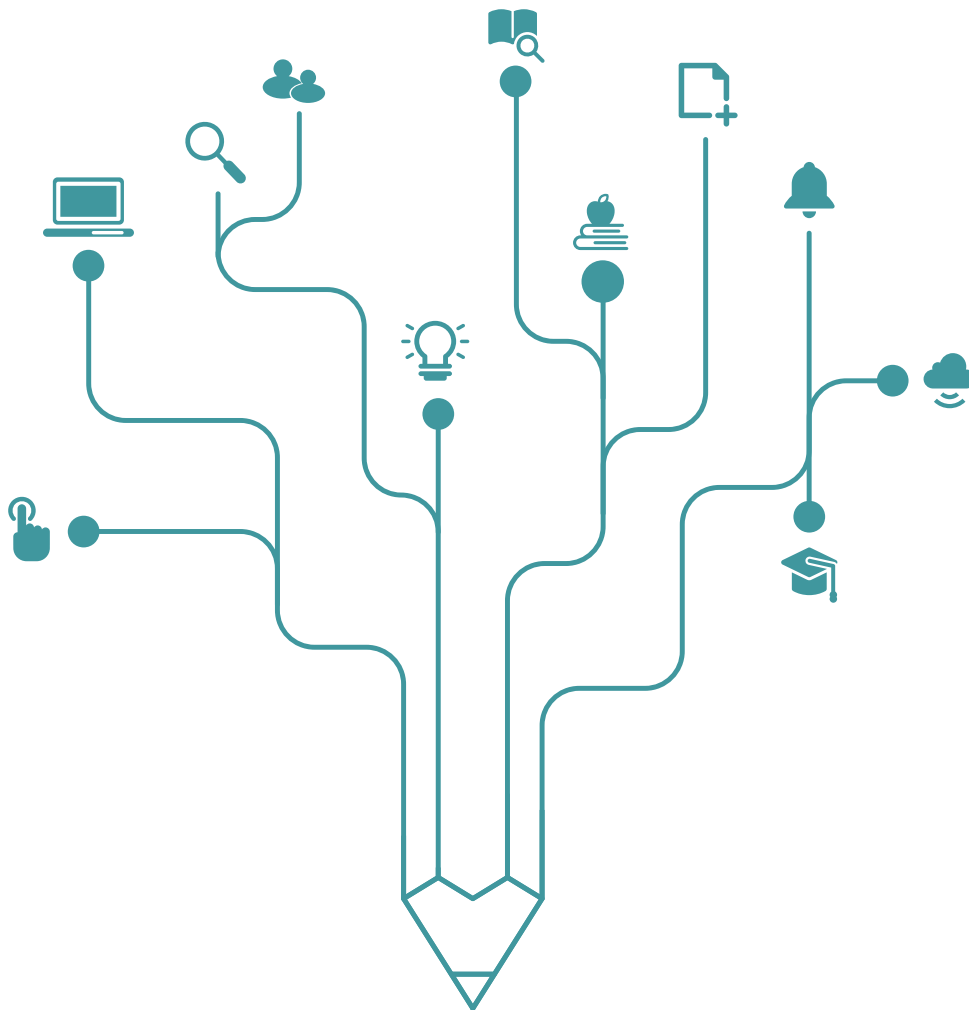


Financial Inclusion: A Case of Village Banks in Malawi

Wook Sohn (KDI School of Public Policy and Management)

Wytone Jombo (Reserve Bank of Malawi)



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Wook Sohn ^a and Wytone Jombo ^b

Abstract

This study investigates the determinants of household participation in credit markets in Malawi using merged comprehensive data from the Integrated Household Survey. We find that larger family sizes increase the probability of households accessing credit from village banks, and that higher educational levels and residing in urban areas reduce the probability that households tap unchartered sources. In addition, women are more likely to borrow from village banks, while men are more likely to borrow from loan sharks, relatives, and neighbors. Since access to credit has welfare enhancing effects, it is plausible to have policies that encourage to penetrate rural areas.

JEL classification: O16, O17, O18

Keywords: financial inclusion; informal credit; village banks in Malawi; determinants of credit participation

^a Correnponding author. KDI School of Public Policy and Management; E-mail address: wooksohn@kdischool.ac.kr

^b Reserve Bank of Malawi; E-mail address: jombowytone@gmail.com

1. Introduction

This study explores why most Malawians access loans from informal sources such as village banks. Existing research examines how the adult population participates in banking institutions by investigating the extent of their access and use of financial services, account ownership, savings, and credit access at formal financial institutions (Evans 2016; Soumaré et al. 2016). Particularly, studies in the last decade explore the determinants of financial inclusion (Nkuna et al. 2021; Zins and Weill 2016). Most studies suggest that financial inclusion is affected by the lack of formal financial institutions, educational attainment, trust, and income.

The fourth (IHS 4) and fifth (IHS 5) Malawi Integrated Household Surveys (IHS) indicate that most individuals in urban and rural areas source credit from village banks (National Statistical Office 2017; National Statistical Office 2020). In 2019–2020, village banks account for approximately 42.9% of rural credit and 37.9% of urban credit (National Statistical Office, 2020). National Statistical Office (2020b) estimates that an average Malawian is 76.1% more likely to access informal credit. Therefore, despite efforts to promote access to formal credit to the unbanked population, the outcomes of policy interventions are discouraging.

This study explores the demand-side determinants of household participation in informal credit markets using nationally representative datasets. We provide a rare view of factors that explain why households decide to access credit from a particular source in Malawi. Specifically, we assess the determinants of borrowing from village banks, relatives, neighbours, commercial banks, Savings and Credit Cooperatives (SACCOs), and loan sharks given that the household head is female, resides in urban areas, educated, and endowed with assets. We examine whether access to informal sources of funds has declined following the implementation of financial inclusion policies in the past decade by the Government of Malawi (GoM).

While participation in the credit market is both a demand-side and supply-side issue, this study primarily focuses on demand-side factors. This is premised on the fact that IHS data do

not cover much of the credit supply factors data and that other sources of such data are at highly aggregated; hence, cannot be used for this study. This notwithstanding, the findings from this study can help shape the policy direction in the credit market.

The conventional expectation is to have more people participate in the formal credit market. Deviating from this expectation and preferring informal credit, such as village banks, relatives, and loan sharks, even in urban areas where formal financial services are adequate, provides a need to understand why this is the case. Thus, by investigating the household's determinants for participating in different credit markets, the study helps craft policy recommendations on how best to promote formal credit in Malawi.

Most previous studies focus on aggregate credit demand and access. However, they overlook the heterogeneities of the credit sources within each credit market. Therefore, this study contributes to the existing literature by using pooled comprehensive IHS dataset to explain the factors influencing borrowing from individual credit sources within the formal or informal credit markets.

The rest of the paper is organized as follows: Section 2 provides the stylized facts about Malawi's economy and the related literature. Section 3 briefly describes the methodologies, data sources, and sampling methods. Section 4 outlines the empirical findings of the study. Finally, section 5 concludes the paper and highlights policy recommendations.

2. Household participation in credit markets in Malawi

2.1 Financial inclusion in Malawi

Financial inclusion looks at the accessibility of credit in formal or informal credit markets. Nkuna et al. (2021) list three main dimensions of financial inclusion: access, usage, and quality. Households have access to credit if they can borrow the maximum amount they need from different sources in a timely manner and at an affordable cost (Diagne and Zeller 2001). Diagne

(1999) adds that access to credit is more of a supply-side issue and credit participation is a demand-side issue. Households rarely control access to credit but may have some control on their participation in credit markets.

IHS 4 shows that only 13% of the adult population accessed credit in 2016–2017 (National Statistical Office 2017). IHS 5 indicates a slight improvement to 17.7% in 2019-2020 (National Statistical Office 2020). The Ministry of Agriculture, Irrigation and Water Development (2018) further reports that access to formal credit by farmers in Malawi remains a big challenge due to high interest rates, collateral requirements, and complex loan application processes. Similarly, Diagne (1999) acknowledges the credit constraints faced by Malawian households and argues that less than half of the loan amount demanded is accessed. This shows that credit is inaccessible to many despite its importance in achieving sustainable and inclusive economic growth and development.

Over the years, the GoM is making strides in promoting financial inclusion. In 2002, the GoM has launched the Microfinance Policy and Action Plan to enhance sustainable microfinance service provision to low-income people (Burritt 2006). In 2007, the GoM has launched the Financial Inclusion in Malawi program to increase the poor masses' access to sustainable financial services by developing microfinance services. In addition, Malawi has launched the National Strategy for Financial Inclusion in 2010 to improve service delivery of quality financial services, such as credit. In addition, the GoM has launched the Financial Development Strategy in 2010, and the Financial Sector Technical Assistance Project (FSTAP) has been launched in 2011 (Nkuna et al. 2021). Improving regulatory and supervisory framework, financial infrastructure, consumer protection and financial literacy, financial sector policies and governance ability, and implementation of critical policies and initiatives are the main objectives of the FSTAP (World Bank 2011). The project has helped establish a consumer protection section inside the Reserve Bank of Malawi (RBM), conduct baseline surveys,

develop financial literacy materials, launch financial literacy weeks, and promote financial literacy through radio and print media.

Several Non-Governmental Organizations (NGOs) advocate for more flexible non-formal financial service provisions for low-income people. Karlan et al. (2017) assert that formal financial providers, such as commercial banks and microfinance institutions, are more complex, expensive, risky, and not flexible for the poor. Moreover, low-income individuals are deemed as unbanked by most formal financial institutions due to lack of collateral and high transactional cost (Diagne 1999). Inaccessibility of credit further widens the financial inclusion gap. Therefore, NGOs are lobbying for more innovative ways, such as village savings and loan associations (VSLAs), to promote savings and provide more flexible loans to rural people. At present, this mechanism is popular among urban residents of Malawi. In addition to VSLAs, people obtain credit informally from relatives, friends, neighbors, and loan sharks.

2.2 Credit market structure in Malawi

In Malawi, credit is accessed through informal or formal markets. Nevertheless, other studies include a third category called the semi-formal market (Silong and Gadanakis 2020). Linh et al. (2019) indicate that behaviors of semi-formal credit providers are highly unpredictable. Therefore, in this study, the semi-formal and formal credit markets are regarded as one group. Diagne and Zeller (2001) find that in Malawi, formal and informal credits are imperfect substitutes. This means that, although the two appear to be negatively linked, one cannot eliminate the other.

2.2.1 Formal credit market

Formal credit are loans obtained from registered financial institutions with predetermined interest rates, security, and payment terms. Formal credit markets are structured, complex, and strict. The RBM is at the heart of the formal financial system and is responsible for monetary stability and foreign exchange management (Burritt 2006). As such, the RBM regulates the formal financial market through the Banking Act of 1989, which requires financial institutions to register with the central bank before operating (Luboyeski et al. 2004). The RBM classifies the formal market players into two: commercial banks and other financial institutions.

The procedure for obtaining a loan from these sources is well-defined and organized. In most cases, physical collateral is required to guarantee loan repayment. However, most formal loans are not prompt due to the complexity of the process, making it less suitable for individuals who urgently need cash. Commercial banks require clients to have an account with them and have collateral. Conversely, Microfinance institutions are open to anyone who meets the requirements of the desired credit product.

Atieno (2001) and Ngalawa (2014) concur that formal credit markets in Malawi are small and incapable of clearing out. Several studies attribute this to the complexity of the lending terms and conditions (Atieno 2001; Diagne and Zeller 2001; Karlan et al. 2017).

Commercial banks. Commercial banks are formal financial institutions that offer several financial services, such as savings, lending, and investment opportunities. Malawi has approximately ten full-service commercial banks. Commercial banks are important for bringing most of the unbanked population into the formal financial scope (Nkuna et al. 2018). However, most adults are still unbanked. The IMF (2008) finds that only 4.6% of Malawian adults have access to banking services; although, Chirwa and Mvula (2014) estimate the proportion to be 15.4 %. Commercial bank loans account for 3.3% and 1.1% of credit in 2016-

17 and 2019-2020, respectively (National Statistical Office, 2020b). The declining trend raises questions as to why credit from commercial banks is increasingly becoming less preferred.

Microfinance institutions. The RBM regulates microfinance institutions under the Microfinance Act of 2010. Malawi has many microfinance institutions. The IHS report shows that most of the population are served by the Malawi Rural Finance Company (MRFC) and Malawi Rural Development Fund (MARDEF).

Malawi Rural Finance Company. MRFC is established in 1994 to replace SACA. The MRFC, which has taken over many operations of SACA, is to operate on commercial principles. According to Diagne and Zeller (2001), MRFC targets smallholder farmers, providing them with seasonal agricultural loans to purchase farming inputs, fertilizers, seeds, and farm implements. The MRFC is the largest microfinance institution based on the number of active borrowers with nearly 132,000. However, it charges relatively high-interest rates. Diagne and Zeller (2001) report that the interest rate is over 40% in 1994-1995 and 54% in 1995-1996. However, these rates are possibly influenced by inflation.

Malawi Rural Development Fund. The Malawi Rural Development Fund (MARDEF) was established in 2005 by the government to increase access to finance for low-income households, particularly those in rural areas. Burritt (2006) argues that it is used by the government to balance the development agendas between rural and urban areas. However, MARDEF offers relatively higher rates compared to other lending institutions. This is deliberate to cover high transaction and administrative costs associated with microloans. MARDEF is now known as National Economic Empowerment Fund Limited.

2.2.2 *Semi-formal credit market*

Silong and Gadanakis (2020) acknowledge that semi-formal sources are member-owned associations that fit the financial conditions of low-income people in both urban and rural areas. In Malawi, these include SACCOs, NGOs, and private companies (Luboyeski et al. 2004).

Most sources provide credit to their members, except for SACCOs which are permitted to accept deposits.

Savings and credit cooperatives. SACCOs generally provide savings services to underprivileged individuals who do not have access to formal financial institutions such as commercial banks. SACCOs are member-owned financial associations of people who share a common bond, such as coworkers or people within the same community (Burritt 2006). They have offices in rural and urban areas to pool savings and lend to their members. The government regulates SACCOs through Malawi's Cooperative Act.

2.2.3 Informal credit market

Informal credit involves borrowing from legal but unregulated sources with or without interest and has no formal agreement outlining payment terms. Village banks, relatives, neighbors, local merchants, and loan sharks are examples of informal loan sources (National Statistical Office 2017). According to National Statistical Office (2020b), Malawians predominantly source credit from unchartered sources.

Village savings and loan associations. VSLAs, popularly known as village banks, are self-financed and self-managed informal groups formed on the principle of fund-pooling to improve access to low-cost financial services. The country has seen exponential growth in village banks over the years, even among literate and urban residents. Village banks are currently the primary source of credit for Malawian households, highlighting their critical role in the economy. Village banks adhere to the following guidelines: (i) self-governance, (ii) membership of 15-25 self-selected members, (iii) membership open to both males and females, (iv) savings through the purchase of shares, (v) savings are invested in loan fund (interest 5% - 20%), (vi) autonomous equally contributed social fund, (vii) regular meetings, and (viii) transparency and accountability.

In Malawi, most village banks follow a 10 to 12-month cycle. At each scheduled meeting, group members contribute to group savings by purchasing shares. The value of the shares is determined by the maximum number of shares that a member purchases. The savings are invested in loan funds and are kept in padlocked boxes by group leaders. Members also make equal-sized contributions to the social or solidarity fund, which is separate from the loan fund. The social fund does not pay interest and is used to cushion group members from shocks, such as funerals, illness, accidents, and other emergencies, which enhance group solidarity. Members borrow from the loan fund upon request and repay with the agreed-upon terms. According to Mwansakilwa et al. (2017), the interest rate ranges from 10% to 30% on the borrowed fund per month. The total group savings, along with interest earnings, are distributed proportionately to members at the end of each cycle, and members decide whether to start a new cycle. Village banks operate on member contributions and interest income. Commercial banks in Malawi are now more inclined to collaborate with village banks. Several commercial banks have recently launched affordable financial services and products targeting village banks. Based on this model, village banks operate bank accounts instead of keeping money in padlocked boxes.

2.3 Related literature

To the best of our knowledge, although there is extensive literature on credit demand and credit access for most countries, empirical evidence on what influences people to borrow from formal or informal sources is scarce. Some studies focus more on credit demand, while others discuss financial inclusion. Mkandawire and Duan (2016) investigate the determinants of credit demand among Malawian households engaged in non-agricultural enterprises. Likewise, Biyase and Fisher (2017) study poor households' access to formal credit in South Africa. Asiamah et al. (2021) investigate credit demand and credit constraints among households in Ghana. Mukasa et al. (2017) examine credit constraints and agricultural productivity in

Ethiopia. However, studies focusing on determinants of household borrowing from individual credit sources within the formal or informal markets are limited.

Nkuna et al. (2021) provide insights on determinants of financial inclusion in Malawi using data from the 2014 Baseline Financial Literacy and Consumer Protection Survey. The survey discovers a reverse gender gap in financial inclusion. Financial capability, age, geographical location, marital status, educational attainment, and wage employment are also important determinants. However, despite increased exposure to formal financial institutions over the years, Malawi has seen an exponential rise in the preference for informal sources such as village banks, irrespective of the geographical location and social status. As a result, information on determinants of household credit source choices is limited. Additionally, our study uses pooled data to ensure efficient results and examine structural changes over time.

Asiamah et al. (2021), Mkandawire and Duan (2016), and Sekyi (2017) demonstrate that the household head's age, gender, educational level, credit history, family size, assets, wage employment, proximity to credit institutions, and credit history influence credit demand. However, the findings for gender are inconclusive. Sekyi (2017) finds that women are more likely than men to access credit, whereas Asiamah et al. (2021) discover that women are more likely to experience credit constraints.

Biyase and Fisher (2017) use panel data and estimate a Heckman selection model to evaluate the determinants of poor households' access to formal credit in South Africa. They demonstrate that several factors, including the household head's age, geographical location, gender, educational level, employment, and race, significantly influence the likelihood of obtaining formal credit. However, informal and semi-formal credits receive less attention. Similarly, Diagne (1999) analyzes the determinants of household access and participation in formal and informal credit markets of Malawi using the multinomial logit model. A

household's ownership of valuable assets is the most significant determinant of formal credit access. Educational attainment, household income, number of adults in the family, distance to credit officer, and distance to the trading centre also influence credit access. However, formal or informal credit markets include several credit sources with distinct operational characteristics. As a result, factors influencing credit sourcing from one channel may crowd out factors that affect credit sourcing from other sources. Concurrent evaluation of different sources is necessary to get detailed results.

Table 1 summarizes the empirical results from related studies and includes the econometric models used for estimation.

3. Methodology

3.1 Conceptual Framework

Modigliani (1976) proposes using the life cycle hypothesis to examine household credit demand. According to the theory, intertemporal budget constraints limit consumer choices; thus, reallocation of resources is necessary to maximize lifetime utility. Access to credit helps smooth consumption and improve household welfare. This model, similar to the permanent income hypothesis, explains consumer behavior (Bertola et al. 2006; Modigliani, 1976). In both models, households must choose whether to use available resources for consumption right away or invest for future returns. Miller et al. (1979) present these models using a two-period income possibilities curve. Awunyo-Vitor (2018) and King (2014) propose the rational choice theory. This theory's proponents contend that a clear description of (i) the need for credit, (ii) the nature and type of credit provided by lenders, and (iii) the condition of the credit is necessary for the analysis. Given these circumstances, households must decide where to obtain credit. The fundamental principle guiding decision-making is the maximization of utility.

Muhongayire (2012) groups the determinants into socioeconomic, institutional, and environmental factors. The socioeconomic aspect covers the household-specific factors that influence credit decision-making, such as educational attainment, age, sex, marital status, and household size. Institutional factors focus on rules, conduct, and structure of different credit markets that influence household decisions. These factors include the complexity of the loan application process, interest rates, loan duration, convenience, transaction fees, and collateral requirements. Environmental factors focus on credit market accessibility and include proximity to formal credit providers, availability of credit providers, and distance to the village centre. Figure 1 shows the overall conceptualization of this study, which demonstrates how the household's choice to obtain credit through various channels is related to socioeconomic, personal, institutional, and environmental factors.

3.2 Data sources and sampling method

This study uses datasets from IHS, which are nationally representative cross-sectional surveys. The NSO has conducted five rounds of the poll since their inception in 1997. The first round, IHS 1, is held in 1997-1998. IHS 2, IHS 3, IHS 4, and IHS 5 are conducted in 2004-2005, 2010-2011, 2016-2017, and 2019-2020, respectively. IHS 3 to IHS 5 follow a similar methodology and differ from the first two rounds because they are part of the World Bank Living Standards Measurement Study. Therefore, we pool data from IHS 3, IHS 4, and IHS 5 with sample sizes of 1,393, 2,880, and 3,137, respectively. The pooled dataset's total sample size is 7,410 households. Following Wooldridge (2013), pooling data provides a sufficient sample size to ensure more robust results. Wooldridge (2013) recommends including dummy variables for all years except one to account for potential structural changes over time.

3.3 Analytical methods

The study uses a probit model to assess the determinants of household participation in formal and informal credit markets. Participation in the formal credit market is assigned the value of 1 and 0 otherwise. Based on Hill *et al.* (2011), Greene (2012), and Wooldridge (2013), the standard structure of the probit model is given as:

$$y_i^* = x_i\beta + \varepsilon_i, \varepsilon \sim N(0, 1) \quad (1); \quad y_i = 1 \text{ if } y_i^* > 0 \text{ and } 0 \text{ if } y_i^* \leq 0 \quad (2)$$

Where i represents a household, β denotes the parameter of the explanatory variable x_i , and ε denotes the normally distributed stochastic disturbance term with zero conditional mean and a variance of 1.

Following Wooldridge (2013), we express the probability of participating in the formal credit market as follows:

$$\text{Prob} [y_i^* = 1 | x_i] = \theta(\beta_0 + \beta_1 x_1 + \dots + \beta_k x_k) = \theta(\beta_0 + x\beta) \quad (3)$$

Hill *et al.* (2011) and Wooldridge (2013) denote $\theta(z)$ as the standard normal cumulative distribution function and takes values strictly between 0 and 1.

We further employ the multivariate probit model (MVP) to assess the determinants of household borrowing from individual credit sources, such as village banks, relatives, neighbors, loan sharks, MRFC, SACCOs, and commercial banks. The rationale for the model is based on the binary nature of all response variables and assumed correlation between the errors of the sub-models. Thus, using the univariate probit model does not yield efficient estimates (Cappellari and Jenkins, 2003; Greene, 2012; Lesaffre and Molenberghs 1991). Following Cappellari and Jenkins (2003), Cappellari and Jenkins (2006) and Greene (2012), we illustrate the structure of the MVP using the following standard system:

$$y_{im}^* = \beta_m' x_{im} + \varepsilon_{im}; \quad y_{im} = 1 \text{ if } y_{im}^* > 0 \text{ and } 0 \text{ otherwise; } m = 1, \dots, M \quad (4)$$

Where ε_{im} are multivariate normal errors with a mean of zero and variance-covariance matrix V ; V has values of 1 on the leading diagonal and correlations $\rho_{jk} = \rho_{kj}$ as off-diagonal elements (Cappellari and Jenkins, 2003). The MVP follows the simulated maximum likelihood estimation method. The probability of obtaining credit from each source is given in equation (5) and the generalized log-likelihood function in equation (6):

$$\Pr(y_1 = 1, \dots, y_m = 1) = f_m(x'\beta_1, \dots, x'\beta_m; \Omega) \quad (5)$$

$$L_i = \sum_{i=1}^N w_i \log \Phi_m(\mu_i; \Omega) \quad (6)$$

Where w_i represents the weight for observation $i = 1, \dots, N$ and the $\Phi_m(\cdot)$ represents the standard normal distribution for the M -equations and Ω denote the covariance matrix.

3.4 Variable description and measurement

Table 2 presents the descriptions and measurements of the variables in the study. The dependent variables in both the probit model and MVP are binary indicators. We consider a household to be a participant in either the formal or informal credit market if it obtains credit from any source within the market in the previous 12 months before the interview date. For the MVP, we use dummy variables for individual credit sources as outcome variables. The covariates include socioeconomic and location factors. Gender, age, education, household size, employment, location, income, and asset ownership influence credit market participation (Asiamah et al. 2021; Barslund and Tarp 2008; Chitungo and Munongo 2012; Diagne and Zeller 2001; Khoi et al. 2013; Mwansakilwa et al. 2017; Nkuna, et al. 2021).

4. Results and discussions

4.1 Descriptive Statistics

Table 3 shows the summary statistics for the explanatory variables. The results indicate that 74% of the households that accessed either formal or informal credit from 2010 to 2020

are headed by men and only 26% are headed by women. Asiamah et al. (2021) and Mkandawire and Duan (2016) observe similar trends. The average household size is 4.71 individuals, with most household heads being illiterate. We find that 62% have no formal education, 13% have primary education, 21% have secondary education, and 4% have tertiary education. The average household head has 7.01 years of education during this period. Most households are in rural areas and only 20 % are in urban areas. Approximately 47% are from Southern Malawi, 35% are from the central region, and 18% are from Northern Malawi.

The average amount borrowed from formal and informal sources is US\$38.36. However, we observe a high variation in credit amount. Furthermore, aggregated data show that 49% of households borrowed for investment purposes. Approximately 21% of household heads are wage employees, with the majority being collaterally constrained. Almost 57% of respondents are in the lowest asset quartile.

Table 4 shows the aggregated household credit market participation in Malawi. Nearly 84.7% of households borrow from informal sources. With regards to individual credit sources, most Malawian households borrow from village banks (32.2%), relatives (21.6%), and neighbors (19.9%), while only few households obtain formal credit. Commercial bank loans only account for 3.6% of the credit market. This trend contradicts government efforts to increase financial inclusion in the formal financial scope.

4.2 Bivariate Analysis

4.2.1 Credit market participation by category

Table 5 shows how socio-economic and geographical factors relate to credit market participation based on the pooled data. We include factors, such as gender, area of residence, region, education attainment, employment, asset possession, and marital status. The pooled

data show that the area of residence influences participation in credit markets. Households in urban areas are more likely to source formal credit (22.55%) than those in rural areas (11.47%).

We find gender differentials in credit market participation. Men participate more in the formal credit market (14.64%) than women (10.57%). In line with our expectations, women are more likely to participate in the informal credit market. Table 5 indicates that heads with tertiary education are more likely to participate in the formal credit market than those with lesser education. Approximately 50.55% of household heads with tertiary education participate in the formal credit market. In comparison, only 21.35% of heads with secondary education, 14.32% of heads with primary education, and 9.48% of heads without formal education participate in the formal credit market. In addition, households with wage employees are more likely to participate in formal credit markets (27.28%) than households with unemployed individuals. The findings also demonstrate the significance of asset ownership in formal credit market participation. Households with the most assets (31.92%) access formal credit more frequently than households with fewer assets.

4.2.2 Individual credit sources by category

Table 6 shows how individual credit sources relate to socioeconomic and geographical factors based on pooled data. More rural households (40.92%) obtain credit from village banks, as compared to urban residents (30.72%). The results further reveal differences in sourcing credit from loan sharks by households in urban areas (6.93%) and rural areas (10.08%). As expected, urban residents obtain loans mostly from commercial banks (7.25%) and MARDEF (1.40%) in comparison with their rural area counterparts. In contrast, compared to households in urban areas (14.12%), rural households borrow more from relatives (23.73%). Furthermore, women (45.42%) participate more in village banks than men (36.66%). In addition, men acquire more credit from loan sharks (10.24%), commercial banks (3.09%), and MARDEF

(0.85%) than women. Lastly, there are marginal gender differentials in sourcing credit from relatives.

The results further show that educational attainment is insignificant in influencing participation in village banks. Existing literature argue that in Malawi, even educated people increasingly prefer village banks. However, most households with tertiary education still acquire more credit from commercial banks (21.15%) and less from loan sharks (2.13%) and relatives (4.74%) than those with lower education. Households with more valuable assets obtain more credit from commercial banks (10.83%) and MARDEF (1.76%) than those with lesser assets. The observation is logical because formal credit providers require collateral to secure loans. However, asset possession only slightly influences participation in village banks and loan sharks.

4.3 Main results

This section presents the findings and discussions based on econometric analysis. First, we discuss the results of probit models, which analyze the factors associated with household participation in formal and informal credit markets. Second, we discuss the findings of the MVPs, which examine the factors influencing borrowing from various credit sources by using a system of equations with each credit source acting as a binary dependent.

4.3.1 Determinants of households' participation in formal and informal credit markets

Table 7 presents the marginal effects of the three probit models estimated on informal credit market participation. Model 1 shows the findings for all households. Models 2 and 3 present the results for urban and rural residents, respectively.

Our study focuses on Model 1, while Models 2 and 3 are for robustness checks. To ensure the model's stability, we conduct Pearson goodness-of-fit diagnostic tests. The model is appropriate since the Pearson goodness-of-fit test is insignificant at any level (Prob>F=0.5345).

Furthermore, structural changes in the pooled data, with IHS 3 as the reference category, are examined using the Chow test. The F-statistic (9.07) of the Chow test is significant at 1%, suggesting that the null hypothesis is rejected that indicates a significant change in estimates. Per Wooldridge (2013), we mitigate the situation by including dummy variables for all but the base period (y2011) in the model.

Table 7 shows that age, education, asset possession, wage employment, hospitalization, credit purpose, and location are significantly associated with borrowing from informal sources. Model 1 of Table 7 indicates that the household head's age is negatively related to sourcing loans from informal institutions. Findings suggest that for every one-year increase in the household head's age, the likelihood of borrowing from informal sources declines by 0.80 percentage points. The results are consistent with Asiamah et al. (2021), Biyase and Fisher (2017), and Mukasa et al. (2017); although, they contradict Mkandawire and Duan (2016). We also analyze the squared value of age and find it positively related to informal borrowing, indicating the non-linear effects of age. We find that the likelihood of borrowing from informal sources initially declines with the household head's age; however, after reaching 54.99 years¹, the odds increase. Models 2 and 3 indicate that these findings are significant in both rural and urban areas. In the context of this study, we argue that young and older people in Malawi are more likely to experience credit constraints from formal sources. Most young people lack collateral to secure credit. With regards to older people, as they age and retire², old age and health-related issues undermine loan repayment ability; thus, they resort to informal sources.

Educational attainment negatively influences participation in the informal credit market. Household heads with tertiary education are 17.8 percentage points less likely to source credit from informal institutions than their uneducated counterparts. Similarly, household heads with

¹ Found by $\left(\frac{0.00760}{(2 \times 0.0000691)}\right)$ (Hill et al. 2011)

² The retirement age in Malawi is 60 years.

secondary education are 5.9 percentage points less likely to borrow from these sources. Models 2 and 3 in Table 7 indicate that the probability of sourcing credit from unchartered sources decline with educational attainment in both rural and urban areas. Asiamah et al. (2021), Biyase and Fisher (2017), Khoi et al. (2013), Muhongayire (2012), and Tang et al. (2010), discover comparable findings. Highly-educated household heads likely have high income, financial knowledge, valuable assets, and prominent social connections, which increase their chances of accessing formal credit. In line with these observations, Nkuna et al. (2021) find financial capability to be a significant determinant of financial inclusion. Therefore, these results are plausible. This study finds that most Malawians are uneducated and reside in rural areas, which suggests lower financial literacy levels among the population.

Table 7 also indicates that having valuable assets reduces the likelihood of borrowing from informal sources. Households with more assets are 7.9 percentage points less likely to borrow from informal sources than those with fewer assets. Models 2 and 3 in Table 7 show that with asset ownership, the likelihood of obtaining informal credit declines in urban and rural areas. Our findings are consistent with Diagne (1999), Linh et al. (2019), and Silong and Gadanakis (2020). These findings are logical given that valuable assets provide collateral in formal credit institutions. Per Robinson (2001), collateral possession signals an individual's creditworthiness. This study observes that most Malawians have few assets; thus, they are at high risk of being turned down by formal credit providers. As a result, a sizeable portion of the population remains stuck in the informal credit market.

The findings also show that wage-employed household heads are 9.20 percentage points less likely to borrow from unchartered sources than unemployed household heads. Our findings are consistent with Asiamah et al. (2021), Biyase and Fisher (2017), and Nkuna et al. (2021). The results are marginally different between rural and urban households. We predict that employed people have higher income and assets, which increase the odds of sourcing formal

credit. Therefore, results suggest that an increase in household income reduces the interest in informal credit.

The results in Table 7 further indicate that experiencing shocks as proxied by the hospitalization of at least one household member is significant and positively related to borrowing from unchartered sources. The illness of a household member increases the propensity to borrow from unchartered sources by 1.70 percentage points. However, Models 2 and 3 in Table 7 indicate that hospitalization does not significantly explain participation in the informal credit market in urban or rural areas. The finding contradicts Akpandjar *et al.* (2013), but concurs with Asiamah *et al.* (2021), Menkhoff and Rungruxsivorn (2011), and Tang *et al.* (2010). In the context of this study, unexpected events like illness necessitate quick access to loan funds. However, because of lengthy loan application processes, formal credit frequently falls short of meeting the need. Thus, when faced with shocks, most households prefer unchartered sources, which can promptly provide loans.

The intended use of the credit also explains the variation in household borrowing from unchartered sources. We discover that credit used for investments is 10.9 percentage points less likely to come from unchartered channels than consumption loans. Mukasa *et al.* (2017) find similar results. The finding suggests that most households source investment loans from formal financial institutions. Formal sources prefer investment loans over consumption loans due to higher repayment assurance. Hence, the chances of turning down a consumption loan are high.

Concerning structural changes in the pooled data, we find significant growth in household borrowings from unchartered sources over time compared to the base year (2010-2011). Sourcing credit from these sources rise by 11.9 and 13.9 percentage points in 2016-2017 and 2019-2020, respectively. Interestingly, Models 2 and 3 indicate that the propensity to borrow has grown more in urban areas than in rural areas. The results suggest a growing interest in

borrowing from informal sources in Malawi despite the proliferation of formal financial institutions. This may be due to the complexity of the formal loan granting process and the flexibility of loan terms offered by informal sources. It also demonstrates the ineffectiveness of government financial sector policies in improving access to affordable financial services. However, this finding needs to be thoroughly investigated.

To address the possibility of sample selection bias, Heckman probit model is estimated for robustness checks. Table 8 presents the Heckman probit model results on determinants of participation in the informal credit market and credit access. The estimated rho for the two equations' errors in the Heckman probit model is insignificant, indicating the nonexistence of sample selection errors and consistency of the univariate probit models.

4.3.2 Factors influencing borrowing from individual credit sources in Malawi

To assess the determinants of household borrowing from individual credit sources, we estimate MVPs for formal and informal sources. The models' underlying assumption is the correlation between binary dependent variables. In both models, the likelihood ratio test has significant chi-squares (p-value: 0.000), indicating sufficient correlation and consistency. Therefore, we reject the null hypothesis of the nonexistence of correlation among the response variables.

Village banks dataset is only available after IHS 3; hence, IHS 4 is the first wave to record information on village banks. Therefore, village banks only have two waves of data (IHS 4 and 5), while other credit sources have three waves (IHS 3, 4, and 5). Due to the unbalanced data waves, we estimate a univariate probit model for village banks and MVPs for the remaining sources. For robustness checks, we re-estimate an MVP for the informal sources using IHS 4 and 5 to incorporate village banks. The results in Appendix 4 show marginal differences with those presented in this section. Table 9 shows the marginal effects of the probit model on the

determinants of sourcing credit from village banks. The results of the MVPs on borrowing from informal and formal sources are presented in Tables 10 and 11, respectively.

Model 1 in Table 9 shows that borrowing from village banks is associated with several factors, including the household head's gender, age, household size, educational attainment, wage employment, credit amount, geographical location, and loan purpose. The model shows that women are more likely to borrow from village banks than men. Specifically, the propensity to source credit from village banks for women is 6.8 percentage points higher than for men. The results are consistent with Mwansakilwa et al. (2017). However, Models 2 and 3 in Table 9 indicate that the finding is insignificant for urban households. The results are expected because village banks are established primarily to improve access to affordable financial services for marginalized women in rural areas (International Rescue Committee 2012). Per this observation, Model 1 also shows that an average urban resident is less likely to borrow from village banks by 9.7 percentage points compared to a rural household. Therefore, we argue that women prefer village banks because of their low borrowing costs, risks, and flexible loan terms. Additionally, they offer highly-demanded saving services, which are underserved by formal credit institutions in rural areas.

The household head's age, as well as its squared value, are all significant. The findings point to a non-linear relationship between the household head's age and borrowing from village banks. The likelihood to obtain credit from village banks initially increases with age, but after reaching 59.3 years, it declines. Per our observations, getting older is associated with health-related issues that reduce revenue-generating capacity. As a result, aged members find it challenging to make weekly contributions to the group; thus, they are unlikely to participate. Table 9 further shows that household size, secondary education, credit amount, and investment are positive determinants of borrowing from village banks. However, being a wage earner is negatively associated with the likelihood of obtaining credit from village banks. The findings

also show that participants in urban area village banks are more likely to borrow for investment purposes than those in rural areas.

While women participate more in village banks, they are less likely to borrow from other informal sources than men. Table 10 shows that women are unlikely to borrow from loan sharks, relatives, or neighbours. We attribute the findings to the high risk of borrowing from loan sharks, whom some argue are malicious agents charging exploitative rates (Armendáriz de Aghion and Morduch 2005). Women are risk averse and prefer less risky credit sources; hence, they prefer village banks. Because of the uncertainty of receiving credit upon request, relatives and neighbors are unreliable sources. On the other hand, village banks alleviate credit constraints among rural households, and members benefit from the interest earnings on their savings. Therefore, we find it logical to argue that women are substituting village banks for most unchartered sources.

Table 10 shows that as the household head's age increases, the tendency to borrow from family members decreases. However, Table 11 indicates that the increase in household head's age favorably impacts sourcing credit from commercial banks, SACCOs, and NGOs. The age-squared variable, as predicted, shows the variable's non-linear effects. These results agree with those of Barslund and Tarp (2008), Khoi et al. (2013), Menkhoff and Rungruxsirivorn (2011), and Tang et al. (2010). Lenders view lending to young and aged people as unreliable and risky.

Households with high asset ownership are less likely to obtain credit from loan sharks (Table 10) and NGOs than households with low asset ownership (Table 11). The results also show that households are more prone to seeking credit from relatives and loan sharks during emergencies as proxied by hospitalization. Unlike most formal institutions, such as commercial banks, these sources have flexible loan-issuing procedures, which make credit easily accessible.

Borrowing from commercial banks, loan sharks, SACCOs, MARDEF and MFRC is positively influenced by credit amount. However, a higher credit amount reduces the likelihood of borrowing from relatives, neighbours, and local merchants. In contrast, wage earners are more likely to borrow from commercial banks, employers, and SACCOs, but are less likely to borrow from relatives. The results are reasonable because most SACCOs are run by employees, reducing their borrowing from most informal sources. The findings indicate that borrowings from all formal institutions decrease in 2016 and 2020 in comparison with the reference year of 2011 (Table 11).

4.3.3 Informal Credit and Welfare Outcomes

This study finds that most Malawian households participate in the informal credit market. Following Tonch and Sohn (2022), the study explores whether utilizing informal credit is positively associated with household welfare. Welfare is measured by log of weekly food expenditures, while informal credit is measured by log of amount borrowed from informal sources. In Appendix 5, the results suggest that informal credit is positively associated with welfare, such that a one percent increase in the credit amount from informal sources is associated with an approximately 0.18 percent increase in weekly food expenditures. This result is consistent with the findings of Tonch and Sohn (2022) for Ethiopia, in which they find that a US\$28 increase in informal credit is associated with a 4.3% increase in welfare. These results entail that amidst low coverage of formal credit providers in developing countries, such as Malawi, informal sources still help improve household welfare.

5. Conclusions and recommendations

Using pooled cross-sections of nationally representative IHS data, this study examines the relationship of demand-side factors on household participation in Malawi's formal and informal credit markets. The study specifically adds to the body of knowledge on what influences

households' decisions to borrow from formal institutions and unchartered channels. Most households are expected to be in the formal credit scope. The deviation from this expectation and strong preference for informal credit is the motivation for this study.

Using a sample of 7,411 households, we find that 84.7% of Malawians overwhelmingly source credit from informal sources. For individual credit sources, Malawians predominantly use village banks (32.2%). The results further indicate marginal household borrowing from formal institutions. For instance, only 3.6% and 0.8% of households source credit from commercial banks and MARDEF, respectively.

Probit models and Multivariate Probit models are employed to empirically evaluate what determines household participation in formal or informal credit markets and borrowing from individual credit sources within these markets. Our estimates yield several interesting results.

First, the results suggest that young and aged Malawians are more likely to experience credit constraints from formal credit providers, which explains why they often borrow from unchartered sources. The findings also show that educational attainment has a strong negative effect on borrowing from informal sources. Interestingly, despite the increase in formal institutions, we find increased interest in borrowing from informal sources in 2016 and 2020 compared to 2011. Furthermore, asset ownership, wage employment, hospitalization, intended credit use, and the province of residence influence household borrowing from uncharted sources.

In terms of individual credit sources, women are more likely to borrow from village banks and NGOs but are less likely to borrow from loan sharks, relatives, or neighbors. Furthermore, the findings indicate that the household head's age has a negative non-linear effect on borrowing from village banks, commercial banks, SACCOs, and NGOs. Household heads with higher educational attainment are less likely to seek credit from loan sharks. Surprisingly, educational level has no effect on borrowing from most formal institutions, such as commercial

banks. Credit for investment is generally sourced from formal institutions while consumption loans are generally sought from informal sources such as relatives. When a household is affected by some shock requiring finances, it is likely to obtain funds from informal sources. In terms of structural changes, we observe a decrease in credit sourcing from all formal institutions and relatives in 2016 and 2020, as compared to 2011.

This study's findings have significant policy implications. The collateral requirement to access credit from the formal sources is an impediment in making credit accessible to potential entrepreneurs who could have realistic business ideas. As such, policy intervention that would help poor people without tangible assets for collateral access small loans to start businesses is needed. One suggestion is to group them in entrepreneurial cooperatives for easy follow-up during repayment. Further, tailor-made credit options for poor people who might have bankable ideas for small and medium enterprises are needed. One daunting issue that formal credit providers face in providing credit to some sections of the population is traceability during repayment, particularly when national identification registration has a low coverage. As an enabler, GoM should consider improving national registration, which would help solve the traceability issue. Since access to credit has welfare enhancing effects, it would be plausible to have policies that would encourage coverage of credit provision across the country. According to summary statistics, farmers travel an average of 29.84 kilometers to the district administrative central, where most formal financial institutions are located. Offering incentives to formal credit providers to expand into rural areas may improve credit accessibility. Finally, we recommend providing adequate financial resources to village banks to improve low-income households' access to financial services.

There are a few limitations in this study. Firstly, access to credit is determined by both demand and supply factors. This study has only focused on demand side factors because the data on supply side factors are not available. It is therefore, recommended that, subject to

availability of comprehensive supply side factors data, future research should examine the supply side factors in determining access to credit in Malawi. Secondly, the Malawi Government has attempted to implement policies to achieve financial inclusion. This study has not robustly whether these policies have been effective or not. Further research could therefore attempt to establish if such pro-inclusion policies have worked in Malawi.

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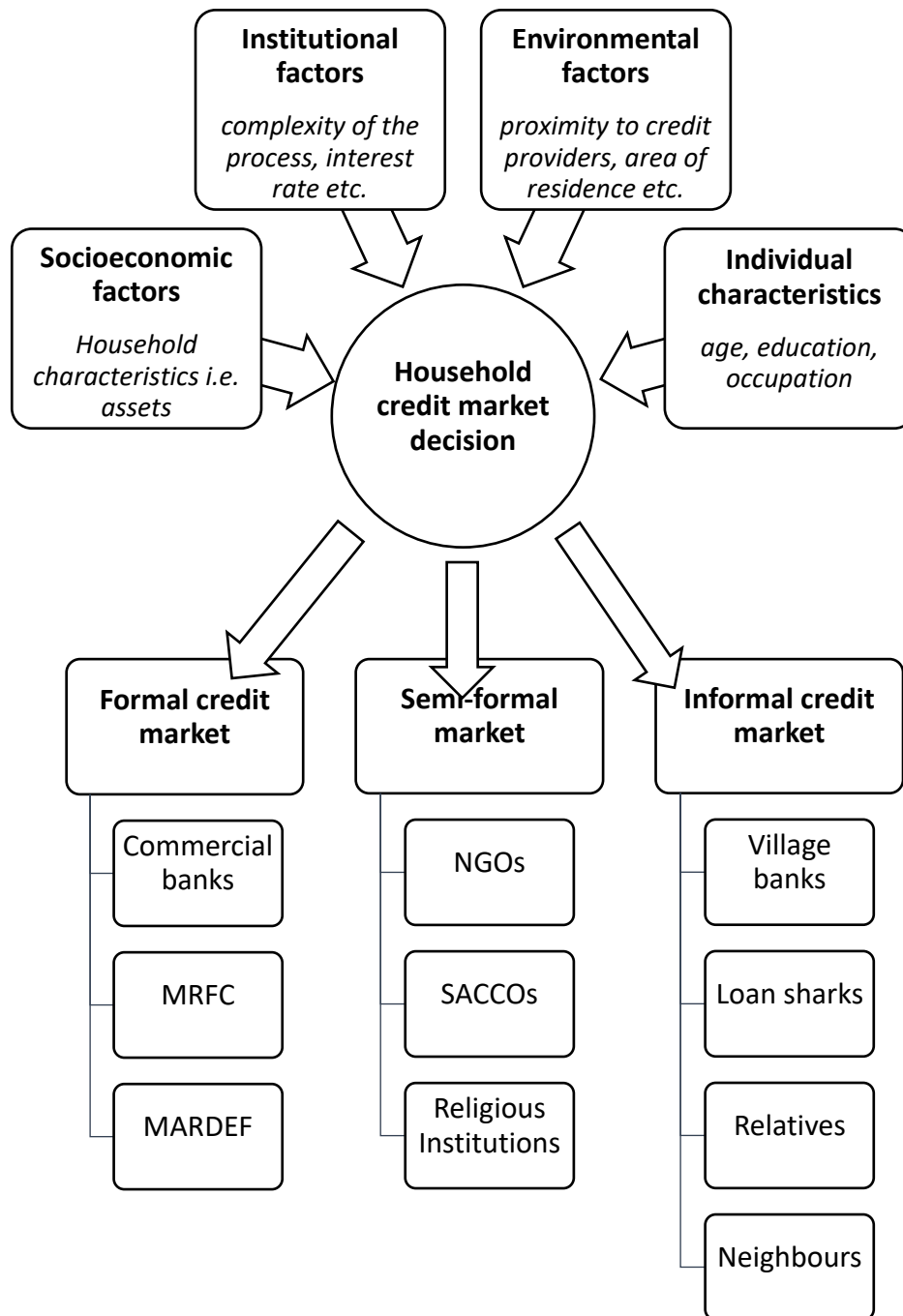


Figure 1: a conceptual framework of household participation in the credit market

Table 1: Empirical literature on determinants of credit market participation

Study	Author(s)	Determinants	Model used	Results
Determinants of farmers' decision to access credit: The case of Zimbabwe	Chitungo and Munong (2012)	Age (+), household size (+/-), marital status (<i>married farmers are more likely to borrow</i>), gender, education (+), income (+), and crop type (<i>cash crop farmers are more likely to borrow</i>)	Probit model	The square of age portrayed a negative marginal effect. Household size increases the likelihood to borrow. Lastly, male-headed households are more likely to borrow.
An economic assessment of the factors influencing farmers' access to formal credit: A case study of Rwamagana district, Rwanda	Muhongayire (2012)	Gender, off-farm income, land size, keeping farm records, participation in informal credit, agricultural extension services, savings, and insurance groups	Logistic model	The results indicate that access to formal credit is significantly influenced by participating in informal credit (-), accessing agricultural extension services (+), education (+), and households' off-farm income (+).
Formal and Informal Credit Markets and Rural Credit Demand in China	Tang <i>et al.</i> (2010)	Some of the covariates that were used include off-farm activities, household size, farm size, and education level of the head	Probit model and multinomial probit	Household size, farm size, and education level increase the likelihood of acquiring a formal credit. Households with more off-farm activities are more likely to borrow from either formal or informal sources.

Formal and informal rural credit in four provinces of Vietnam	Barslund and Tarp (2008)	Farm size, gender age, residence, the number of adults in the household, distance to the Centre of economic activities, and asset holdings	Probit model and Heckman selection model	The variables in the determinant's column are significant in influencing access to formal or informal credit
Formal and informal rural credit in the Mekong River delta of Vietnam: interaction and accessibility	Khoi <i>et al.</i> (2013)	Land ownership, savings, income, age, marital status, education level, the purpose of the loan, occupation interest rate, duration of the loan, direct road access to the village, farm size, household expenditure	Heckman two-step model	<p>Formal credit: The lowest income groups are less likely to acquire formal credit than other groups. Road access to nearest financial institutions, education attainment, and occupation are significant in influencing access.</p> <p>Informal credit landholding status, loan duration, and informal interest among others influence access to informal credit.</p>

Source: Author's summary

Table 2: Variable description and measurement

Variable	Description	Measurement
Credit market participation	Dummy variable. Indicates the credit market from which the household sourced credit.	1 = Formal credit, 0 = Informal credit
Borrowing from individual credit sources	Dummy variable indicating household borrowing from individual credit sources within the formal or informal credit market.	1 = Yes, 0 = No
<i>Covariates</i>		
Age	A continuous variable capturing the age of the head. The chance of participating in a formal credit market is hypothesized to increase with age.	Age in years
Sex	Dummy variable for the sex of the household head, whether male or female	1 = Women, 0 = Men
Household size	A count variable capturing the number of persons in the household.	Number of persons
Education attainment	A categorical variable capturing the level of education of the household head. Highly educated household heads were expected to participate more in the formal credit market.	1 = None, 2 = Primary, 3 = Secondary, 4 = Tertiary
Asset possession	A composite index capturing ownership of household assets that are frequently used as collateral in Malawi. The assets include a television, refrigerator, bicycle, motorcycle, car, minibus, lorry and sofa set.	1 = Low, 2 = Middle, 3 = High
Wage employment	A dummy variable indicating whether the head was wage employed or not. Employed household heads were expected to participate more in the formal credit market than their unemployed counterparts.	1 = Wage employed, 0 = Unemployed
Credit amount	A continuous variable capturing the actual amount that was borrowed.	Amount in US dollars
Purpose of the credit	Dummy variable. This captures the reason for obtaining the credit.	1 = Investment, 0 = Consumption
Area of residence	Dummy variable indicating the location of the household.	1 = Urban, 0 = Rural
Region	Categorical variable capturing the geographical distribution of the households based on region	1 = North, 2 = Central, 3 = South
Distance	A continuous variable capturing the distance from the household to the District Administrative Center (DAC).	Kilometers
Hospitalization	Dummy variable used as a proxy for experiencing a shock.	1 = Hospitalized, 0 = Not hospitalized

Source: Authors' compilation

Table 3: Summary statistics of the explanatory variables (n=7,411)

Variable	Mean	SD	Min	Max
Women	0.26	0.439	0.000	1.000
Age	39.81	12.450	23.000	67.000
Household size	4.71	2.034	1.000	14.000
Wage employment	0.21	0.409	0.000	1.000
Years of education	7.01	4.469	0.000	23.000
No education	0.62	0.485	0.000	1.000
Primary school	0.13	0.333	0.000	1.000
Secondary school	0.21	0.408	0.000	1.000
Tertiary school	0.04	0.190	0.000	1.000
Single	0.03	0.158	0.000	1.000
Divorced	0.13	0.337	0.000	1.000
Widow or Widower	0.09	0.290	0.000	1.000
Married	0.75	0.433	0.000	1.000
Hospitalization	0.69	0.461	0.000	1.000
Low asset quartile	0.57	0.495	0.000	1.000
Medium asset quartile	0.31	0.464	0.000	1.000
High asset quartile	0.12	0.320	0.000	1.000
Investment loan	0.49	0.500	0.000	1.000
Distance to DAC (Km)	29.84	26.641	0.000	142.000
Weekly food expenditure (\$)	9.16	9.970	0.000	112.610
Credit amount (\$)	38.36	77.861	0.671	536.877
Urban	0.20	0.400	0.000	1.000
Northern region	0.18	0.383	0.000	1.000
Central region	0.35	0.477	0.000	1.000
Southern region	0.47	0.499	0.000	1.000

Source: Author's estimations on the pooled IHS data

Table 4: Credit market participation (n=7,411)

Market	Source	Mean	Std. Dev.
Informal market	Relatives	0.216	0.411
	Neighbours	0.199	0.400
	Local merchants	0.016	0.126
	Loan sharks	0.094	0.291
	Village banks	0.322	0.489
Total Informal Borrowing		0.847	
Formal market	MARDEF	0.008	0.091
	MRFC	0.013	0.114
	SACCO	0.022	0.147
	Employer	0.014	0.115
	Commercial banks	0.036	0.187
	Religious institution	0.009	0.095
	NGOs	0.051	0.221
Total Formal Borrowing		0.153	

Source: Author's estimations on pooled IHS data

Table 5: Credit market participation (%) by categorical variables (n=7,411)

Variable		Pooled IHS data (2010-2020)		P-value
		Informal (%)	Formal (%)	
Residence	Urban	77.45	22.55	0.000
	Rural	88.53	11.47	
Sex	Men	85.36	14.64	0.000
	Women	89.43	10.57	
Region	North	80.70	19.30	0.000
	Central	85.59	14.41	
	South	88.67	11.33	
Education Attainment	None	90.52	9.48	0.000
	Primary	85.68	14.32	
	Secondary	78.65	21.35	
Employment	Tertiary	49.45	50.55	0.000
	Employed	72.72	27.28	
Asset possession	Unemployed	89.90	10.10	0.000
	Low	90.41	9.59	
	Middle	85.00	15.00	
Marital status	High	68.08	31.92	0.0019
	Single	85.31	14.69	
	Divorced	90.85	9.15	
	Widow	86.82	13.18	
	Married	85.62	14.38	

Notes: Row percentage. The P-value is for Chi-square Test of Independence

Source: Author's compilations based on pooled IHS data

Table 6: Individual credit sources by category (n=7,411)

Variable		Village Bank	Relatives	Neighbors	Loan Sharks	Religious institutions	Commercial Bank	MARDEF	SACCO	MRFC	NGOs	Employers
Residence	Urban	30.72	14.12	29.49	6.93	0.65	7.25	1.40	3.18	1.46	5.00	4.17
	Rural	40.92	23.73	18.26	10.08	0.78	1.78	0.70	1.70	0.91	4.41	0.63
Sex	Men	36.66	21.70	21.5	10.24	0.72	3.09	0.85	2.17	1.51	4.67	1.63
	Women	45.42	22.53	17.27	7.42	0.85	2.06	0.78	1.47	0.94	4.11	0.37
Region	North	42.13	13.02	16.61	10.90	1.92	4.79	0.50	3.02	0.82	6.45	1.80
	Central	35.13	23.48	21.74	10.15	0.39	3.33	0.82	1.80	2.01	5.08	0.98
	South	41.86	22.73	20.07	8.52	0.80	1.84	0.93	1.89	0.89	3.52	1.47
Education Attainment	None	39.45	24.64	20.84	10.05	0.75	1.42	0.82	0.99	1.35	3.77	0.38
	Primary	39.70	22.04	18.81	9.86	0.68	2.14	0.57	2.29	2.24	4.87	1.54
	Secondary	38.28	15.24	20.58	8.44	0.73	5.24	0.92	3.91	0.86	6.42	3.27
Employment	Tertiary	33.25	4.74	15.4	2.13	1.35	21.15	1.73	10.19	1.08	7.15	7.89
	Employed	29.48	15.20	23.79	8.83	0.71	7.32	1.26	5.48	0.85	5.66	5.78
Asset possession	Unemployed	41.28	23.61	19.51	9.65	0.93	1.67	0.73	1.10	1.49	4.24	0.17
	Low	36.90	24.69	21.88	10.37	0.66	1.40	0.42	1.06	1.10	3.57	1.38
	Middle	42.47	20.82	18.96	9.01	0.77	2.85	1.30	2.64	1.76	5.17	0.51
Marital status	High	41.35	9.44	16.20	5.91	1.26	10.83	1.76	5.21	1.58	7.94	3.35
	Single	16.77	19.25	40.09	10.12	0.11	2.48	0	3.82	0.08	3.70	4.51
	Divorced	36.44	26.39	21.49	8.88	0.84	1.26	0.94	1.60	0.28	3.39	0.86
Marital status	Widow	45.70	18.88	18.47	7.55	1.02	3.55	0.66	1.02	1.75	4.70	0.49
	Married	39.51	21.55	19.80	9.81	0.73	3.02	0.86	2.11	1.55	4.74	1.38

Table 7: Marginal effects of the probit model on Informal credit market participation

Variables	All households (1)		Urban residents (2)		Rural residents (3)	
	Marginal Eff.	Std. Err.	Marginal Eff.	Std. Err.	Marginal Eff.	Std. Err.
Women	-0.031	0.022	-0.085	0.062	-0.020	0.022
Age	-0.008***	0.003	-0.015**	0.007	-0.006**	0.003
Age squared	0.000**	0.000	0.000*	0.000	0.000*	0.000
Household size	-0.003	0.002	0.005	0.007	-0.004*	0.003
Primary education	-0.041***	0.015	-0.020	0.036	-	0.017
Secondary education	-0.059***	0.013	-0.049*	0.029	0.045***	0.014
Tertiary education	-0.178***	0.036	-0.140**	0.055	-	0.055
Middle asset quartile	-0.031***	0.011	-0.008	0.028	0.062***	0.011
High asset quartile	-0.079***	0.018	-	0.037	-	0.022
Wage employed	-0.092***	0.014	0.117***	0.026	0.065***	0.017
Hospitalisation	0.017*	0.010	-	0.026	-	0.017
Urban	-0.039	0.033	0.118***	0.027	0.089***	0.010
Central region	0.029**	0.014	0.012	0.029	0.016	0.016
Southern region	0.057***	0.013	0.087***	0.030	0.042***	0.015
Investment	-0.109***	0.011	-	0.035	-	0.010
Distance to the DAC Km)	0.000	0.000	0.199***	0.001	0.090***	0.000
y2016 (IHS4)	0.119***	0.016	-0.001	0.064	0.112***	0.015
y2020 (IHS5)	0.139***	0.015	0.141**	0.066	0.126***	0.014
Observations	7,411		1,481		5,929	

*** p<0.01 statistically significant at 1%, ** p<0.05 statistically significant at 5%, * p<0.1 statistically significant at 10%

Table 8: Heckman probit estimates of determinants of participation in the informal credit market and credit access

Variables	Informal Credit Market		Credit Access (Selection)	
	AME	Std. Err.	AME	Std. Err.
Women	-0.039	0.031	0.005	0.006
Age	-0.008***	0.003	0.006***	0.001
Age squared	0.000	0.000	-0.000***	0.000
Household size	-0.006	0.004	-	-
Primary education	-0.041*	0.022	0.040***	0.009
Secondary education	-0.069***	0.019	0.022**	0.009
Tertiary education	-0.261***	0.046	-0.048***	0.014
Middle asset quartile	-0.016	0.022	0.035***	0.007
High asset quartile	-0.086***	0.023	0.039***	0.009
Wage employed	-0.112***	0.019	0.020**	0.009
Hospitalization	0.023	0.015	-	-
Urban	-0.048	0.047	-0.001	0.012
Central region	0.041**	0.019	-	-
Southern region	0.080***	0.019	-	-
Investment	-0.173***	0.027	-	-
Distance to the DAC (Km)	0.000	0.000	-	-
y2016 (IHS4)	0.219***	0.065	0.114***	0.010
y2020 (IHS5)	0.279***	0.084	0.183***	0.010
Women × y2016	0.029	0.039	-	-
Women × y2020	0.052	0.037	-	-
Urban × y2016	0.079	0.050	-	-
Urban × y2020	0.019	0.053	-	-
Observations	35,459			
Uncensored observations	7,390			
Rho (ρ)	0.478	0.300		

Note: *** p<0.01, ** p<0.05, * p<0.1. AME denote Average Marginal Effects

Source: Authors' estimations on pooled IHS data

Table 9: Marginal effects of the probit model on determinants of sourcing credit from village banks

Variables	All households (1)		Urban residents (2)		Rural residents (3)	
	Marginal Eff.	Std. Err.	Marginal Eff.	Std. Err.	Marginal Eff.	Std. Err.
Women	0.068***	0.025	0.025	0.057	0.077***	0.028
Age	0.013***	0.004	0.007	0.010	0.015***	0.005
Age squared	-0.000**	0.000	-0.000	0.000	-0.000**	0.000
Household size	0.013***	0.004	0.036***	0.009	0.008	0.005
Primary education	0.026	0.023	0.024	0.045	0.030	0.026
Secondary education	0.044*	0.022	0.074**	0.036	0.036	0.027
Tertiary education	0.020	0.053	0.083	0.074	-0.039	0.068
Middle asset quartile	0.026	0.018	0.111**	0.045	0.012	0.020
High asset quartile	0.002	0.032	0.028	0.047	-0.010	0.042
Wage employed	-0.111***	0.021	-0.097***	0.036	-0.114***	0.025
Hospitalisation	-0.010	0.017	0.016	0.034	-0.020	0.019
Log of credit amount	0.030***	0.007	0.018	0.013	0.033***	0.009
Urban	-0.097***	0.033				
Central region	-0.052*	0.030	-0.104**	0.043	-0.036	0.037
Southern region	0.010	0.029	-0.069*	0.041	0.034	0.036
Investment	0.050***	0.017	0.103***	0.035	0.039**	0.020
Distance to the DAC (Km)	-0.000	0.001	0.001	0.002	-0.000	0.001
y2020 (IHS5)	0.006	0.023	-0.009	0.037	0.012	0.024
Women × y2020	0.022	0.032	0.075	0.069	0.006	0.036
Urban × y2020	-0.010	0.044				
Observations	6,017		1,177		4,840	

*** p<0.01 statistically significant at 1%, ** p<0.05 statistically significant at 5%, * p<0.1 statistically significant at 10%

Source: Author's estimations on the pooled IHS data

Table 10: Results of the Multivariate Probit model on borrowing from individual informal credit sources

Variables	(1) Relatives	(2) Neighbour	(3) Loan Sharks	(4) Local Merchants
Women	-0.112*** (0.040)	-0.204*** (0.042)	-0.199*** (0.052)	0.049 (0.084)
Age	-0.027*** (0.010)	0.011 (0.010)	-0.020 (0.012)	0.026 (0.021)
Age-squared	0.000** (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)
Household size	-0.030*** (0.010)	-0.014 (0.010)	0.002 (0.012)	-0.056** (0.023)
Primary education	-0.029 (0.052)	-0.053 (0.054)	-0.043 (0.063)	-0.319** (0.131)
Secondary education	-0.092* (0.048)	-0.008 (0.049)	-0.073 (0.058)	-0.122 (0.106)
Tertiary education	-0.114 (0.132)	-0.071 (0.117)	-0.449*** (0.160)	-0.036 (0.244)
Middle asset quartile	0.008 (0.039)	-0.053 (0.041)	-0.093** (0.048)	-0.019 (0.089)
High asset quartile	0.015 (0.071)	-0.012 (0.068)	-0.146* (0.081)	-0.033 (0.146)
Hospitalisation	0.089** (0.038)	-0.035 (0.038)	0.092** (0.046)	-0.056 (0.079)
Urban	-0.117** (0.049)	0.503*** (0.047)	-0.239*** (0.061)	0.132 (0.097)
Log of credit amount	-0.280*** (0.016)	-0.278*** (0.016)	0.073*** (0.017)	-0.149*** (0.033)
Central region	0.104** (0.052)	0.041 (0.052)	-0.030 (0.058)	-0.468*** (0.103)
Southern region	0.068 (0.051)	-0.047 (0.051)	-0.154*** (0.057)	-0.320*** (0.096)
Wage employed	-0.148*** (0.049)	0.027 (0.049)	0.005 (0.059)	0.041 (0.107)
y2016 (IHS4)	0.134*** (0.049)	-0.069 (0.048)	-0.166*** (0.058)	-0.241** (0.098)
y2020 (IHS5)	0.148*** (0.050)	-0.124** (0.049)	-0.066 (0.059)	-0.316*** (0.104)
Constant	2.438*** (0.225)	1.641*** (0.232)	-1.318*** (0.259)	-0.561 (0.467)
Observations	7,411	7,411	7,411	7,411

Notes: The likelihood ratio test measures the correlation between the binary response variable. The null hypothesis is represented by (a). The probability chi-square of 0.0000 in (b) indicates that the null hypothesis is rejected. Therefore, we can conclude that there is a correlation between the individual credit sources hence the justification to use the multivariate model.

- Likelihood ratio test of $\rho_{21} = \rho_{31} = \rho_{41} = \rho_{32} = \rho_{42} = \rho_{43} = 0$
- $\text{Chi}^2(6) = 1215.88$ Prob > chi2 = 0.0000
- *** p<0.01, significant at 1%; ** p<0.05, significant at 5%; * p<0.1 significant at 10%
- Robust standard errors in parentheses

Table 11: Results of the Multivariate Probit model on borrowing from individual formal credit sources

Variables	(1) Commercial bank	(2) SACCO	(3) MRFC	(4) MARDEF	(5) Religious Institutions	(6) Employer	(7) NGO
Women	0.0656 (0.0882)	0.0370 (0.0944)	0.0726 (0.102)	0.194 (0.124)	0.120 (0.107)	-0.375** (0.165)	0.142** (0.0641)
Age	0.0426** (0.0191)	0.0358** (0.0172)	0.00375 (0.0201)	0.000477 (0.0210)	-0.0126 (0.0166)	0.00600 (0.0286)	0.0266** (0.0125)
Age-squared	-0.000422** (0.000199)	-0.000374** (0.000186)	-4.20e-05 (0.000213)	0.000105 (0.000201)	0.000223 (0.000159)	-0.000145 (0.000321)	-0.000232* (0.000130)
Household size	0.0178 (0.0189)	-0.0145 (0.0202)	0.0170 (0.0212)	-0.0220 (0.0280)	0.0352 (0.0235)	-0.0632* (0.0338)	0.0147 (0.0144)
Primary education	0.0392 (0.117)	0.120 (0.116)	0.0341 (0.123)	-0.149 (0.190)	0.257* (0.132)	0.248 (0.161)	0.0773 (0.0805)
Secondary education	0.149 (0.0971)	0.161* (0.0828)	-0.232* (0.128)	-0.0780 (0.154)	0.0953 (0.137)	0.199 (0.128)	0.0305 (0.0732)
Tertiary education	0.188 (0.149)	0.109 (0.152)	-0.359 (0.261)	-0.351 (0.335)	0.309 (0.217)	-0.0692 (0.202)	-0.511*** (0.173)
Middle asset quartile	-0.0628 (0.0880)	0.148* (0.0860)	0.104 (0.0950)	0.419*** (0.123)	0.0456 (0.109)	-0.577*** (0.139)	-0.0841 (0.0621)
High asset quartile	0.0197 (0.106)	0.113 (0.112)	-0.00173 (0.156)	0.334* (0.182)	-0.00613 (0.164)	-0.224 (0.139)	-0.202** (0.0935)
Hospitalisation	0.0309 (0.0763)	-0.0546 (0.0769)	-0.0610 (0.0912)	0.222* (0.122)	0.00564 (0.103)	-0.185* (0.0998)	0.00477 (0.0592)
Urban	0.137 (0.0834)	-0.223** (0.0905)	-0.132 (0.121)	-0.171 (0.156)	0.0287 (0.122)	0.217** (0.111)	-0.0783 (0.0709)
Log of credit amount	0.472*** (0.0323)	0.242*** (0.0266)	0.288*** (0.0334)	0.273*** (0.0356)	-0.00670 (0.0355)	0.186*** (0.0355)	0.386*** (0.0239)
Central region	-0.0808 (0.0896)	0.0256 (0.101)	0.351*** (0.128)	0.0932 (0.173)	-0.556*** (0.131)	0.0364 (0.137)	0.0564 (0.0713)
Southern region	-0.245*** (0.0896)	0.107 (0.0934)	0.222* (0.130)	0.294* (0.172)	-0.309*** (0.114)	0.164 (0.130)	-0.0104 (0.0721)

Wage employed	0.264*** (0.0849)	0.501*** (0.0766)	-0.191 (0.127)	-0.0690 (0.147)	0.120 (0.119)	1.256*** (0.133)	-0.0396 (0.0746)
y2016 (IHS4)	-1.147*** (0.0937)	-0.206** (0.0975)	-0.843*** (0.119)	-1.177*** (0.152)	-0.454*** (0.123)	-0.590*** (0.131)	-0.746*** (0.0729)
y2020 (IHS5)	-1.512*** (0.106)	-0.473*** (0.0971)	-0.637*** (0.113)	-1.252*** (0.149)	-0.448*** (0.125)	-0.301** (0.127)	-0.857*** (0.0742)
Constant	-6.787*** (0.479)	-5.131*** (0.400)	-4.790*** (0.482)	-4.922*** (0.534)	-1.920*** (0.470)	-4.109*** (0.583)	-5.483*** (0.331)
Observations	7,411	7,411	7,411	7,411	7,411	7,411	7,411

Notes: The likelihood ratio test measures the correlation between the binary response variable. The null hypothesis is represented by (a). The probability chi-square of 0.0000 in (b) indicates that the null hypothesis is rejected. Therefore, we can conclude that there is a correlation between the individual credit sources.

- Likelihood ratio test of $\rho_{21} = \rho_{31} = \rho_{41} = \rho_{51} = \rho_{61} = \rho_{71} = \rho_{32} = \rho_{42} = \rho_{52} = \rho_{62} = \rho_{72} = \rho_{43} = \rho_{53} = \rho_{63} = \rho_{73} = \rho_{54} = \rho_{64} = \rho_{74} = \rho_{65} = \rho_{75} = \rho_{76} = 0$
- $\chi^2(21) = 118.274$ Prob > $\chi^2 = 0.0000$
- *** p<0.01, significant at 1%; ** p<0.05, significant at 5%; * p<0.1 significant at 10%
- Robust standard errors in parentheses

Source: Author's estimations on the pooled IHS data

APPENDIX

Appendix 1: Summary statistics of the IHS rounds

Variable	2010/2011		2016/2017		2019/2020	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Women	0.20	0.402	0.26	0.436	0.29	0.455
Age	38.50	11.573	39.94	12.499	40.26	12.742
Household size	4.99	2.171	4.66	1.985	4.63	2.005
Wage employment	0.27	0.443	0.20	0.402	0.20	0.397
Years of education	7.01	5.063	7.19	4.460	6.85	4.182
No education	0.63	0.482	0.61	0.487	0.63	0.483
Primary school	0.11	0.314	0.12	0.328	0.14	0.346
Secondary school	0.21	0.406	0.22	0.415	0.20	0.404
Tertiary school	0.05	0.214	0.04	0.204	0.03	0.163
Single	0.02	0.138	0.03	0.160	0.03	0.165
Divorced	0.10	0.304	0.13	0.337	0.14	0.351
Widow or Widower	0.09	0.282	0.09	0.289	0.10	0.295
Married	0.79	0.407	0.75	0.432	0.73	0.443
Hospitalization	0.63	0.483	0.72	0.448	0.69	0.461
Low asset quartile	0.53	0.499	0.56	0.496	0.60	0.491
Medium asset quartile	0.36	0.479	0.31	0.464	0.30	0.457
High asset quartile	0.11	0.319	0.12	0.331	0.11	0.310
Investment loan	0.54	0.499	0.39	0.487	0.57	0.495
Distance to Boma (Km)	59.44	30.322	22.93	20.255	23.02	20.299
Weekly food expenditure (\$)	3.00	3.727	10.34	10.554	10.80	10.275
Credit amount (\$)	23.30	67.723	37.95	75.261	45.44	83.284
Urban	0.22	0.413	0.23	0.419	0.17	0.373
Northern region	0.13	0.332	0.21	0.409	0.17	0.376
Central region	0.41	0.493	0.35	0.476	0.32	0.468
Southern region	0.46	0.499	0.44	0.497	0.51	0.500
Observations	1,393		2,880		3,137	

Source: Authors' calculations on IHS3, IHS4 and IHS5 data

Appendix 2: Marginal effects of the probit model on formal credit market participation

Variables	All households (1)		Urban residents (2)		Rural residents (3)	
	Marginal Eff.	Std. Err.	Marginal Eff.	Std. Err.	Marginal Eff.	Std. Err.
Women	0.031	0.022	0.085	0.062	0.020	0.022
Age	0.008***	0.003	0.015**	0.007	0.006**	0.003
Age squared	-0.000**	0.000	-0.000*	0.000	-0.000*	0.000
Household size	0.003	0.002	-0.005	0.007	0.004*	0.003
Primary education	0.041***	0.015	0.020	0.036	0.045***	0.017
Secondary education	0.059***	0.013	0.049*	0.029	0.062***	0.014
Tertiary education	0.178***	0.036	0.140**	0.055	0.225***	0.055
Middle asset quartile	0.031***	0.011	0.008	0.028	0.031***	0.011
High asset quartile	0.079***	0.018	0.117***	0.037	0.065***	0.022
Wage employed	0.092***	0.014	0.118***	0.026	0.089***	0.017
Hospitalisation	-0.017*	0.010	-0.012	0.027	-0.017	0.010
Urban	0.039	0.033	-	-	-	-
Central region	-0.029**	0.014	-0.087***	0.029	-0.016	0.016
Southern region	-0.057***	0.013	-0.117***	0.030	-0.042***	0.015
Investment	0.109***	0.011	0.199***	0.035	0.090***	0.010
Distance to the DAC (Km)	-0.000	0.000	0.001	0.001	-0.000	0.000
y2016 (IHS4)	-0.119***	0.016	-0.141**	0.064	-0.112***	0.015
y2020 (IHS5)	-0.139***	0.015	-0.145**	0.066	-0.126***	0.014
Women × y2016	-0.020	0.026	-0.078	0.073	-0.011	0.027
Women × y2020	-0.035	0.024	-0.039	0.069	-0.032	0.025
Urban × y2016	-0.050	0.033	-	-	-	-
Urban × y2020	-0.013	0.035	-	-	-	-
Observations	7,411		1,481		5,929	

*** p<0.01 statistically significant at 1%, ** p<0.05 statistically significant at 5%, * p<0.1 statistically significant at 10%

Source: Authors' estimations

Appendix 3: Association between provincial location and education attainment

Education level	Region			Total
	North	Central	Southern	
None	45.24	67.18	65.27	62.36
Primary	16.31	11.74	12.12	12.74
Secondary	32.40	18.38	18.95	21.15
Tertiary	6.04	2.70	3.66	3.75
Total	100	100	100	100

Pearson $\chi^2(6) = 215.8026$ Pr = 0.000

Source: Authors' estimations on the pooled data

Appendix 4: Results of the Multivariate Probit model on borrowing from informal credit sources (two IHS waves)

VARIABLES	(1) Village banks	(2) Relatives	(3) Loan sharks	(4) Local merchants
Women	0.230*** (0.039)	-0.134*** (0.044)	-0.158*** (0.055)	0.029 (0.097)
Age	0.026*** (0.010)	-0.021* (0.011)	-0.037*** (0.014)	0.020 (0.026)
Age-squared	-0.000** (0.000)	0.000 (0.000)	0.000*** (0.000)	-0.000 (0.000)
Household size	0.049*** (0.010)	-0.044*** (0.011)	0.007 (0.013)	-0.094*** (0.028)
Primary education	0.039 (0.051)	-0.046 (0.058)	-0.079 (0.069)	-0.192 (0.141)
Secondary education	0.052 (0.047)	-0.139** (0.055)	-0.117* (0.066)	-0.188 (0.133)
Tertiary education	-0.043 (0.107)	-0.249 (0.154)	-0.471** (0.184)	0.121 (0.289)
Middle asset quartile	0.112*** (0.039)	-0.050 (0.044)	-0.029 (0.053)	0.088 (0.110)
High asset quartile	-0.070 (0.062)	0.035 (0.077)	-0.122 (0.087)	0.227 (0.166)
Hospitalisation	-0.062* (0.037)	0.162*** (0.043)	0.066 (0.051)	-0.029 (0.097)
Urban	-0.267*** (0.046)	-0.095* (0.055)	-0.150** (0.068)	0.055 (0.124)
Log of credit amount	0.110*** (0.014)	-0.253*** (0.017)	0.086*** (0.018)	-0.186*** (0.041)
Central region	-0.087* (0.049)	0.119** (0.057)	-0.006 (0.064)	-0.647*** (0.129)
Southern region	0.096** (0.046)	0.048 (0.055)	-0.136** (0.062)	-0.498*** (0.115)
Wage employed	-0.254*** (0.048)	-0.039 (0.055)	0.015 (0.067)	-0.023 (0.143)
y2020 (IHS5)	0.064* (0.033)	0.001 (0.038)	0.114** (0.046)	-0.036 (0.092)
Constant	-2.181*** (0.223)	2.255*** (0.251)	-1.307*** (0.285)	-0.137 (0.607)
Observations	6,017	6,017	6,017	6,017

Notes: The likelihood ratio test measures the correlation between the binary response variable. The null hypothesis is represented by (a). The probability chi-square of 0.0000 in (b) indicates that the null hypothesis is rejected. Therefore, we can conclude that there is a correlation between the individual credit sources.

- e) Likelihood ratio test of $\rho_{21} = \rho_{31} = \rho_{41} = \rho_{32} = \rho_{42} = \rho_{43} = 0$:
- f) $\text{Chi2}(6) = 1699.09$ Prob > chi2 = 0.0000
- g) *** p<0.01, significant at 1%; ** p<0.05, significant at 5%; * p<0.1 significant at 10%
- h) Robust standard errors in parentheses

Source: Author's estimations on the pooled IHS data

Appendix 5: Regression results on the impact of informal borrowing on household welfare as proxied by household weekly food expenditure

Variables <i>(Response variable: log of weekly food expenditure)</i>	All households (1)		Urban households (2)		Rural households (3)	
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
Log of amount borrowed from informal sources	0.178***	0.012	0.184***	0.022	0.175***	0.014
Household size	0.076***	0.007	0.086***	0.013	0.072***	0.008
Women	-0.124***	0.031	-0.009	0.053	-0.152***	0.034
Age	0.029***	0.008	0.014	0.014	0.032***	0.008
Age-squared	-0.000***	0.000	-0.000	0.000	-0.000***	0.000
Primary education	0.106***	0.038	0.082	0.069	0.114***	0.044
Secondary education	0.158***	0.038	0.249***	0.053	0.131***	0.048
Tertiary education	0.508***	0.087	0.655***	0.079	0.349**	0.172
Wage employed	0.254***	0.034	0.080*	0.046	0.319***	0.043
Urban resident	0.749***	0.039	-	-	-	-
Distance to DAC (km)	-0.003***	0.001	-0.000	0.003	-0.003***	0.001
Central region	-0.151***	0.054	0.061	0.053	-0.216***	0.065
Northern region	-0.130**	0.054	0.031	0.056	-0.190***	0.065
y2016	-0.396***	0.059	-0.441**	0.174	-0.369***	0.063
y2020	-0.328***	0.061	-0.577***	0.179	-0.267***	0.065
Constant	0.902***	0.163	1.775***	0.314	0.920***	0.182
R-squared	0.287		0.320		0.151	

*** p<0.01 statistically significant at 1%, ** p<0.05 statistically significant at 5%, * p<0.1 statistically significant at 10%

Source: Author's estimations on the pooled IHS data