remaining households are assigned to the control group. The difference in the outcome of households who received financial access and the control groups in the later stage represents the causal impact of access to finance on household welfare. Since RCT entirely removes selection bias through randomization, if the sampling techniques are appropriately carried out, it is considered to be a gold standard in empirical causal analysis. However, RCTs are also resource-intensive, practically, and sometimes politically infeasible [21].

Propensity score matching (PSM), proposed by Rosenbaum and Rubin [39], is the commonly used empirical strategy to address selection bias in nonrandomized observational studies. This approach matches treated groups (households who gain access to financial services) with similar observed characteristics to the untreated group based on the propensity score, and the differences in outcomes within pairs are calculated. PSM helps control for observed confounders that may affect the likelihood of gaining financial access and household welfare. However, PSM has some limitations. The major drawback is that it only accounts for observable factors that are known to the researcher, such as age, income, and educational status. Unobservable factors, which are known only to households, cannot be accounted for in this approach. If these unobservable factors are correlated to the error term, selection bias persists, and the PSM approach yields biased estimates of the causal impact of FI on household welfare.

The other empirical strategy to account for both observable and unobservable factors is to employ the endogenous switching regression (ESR) approach developed by Lokshin and Sajaia [27]. ESR deals with selection bias by modeling the specification in a two-stage and simultaneously estimating the probability of FI and household welfare using the full information maximum likelihood estimation method. In the first stage, the selection model for access to finance is modeled. Following recent studies in this realm, such as Dimova and Adebowale [15] and Jawara [20], household head's account ownership (*finance*) is defined as having an account at a bank, microfinance institution, Savings and Credit Cooperative Organization (SACCO), mobile money application (M-Birr and Hello Cash), or in any other formal financial institution is used as a proxy for FI. If the head of the household had an account in formal institutions, the household is considered as financially included. Let us assume f_i is a dichotomous variable that takes the value 1 if households get access to finance (*finance*), 0 otherwise.

$$f_i = \begin{cases} 1 & \text{if } f_i^* > 0 \\ 0 & \text{if } f_i^* \leq 0 \end{cases} \quad (1)$$

Thus, the household's decision to get access to financial services can be represented by the latent variable as follows:

$$f_i^* = \partial Z_i + \mu E_i + \varepsilon_i \quad (2)$$

Z_i is a vector of observable sets of variables that affect the decision to get access to finance. These variables include households' demographic and socioeconomic status, such as age, religion, marital status, education

level, etc., and other factors, such as geographical location (urban vs. rural). We assume that these observed factors influence both households' welfare and FI. E_i is the instrument variable: (i) the presence of a formal bank in the community. The survey asked community members whether a commercial bank was available in the community. An affirmative answer is coded as 1, 0 otherwise; (ii) the average highest educational qualification in the community and (iii) the distance from the household's home to the nearest formal financial institution. The selection of these instruments is guided by both economic theory and previous empirical studies [15, 24]. These instruments are significantly correlated with FI at less than 1% level but not with the outcome variables. ∂ and μ are vectors of parameters to be estimated. The significance and the sign of these parameters indicate the probability of household's access to finance.

The household faces two regimes, (1) get access to finance and (2) not access to finance. Thus, the outcomes (household welfare) are represented by a switching regime as follows:

$$\text{Regime 1 : } y_{i1} = \beta_1 X_{1i} + u_{1i} \quad \text{if } f_i = 1 \quad (3)$$

$$\text{Regime 2 : } y_{i0} = \beta_0 X_{0i} + u_{0i} \quad \text{if } f_i = 0 \quad (4)$$

y_{i1} is the finance level of household welfare for households who get access to finance in regime 1 and y_{i0} is the level of household welfare for households who didn't get access to regime 2. X_{1i} and X_{0i} are vectors of control variables for regimes one and two, which are assumed to be weakly exogenous. β_1 and β_0 are vectors of parameters to be estimated. u_{1i} and u_{0i} are the random disturbance terms.

The treatment effects of access to formal finance can be obtained by comparing the conditional expectations or expected outcomes of the treated and counterfactual scenario from the endogenous switching regression (Eqs. 3, 4). The conditional expectations are presented in Table 2.

Where ATT (average treatment on the treated) indicates the effect of getting financial access for the treated (a, b). ATU (average treatment on untreated) represents the effect of getting financial access for untreated (c, d). ATH is the transition heterogeneity and is calculated by differencing ATT on ATU. In doing so, we will assess whether the effect of getting financial access on household welfare is higher for households who have access or for households who did not get access than in the counterfactual case they had.

Table 2 Conditional expectation and treatment effect. *Source:* Author’s elaboration

Subsamples	Decision stage		Treatment effect
	Financial access	No financial access	
Households who got the finance	$E(y_{i1} f_i = 1)^a$	$E(y_{01} f_i = 1)^b$	ATT
households who didn’t get finance	$E(y_{i1} f_i = 0)^c$	$E(y_{i0} f_i = 0)^d$	ATU
Heterogeneous effect	$\emptyset H_1$	$\emptyset H_0$	ATH

^a Represents the conditional expectation of households who get access to finance (observed)

^b Represents the conditional expectation of households who get access to finance if they did not get finance (counterfactual)

^c It represents the conditional expectation of household who did not get access to finance if they did get finance (counterfactual)

^d Represents the conditional expectation of households who did not get access to finance (observed)

Following previous studies in this realm [20], household welfare is proxied by the following variables: total expenditure, education expenditure, food expenditure, and utility expenditure. Total expenditure is the sum of household spending on food and non-food. Education expenditure constitutes household spending on

education at all levels in the academic year preceding the survey. Utility expenditure captures household spending on utilities. All these variables are expressed in adult equivalent scales.

Results and discussion

Summary statistics of variables used in the analysis

Table 3 presents the descriptive statistics of variables used in the analysis. About half of the respondents live in urban areas, while 68% are male. The average age of the household head is 42.19 years, and about 70% of the respondents are married. About 45% of the respondents have an account in a formal financial institution or mobile money. The average household size is about 4.2, and approximately 44% of sample households are members of an *iddir*.

Table 3 Summary statistics. *Source:* Author’s computation from ESS

Variables	(1) N	(2) Mean	(3) SD	(4) Min	(5) Max
Urban	6678	0.545	0.498	0	1
Gender	6678	0.682	0.466	0	1
Age	6678	42.19	15.12	13	99
Religion	6675	0.375	0.484	0	1
Marital	6676	0.693	0.461	0	1
credit_info	6605	0.166	0.372	0	1
Finance	6655	0.457	0.498	0	1
Iddir	6656	0.449	0.497	0	1
know_account	6656	0.524	0.499	0	1
mobile_own	6677	0.539	0.499	0	1
hh_size	6678	4.239	2.289	1	19
educ	6675	1.146	1.566	0	6
Intot	6678	9.680	0.791	5.583	13.04
Lnfood	6678	9.401	0.834	0	13.02
Lneduc	6678	3.192	3.039	0	12.45
Lnutility	6678	4.620	3.110	0	10.75
Lndis	6656	1.965	1.419	0	6.399
ag2	6678	2009	1482	169	9801
educ_com	6678	1.146	0.924	0	4.600
hh_size2	6678	23.21	24.40	1	361
bank_com	6678	0.416	0.493	0	1
wage_self	6673	0.366	0.482	0	1

Estimation results

OLS and 2SLS

The estimation results of the impact of access to finance on household welfare start with OLS estimation, followed by two-stage least squares (2SLS) estimation. It is important to note that OLS estimation should not be relied upon to investigate the impact of finance on household welfare because the access to finance variable is endogenous. This means that it is correlated with the error term in the regression model, which violates one of the assumptions of classical OLS estimation. To confirm the endogeneity of the access to finance variable, we estimated an expenditure model as a function of the access to finance variable and other covariates. We then treated the access to finance variable as an endogenous variable and used household distance from the nearest bank, whether there is a bank in the community, and the average highest educational qualification in the community as additional instruments for the access to finance variable.

The estimation results of both OLS and 2SLS estimation are provided in Table 4. The Durbin and Wu–Hausman endogeneity tests are presented in the lower section

Table 4 Linear regression results. *Source:* Author’s computation from ESS

	Total expenditure		Food expenditure		Education expenditure		Utility expenditure	
	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS
Finance	0.16*** (0.02)	1.50*** (0.24)	0.12*** (0.02)	1.09*** (0.24)	0.26*** (0.09)	5.78*** (1.01)	0.35*** (0.07)	5.91*** (0.84)
mobile_own	0.16*** (0.02)	0.04 (0.03)	0.11*** (0.02)	0.02 (0.03)	0.19** (0.07)	−0.32** (0.13)	3.15*** (0.05)	2.65*** (0.11)
educ	0.08*** (0.01)	0.03** (0.01)	0.06*** (0.01)	0.03** (0.01)	0.28*** (0.03)	0.07 (0.05)	0.11*** (0.02)	−0.11** (0.04)
iddir	0.01 (0.02)	−0.05** (0.02)	−0.02 (0.02)	−0.06** (0.02)	0.51*** (0.07)	0.28*** (0.10)	0.22*** (0.05)	−0.02 (0.08)
Marital	0.00 (0.02)	0.02 (0.03)	−0.00 (0.02)	0.01 (0.03)	−0.28*** (0.09)	−0.19* (0.12)	0.00 (0.07)	0.09 (0.10)
Religion	0.20*** (0.02)	0.28*** (0.02)	0.21*** (0.02)	0.27*** (0.03)	−0.20*** (0.07)	0.14 (0.11)	0.48*** (0.05)	0.82*** (0.09)
Age	−0.01** (0.00)	−0.01*** (0.00)	−0.01** (0.00)	−0.01*** (0.00)	0.10*** (0.01)	0.08*** (0.02)	0.01 (0.01)	−0.01 (0.01)
ag2	0.00*** (0.00)	0.00*** (0.00)	0.00*** (0.00)	0.00*** (0.00)	−0.00*** (0.00)	−0.00*** (0.00)	−0.00 (0.00)	0.00 (0.00)
Gender	−0.01 (0.02)	−0.02 (0.03)	0.04 (0.02)	0.03 (0.03)	−0.74*** (0.09)	−0.77*** (0.11)	−0.24*** (0.06)	−0.27*** (0.09)
hh_size	−0.13*** (0.00)	−0.12*** (0.01)	−0.14*** (0.00)	−0.14*** (0.01)	0.56*** (0.02)	0.59*** (0.02)	−0.07*** (0.01)	−0.05*** (0.02)
know_account	0.11*** (0.02)	−0.51*** (0.11)	0.09*** (0.02)	−0.36*** (0.11)	0.42*** (0.09)	−2.14*** (0.48)	0.39*** (0.07)	−2.19*** (0.40)
credit_info	0.13*** (0.02)	0.04 (0.03)	0.09*** (0.03)	0.02 (0.03)	0.09 (0.10)	−0.27** (0.14)	0.12* (0.07)	−0.24** (0.11)
Urban	0.28*** (0.02)	0.12*** (0.04)	0.17*** (0.02)	0.06 (0.04)	0.87*** (0.08)	0.24 (0.15)	2.06*** (0.06)	1.42*** (0.13)
wage_self	0.05*** (0.02)	−0.06** (0.03)	0.05** (0.02)	−0.04 (0.03)	−0.07 (0.08)	−0.55*** (0.13)	0.24*** (0.05)	−0.25** (0.11)
_cons	9.76*** (0.06)	9.83*** (0.08)	9.68*** (0.07)	9.74*** (0.08)	−2.42*** (0.28)	−2.09*** (0.35)	1.01*** (0.20)	1.34*** (0.29)
N	6598	6598	6598	6598	6598	6598	6598	6598
R ²	0.427	0.082	0.305	0.140	0.248		0.632	0.247
Durbin (score) chi2		52.3***		20.7***		45.9***		91.1***
Wu–Hausman		52.6***		20.7***		46.2***		92.2***

Standard errors in parentheses

p* < .1, *p* < .05, ****p* < .01

of the table. As shown in the table, both test statistics are highly significant, so we reject the null of exogeneity, indicating that our prior expectation is correct and the access to finance variable is endogenous.

As shown in Table 4, the access to finance variable is significant and positive in both OLS and 2SLS estimations, implying that access to finance has a positive impact on household welfare. However, both OLS and 2SLS estimations are not ideal for this type of analysis

as discussed in the methodology sections. In our case, the preferred impact evaluation method is the endogenous switching regression. This method allows us to estimate the impact of access to finance on household welfare while accounting for the endogeneity of the access to finance variable. The endogenous switching model was estimated using the EndoSwitch package available in the R statistical software. The sections below discuss the estimation result using ESR.

Table 5 Full information maximum likelihood estimates of endogenous switching regression model. *Source:* Author's computation from ESS

	Selection	Adopters	Nonadopters
mobile_own	0.33*** (0.04)	0.08** (0.02)	0.13*** (0.02)
educ	0.12*** (0.02)	0.06*** (0.01)	0.05*** (0.01)
iddir	0.19*** (0.04)	-0.01 (0.02)	0.01 (0.02)
Marital	-0.03 (0.06)	0.05 (0.03)	0.09** (0.03)
Religion	-0.21*** (0.04)	0.12*** (0.02)	0.31*** (0.02)
Age	0.02* (0.01)	0.004 (0.004)	-0.01** (0.004)
ag2	-0.0001 (0.0001)	0.0001 (0.0001)	0.0001** (0.00001)
Gender	0.04 (0.05)	-0.003 (0.03)	-0.04 (0.03)
hh_size	-0.04 (0.03)	-0.28*** (0.02)	-0.22*** (0.02)
hh_size2	0.003 (0.003)	0.01*** (0.002)	0.01*** (0.0014)
know_account	1.35*** (0.05)	-0.10* (0.05)	-0.20*** (0.04)
credit_info	0.32*** (0.06)	0.10*** (0.02)	0.07 (0.05)
Urban	-0.02 (0.06)	0.30*** (0.03)	0.14*** (0.03)
wage_self	0.33*** (0.04)	-0.002 (0.02)	0.002 (0.03)
educ_com	0.23*** (0.03)		
bank_com	0.20*** (0.06)		
Indis	-0.09*** (0.02)		
Const	-1.86*** (0.18)	10.39*** (0.13)	9.98*** (-0.1)
SigmaX		-0.56*** (0.02)	-0.41*** (-0.02)
RhoX		0.44*** (0.08)	-0.74*** (-0.07)
Log likelihood	-8306.99		
AIC	16717.99		

Standard errors in parentheses

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

Since there is no significant difference in the estimation results of the first stage results of the endogenous switching regression, the probit results of total consumption per adult equivalent equation are presented here

Determinants of FI

Prior studies have identified several factors that determine FI, including age, gender, residence, education level, among others. To investigate the determinants of FI in Ethiopia, we estimated the first stage of the ESR model described by Eqs. 1 and 2. The estimation results are presented in column 1 of Table 5.

The estimated results are generally consistent with prior expectations. Mobile ownership, level of education, and membership to adder are all associated with increased access to finance. In contrast, age, self, or wage employment in the non-agriculture sector and higher levels of education are also positively correlated. Conversely, Muslim-headed households have lower access to finance, which may be due to religious reasons. Therefore, it is essential to promote Sharia-compliant financial institutions to increase access to finance for these households. Additionally, the positive relationship between the knowledge of the household head about opening a bank account and access to the household head about credit and access to finance indicates that financial literacy can improve awareness and generate demand for finance.

Relevant infrastructural variables are also positively related to access to finance. The presence of banks in the community and living in urban areas have a positive association, while households' distance to the nearest formal financial institution has a negative relationship. The relationship between the education level of the community and access to finance is also positive, implying that households located in an area where the average education level of the community is higher have a higher probability of accessing finance.

Column 2 and column 3 of Table 5 present the full information maximum likelihood estimates of the endogenous switching regression model. This model is used to estimate the coefficients of the explanatory variables in the sample, indicating heterogeneous effects. The observed household demographics, financial literacy, and household location (urban vs. rural) are significant determinants of the outcome variables (household welfare) for households with access to finance and households without access to finance. However, the effect of these explanatory variables on the outcome variable is not the same for both groups. For instance, marital status is a significant predictor for households with access to finance but not for households without. Similarly, credit information is not correlated to household welfare for households without access to finance, but it is significantly correlated to household welfare for households with access to finance. These findings suggest that different factors

Table 6 Endogenous switching regression-based treatment effect. *Source:* Author’s computation from ESS

	Y1 (Choose to adopt)	Y0 (Choose not to adopt)	Treatment effect	Label
<i>Total expenditure</i>				
A1 (Adopted)	10.02 (0.43)	9.13 (0.44)	0.89*** (0.002)	ATT
A0 (Not adopted)	9.95 (0.41)	9.39 (0.42)	0.56*** (0.002)	ATU
Heterogeneity Effect	0.06 (0.01)	−0.26 (0.01)	0.33*** (0.003)	ATH
<i>Food expenditure</i>				
A1 (Adopted)	9.66 (0.41)	8.94 (0.43)	0.72*** (0.001)	ATT
A0 (Not adopted)	9.88 (0.38)	9.18 (0.40)	0.70*** (0.002)	ATU
Heterogeneity Effect	−0.22 (0.001)	−0.24 (0.01)	0.02*** (0.003)	ATH
<i>Education expenditure</i>				
A1 (Adopted)	3.70 (1.70)	3.33 (1.47)	0.37*** (0.009)	ATT
A0 (Not adopted)	7.51 (1.61)	2.73 (1.39)	4.78*** (0.009)	ATU
Heterogeneity Effect	−3.81 (0.04)	0.60 (0.04)	−4.41*** (0.01)	ATH
<i>Utility expenditure</i>				
A1 (Adopted)	6.19 (1.61)	2.73 (2.06)	3.46*** (0.01)	ATT
A0 (Not adopted)	4.69 (1.77)	3.34 (2.27)	1.35*** (0.01)	ATU
Heterogeneity Effect	1.49 (0.04)	−0.61 (0.05)	2.1112** (0.02)	ATH

determine FI for households with and without access to finance. This has important implications for policymakers and financial institutions, as they need to tailor their interventions to the specific needs of each group.

Treatment effects

The estimation results of the treatment effect of the ESR model are presented in Table 6. The table shows the treatment effect for all expenditure types, as well as the average treatment effect on the treated (ATT) and the average treatment effect on the untreated (ATU).

The results demonstrate that access to finance statistically and significantly impacts household total expenditure per capita. Households with access to finance had an expected total expenditure per capita of 10.02, while households without access to finance had an expected

total expenditure per capita of 9.39. In the counterfactual case, households with access to finance would have obtained a total expenditure per capita of 9.13 had they not had access. Similarly, households without access to finance would have a total expenditure per capita of 9.95 had they had access to finance. This suggests that access to finance increases households’ total expenditure per capita by approximately 0.89 points for households with access to finance and about 0.56 points for households without access to finance.

The impact of access to finance on household food expenditure was also investigated. The estimation results showed that access to finance has a positive and statistically significant impact on household food expenditure per capita. Households with access to finance have an expected food expenditure per adult equivalent of 9.66, while households without access to finance have an expected food expenditure per adult equivalent of 9.18. In the counterfactual case, households with access to finance would have obtained food expenditure per capita of 8.94 had they not had access. This implies that households with access to finance spend an average of 0.72 points more per capita on food than households without access to finance.

The estimation results indicate a statistically significant and positive impact on households’ education expenditure. On average, households with access to finance have an expected education expenditure per adult equivalent of 3.70, while households without access to finance have an expected expenditure of 2.73. In the counterfactual case, households with access to finance would have an education expenditure per adult equivalent of 3.33 had they not had access to finance. This implies that access to finance increased households’ education expenditure per capita by 0.37 points. For households without access to finance, access to finance would have increased households’ education expenditure per adult equivalent by approximately 4.78 points.

The estimation results illustrated that access to finance also has a positive and statistically significant effect on household utility expenditure per capita. The expected utility expenditure per adult equivalent for households with access to finance is 6.19, while 3.34 for those without access. In the counterfactual case, households with access to finance would have obtained utility expenditure per capita of 2.73 had they not had access. This implies access to finance increased households’ utility expenditure per capita by 3.46 points for households with access to finance. In the counterfactual case, households without access to finance would have increased households’

utility expenditure per adult equivalent by about 1.35 points had they had access to finance.³

Discussions

The role of FI in economic development has been well documented in the literature. It has been argued that FI is a key driver of economic growth and poverty alleviation, with several positive impacts on household welfare. With access to financial services, households can start or expand businesses, invest in education or healthcare, or purchase a home, leading to improved income and living standards (see Khaki and Sangmi [22]). Despite the benefits of FI, some researchers debated its effectiveness in benefiting the poor. They have raised concerns about over-indebtedness resulting from households borrowing more than they can afford. A few studies have even challenged the impact of FI on household welfare (see Banerjee et al. [7]).

Prior studies on this topic mainly focused on developed and emerging countries and has limited implications for countries like Ethiopia. Against this backdrop, this study investigated the impact of FI on multiple indicators of household welfare in Ethiopia. The results suggest that FI has a significant positive impact on households' total expenditure, food expenditure, education expenditure, and utility expenditure. These findings are consistent with similar studies, such as Jawara [20], Manja and Badjie [31], and Salima et al. [40], which also reported a positive link between FI and total expenditure and food expenditure.

The study also found that access to finance allowed households to increase their food consumption, improving their dietary intake and quality of life. This finding contradicts Manja and Badjie's [31] study, which discovered that access to finance reduces food expenditure, especially for women in the Gambia. Furthermore, access to finance permits households to finance their children's education and purchase basic utilities such as water, electricity, and fuel, leading to increased utility expenditure. The positive relationship between FI and utility expenditure is consistent with prior studies and expectations.

In conclusion, the outcomes of the investigation suggest that access to formal financial institutions has a considerable positive influence on Ethiopian households' total expenditure per capita, food expenditure per capita, education expenditure per capita, and utility expenditure per capita. The largest impact of access to formal financial institutions was found to be on utility spending, followed by total expenditure, food expenditure, and education spending. This suggests that increasing access to formal financial institutions can have a positive effect on the welfare of households in Ethiopia, as access to

financial services can help households to manage their expenses better and allocate resources toward their basic needs, such as food and utilities, and also toward essential investments such as education.

Conclusions and policy implications

FI has gained more attention from development actors and researchers in the past 3 decades due to its importance in promoting economic growth and poverty alleviation. Several studies have shown that FI encourages economic growth at the national level, improves productivity across industries and businesses, and is associated with poverty alleviation. As a result, there is an increased focus on access to finance, and it is now included in at least 5 of the 17 Sustainable Development Goals (SDGs) set by the United Nations for 2030.

Although the finance and development literature also claims the positive impact of FI on development outcomes, their empirical results are contested on the ground that the relationship shows correlations, not causation. Moreover, the literature has neglected its impact on other household welfare measures such as education investments and expenditure on utility, to mention a few. Against this backdrop, this study attempts to examine the determinants and impact of FI on households' welfare, including total spending, food spending, utility spending, and education spending, using nationally representative survey data covering more than 6000 Ethiopian households. The study employed and ESR to account for both selection bias and heterogeneity.

The results of the study show that FI has a positive impact on household welfare. Households with access to FI have higher levels of total spending, food, utility, and education spending than households without access to FI. The study also finds that the largest impact of FI is on utility spending, followed by total expenditure.

We draw three important conclusions from the empirical exercise. First, FI is influenced by household characteristics, knowledge of banking, and infrastructure variables. Accordingly, households headed by older, more educated, wage or self-employed in the non-agriculture sector are more likely to access financial services, as are those headed by non-Muslims. In addition, greater financial access appears to be associated with membership to a local social group (*iddir*), ownership of mobile phones, credit information, and knowledge about opening bank accounts, but negatively associated with distance from where the household lives to the nearest formal financial institution. Second, FI has a positive and statistically significant impact on household welfare, underpinning the importance of FI and the need for its promotion in Ethiopia. Third, FI has a greater impact on utility spending,

³ See "Appendix" for robustness check.

followed by total spending and food spending. This suggests that FI has the potential to improve the overall welfare of households.

The policy implication of this study can be summarized as follows:

- *Financial sector reforms* Financial sector reforms should be implemented in Ethiopia in order to increase household access to formal financial institutions. This can be done by reducing the barriers to entry for financial institutions, increasing competition, and improving the regulatory environment.
- *Financial literacy* Financial literacy can be used to increase awareness and access to finance. The knowledge of the household head about opening a bank account is a significant predictor of access to finance. Therefore, governments and financial institutions should work to promote financial literacy among households.
- *Sharia-compliant financial institutions* Certain households may have a lower probability of accessing financial services, such as Muslim-headed households. This may be due to religious reasons. Therefore, it is vital to promote Sharia-compliant financial institutions to ensure that these households are able to access financial services.

The study has some limitations with regard to its definition of FI. The study defines FI as access to finance, but a broader definition would include the cost and quality of financial services. For example, if financial services are too expensive, households may be unable to afford them, even if they have access to them. Similarly, if financial services are of poor quality, households may be unable to use them effectively. In future research, exploring whether adopting a more comprehensive definition of FI would lead to different conclusions would be worthwhile. Therefore, future studies should explore the topic by using a broader definition of FI and comparing its findings with those of the current study.

Appendix: Robustness checks using PSM

The table below provides the impact estimates using PSM approaches.

Outcome variable	Impact estimate (ATET)
Total expenditure	0.16***
Food expenditure	0.15***
Education expenditure	0.58
Utility expenditure	0.27***

Abbreviations

2SLS	Two stage least square
ATT	Average treatment on the treated
ATU	Average treatment on untreated
CSA	Central Statistics Agency of Ethiopia
Eas	Enumeration areas
ESR	Endogenous switching regression
ESS	Ethiopian Socioeconomic Survey
FI	Financial inclusion
GMM	Generalized method of moments
GMM	Middle East and North Africa
OLS	Ordinary least square
PSM	Propensity score matching
RCTs	Randomized control trials
SACCOs	Savings and Credit Cooperative Organizations
SDGs	Sustainable Development Goals

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Author contributions

MS conceptualized the paper, did the analysis, and draft the article. MA wrote the introduction, literature review, and critical revised the article.

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Consent for publication

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The authors declare that they have no competing interests.

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