The Impact of Informal Credit on Household Welfare: The Case of Rural Ethiopia

By

TONCH, Habitamu Asifawu

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Submitted to

KDI School of Public Policy and Management

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Committee in charge:

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Contents

Abstract

This study work was based on the idea of "consumption smoothing theory" which was demonstrated based on "life-cycle model of consumption" and the main aim of the study was, *analyzing the effect of informal credit on household welfare. Following two stage least square regression analysis by taking average number of informal borrowing participant households within community as an instrumental variable for informal credit in order to avoid endogeneity, the study found that informal credit and households welfare have positive relationship. Each thousand Birr*[1] *received in the form of informal credit improves welfare expenditure of household by about 4.3 percentage, ceteris paribus. This result was consistent with pervious works of* (Kati.S, 2010; Cuong.V.N & Marrit.vanden.B, 2011).

[1] *Birr is the name of Ethiopian currency.*

1. Introduction

Rural households are more venerable for various socio-economic as well as recently for environmental related factors. Specially, because of nature-based agricultural livelihood system, in rural section of developing economies, the issue has becoming more exacerbated. Due to this income is volatile and consumption is not smoothed (Anne.C, 1995). To escape from these, the rural households looks for alternatives of selling durable assets, having informal credits, "liquidation of previous savings", participating on rotating savings and credit associations, and or social security networks; which together named as nonmarket institution by Timothy Besley (Timothy.B, 1995). These are means to resist shock so that consumption is smoothed and livelihood sustained through bad periods (Anne.C, 1995).

Though, rural households have options to survive in bad periods, but from their economic background of subsistence, non-ownership of easily liquidable assets and inaccessibility of savings and formal credit access (Yann.B & Rachel.K, 2007; Anne.C, 1995; Jonathan.B, Cristobal.M, Laura.S, Jeanette.T, & Anna.Y, 2011) forces them inclined to more to informal means of risk sharing mechanisms (Diagne.A, Zeller.M, & Sharma.M, 2000). The mechanism has been serving as a way in which rural households have get credit, insurance or in general risk sharing to survive in situation of bad circumstances based on their personal relationship of relativeness, neighborhood, social networks, etc,.

Thus, this study focuses on credit related informal risk sharing mechanism, in which rural households obtain credit in informal way from relatives, neighborhood, religious institutions, friends, shops, groceries, etc,. the form of risk sharing most famous in rural part of developing countries (Stefan.D, 2002). The rationales to undertake this study were: first, the country's

current status; Ethiopia is among low income countries with 79 percent of the population live in rural area (WB, 2018). Thus, knowing the various characteristics of rural household can will lead to better direction for formulation and implementation of plausible policies. Second, limited study in the area; although there are studies by (Alemayehu.G, Abebe.S, & Daniel.Z, 2006; Abbi.M.K & Gamal.I, 2011; Bocher.T.F, Alemu.B.A, & Kelbor.Z.G, 2017; Gurmessa.N.E & Catherine.N, 2017; Yehuala, S. , 2008), these studies are focused on access to credit rather than amount of credit obtained. In addition to these, most of the studies are limited to regional specific and doesn't represent recent phenomena.

In connection to this, the study was undertaken with aim of analyzing the impact of informal credit on rural household welfare. Specifically, to identify factors that determine welfare of rural households; to see how informal credit, farm and nonfarm income as well as assistance, extension program participation and household size affects the welfare of rural household and to suggest supportive policy direction that can improve welfare of the rural household.

To this end, following two stage least square regression analysis (2SLS) by taking average number of informal borrowing participant households within community as an instrumental variable for informal credit in order to avoid endogeneity, the study found that informal credit and households welfare have positive and statistically significant relation.

For convenience purpose, the paper was structured in six sections including the introductory part. The second part presents literature review, the third part is about data and methodology, the following section is about descriptive statistics, result presentation and discussion, the fifth part

will look-over robustness check of the result, and the final part will present conclusion and policy recommendations.

2. Literature Review

2.1 Informal credit and Household Welfare Theoretical Foundation

This study work was based on the idea of consumption smoothing theory which was demonstrated based on "life-cycle model of consumption". The model describes about the whole life time movement of individual/household based on consumption and saving choices (Mankiw.N.G, 2010). These choices matter in current as well as future individual or household or whole economy movement. More consumption today determines future consumption and more saving today has implication on future consumption. Since, the focus of the study was about household welfare and credit, the life-cycle model of consumption has important implication on the study through theory of consumption smoothing.

The economic idea of consumption smoothing become popular after the life-cycle model of Modigliani and Brumberg. It reflects, how households try to maintain smoothed consumption through time with fluctuation in income. Smoothing consumption through time is possible by action of such as borrowing, past saving, depleting assets, adjusting employment situation, and others (Jonathan.M, 1995). Based on this theoretical foundation, the study tries to show how informal credit can affect households' welfare by smoothing their consumption expenditure.

2.2 Why Informal Credit?

Before looking at the above question, it is important to know who are participating in informal credit sector both form supply and demand side. From demand perspective, there are three

groups are participants in rural informal credit. Manfred named them 1. “**vulnerable households near or below poverty line**”; 2. “**above the poverty line and not vulnerable**” and 3. “**larger agribusiness and other firms and owners of plantations**”. The classification was based on the individual or household income level and or economy activity. Individuals whose activities are daily laborer, tenant, smallholder agriculturalist, small land owners for food production are considered as client of first group. The second group consistence of civil servants and owners of above average land size and micro and small enterprises, etc. Under the third category, individuals who have capacity to use formal financial sectors but due to less accessibility fall to use them are included (Manfred.Z, 2003).

From supply side, Barbara and Srinivas, divided informal credit suppliers in to three categories. The "**transactional credit suppliers**": those are making lending activities regularly and for whom credit is a business transaction. Under this category we have money lenders, traders, employers etc. The "**mutual credit suppliers**": credit supply based on ideology of give and take. Here they listed ROSCAs, credit unions, credit societies, people's organizations/self-help groups as an example. The "**personal/casual credit suppliers**": this category includes peoples who give loans in a casual manner which is consider as a favor given to friends, relatives, coworkers and neighbors (Barbara.I & Srinivas.H, 1996).

From economics perspective, if there are supply and demand, market will be created and transaction will occur and the same is true for informal credit market. But, why informal credit? Both formal as well as informal credit coexist together in most situation because of their own trade-off. But, in third world, where formal financial institutions are at low stage of development and not easily accessible, informal financial institutions are dominate one. Especially, the rural

part of developing economies are over attached with informal financing for major socio-economic activities (Abhijit.V.B & Esther.D, 2006; Barslund.M & Finn.T, 2008).

In this regard, the question of, what makes the informal credit superior? has been area of interest for many studies and scholars and they come-up with the following justifications: First, the issue of size of project forces the borrowers to make choose between formal and informal credit. The smaller the project with low capital requirement and the more likely the project owner going to finance from informal credit sources (Alexander.K & Anke.K, 2017). Second, social capital. The social bond created within societies and trust developed between individuals, friends and relatives also directs borrowers to informal credit market; because, it lowers "interest rate than formal loans"; which provides large borrowing opportunity with low price for poor and asset disadvantaged groups (Haileleul.G, 2001; Alexander.K & Anke.K, 2017).

Third, low monitoring and enforcement cost; lender as well as borrower are known well each other in informal credit. Since, most of the time, the landing-borrowing activities are taken place among households, friends, relatives or individuals within same village and which provides participants to have better information among and create easy way to monitor and requires low cost to enforce during default (Stiglitz.J, 1990; Bond.P & Robert.T, 1997). It has also low transaction cost than formal credit (Liqiong.L & etal., 2019; Agegnehu.B, Karantininis.K, Li.F, 2012). Fourth, economic background of the borrower; study by Abhijit and Esther (Abhijit.V.B & Esther.D, 2006), on thirteen poor countries identified, households and individual who are in extreme poverty, because of low access of formal institutions for financial services, mostly depends on informal sources for financial need (Abhijit.V.B & Esther.D, 2006).

Fifth for consumption smoothening; due to limited window form formal lending institutions[2] for consumption smoothening, households prefer informal money lender as a means to escape from financial shortage and coping with shock. After all it is sustainable consumption that matter more for rural poor households. Thus, in order to achieve sustainable consumption to keep better welfare, the marginalized low-income households opt for informal credit that smooth their consumption pattern (Barslund.M & Finn.T, 2008; Kati.S, 2010).

The other possible reason for informal credit is zero or less collateral and non-profit motive. Collateral serve as an instrument to be protected from information asymmetries between borrowers and lenders, that will cause adverse selection and moral hazard. But, in the case of informal credit, collateral is less important compared to formal credit (Carmen.K, Lukas.M, Doris.N, 2013; Alexander.K & Anke.K, 2017). Also, the credit activities are mostly based on helping each other which is grounded on "solidarity and mutuality of action" rather than profit motive (Srinivas.H, 2016). Inexpensiveness or short procedure of informal credit and freedom of credit allocation are also other factors behind rural informal credit (Agegnehu.B, Karantininis.K, Li.F, 2012).

Some also choose informal credit because of its characteristic of multiple proprietorships and personalized services. Informal credits formed by group are characterized by proprietorship in which the group members are liable and which provide the members multiple proprietorship opportunity to secure from default. In relation to personalized services, formal institutions "operates with structure and procedures which are common to all borrowers". But in case of

[2] "Formal sector focuses almost entirely on production loans and asset accumulation" (Barslund and Tarp 2008).

informal credit sector, there are options to rearranges and modify the operating means based on the requirements of the creditor (Srinivas.H, 2016). In general, “poor are often excluded from formal credit markets” but, because of easy means of access, less collateral, better information fellow within borrower and lender makes informal credit preferred over formal credit special by poor section (Yan.Y & Lihe.X, 2015).

2.3 Previous Studies

For many of financial analysts and in financial market study, households are considered as savers. Finance related course of studies and research areas considered government and firms as fund users and households as savers or fund providers (Anthony.S & Marcia.M.C, 2012). But, household also make credit from formal as well as informal financial institutional setups and for that matter the theory of consumption smoothing was based on credit. For households with problem of temporary finance, it is credit that improves well-being (Christine.L.D, 2018). Even though, the number of participant households in fund provision are higher than that of fund user, in financial markets such as primary mortgage markets (single-family home loans), households’ participation in use of credit has been increasing (Peter.S.R & Richard.L.H.Jr, 2000). Thus, households are both producers and consumers of fund in financial market through saving and borrowing.

There are different views about household welfare outcome of credit. While saving provides security for future welfare, credit is means for escaping from current financial shortage for households which will be used for welfare maintenance or improvement. Both from provider as well as receiver perspective, welfare will be affected with credit. The provider’s welfare affected in terms of saving for future consumption with scarification of current consumption and the

receivers' welfare is affected in revers way, through solving the current financial problem at cost of future free or interest-bearing repayment.

Even though, many studies identified positive household welfare outcome of credit, still there are studies which showed negative outcome of credit on household welfare. From negative side, the study undertaken by (Britta.A & etal., 2015), identified that credit will reduce the consumption of household. In the study, they come-up with reduction of durable and non-durable household consumptions by amount of 15 percent for treatment group than control group.

Cuong.V.N and Marrit.vanden.B (2011) while studying the impact of informal credit on poverty and inequality, they found positive impact of credit on poverty reduction. The study showed poor gets better proportion of credit from informal than formal institutions and credit reduces "poverty incidence of borrowers by 8 percentage points". As poverty much attached with consumption and welfare, reduction of poverty is much attached with increase in consumption level and improvement of welfare. Study by Bruno, Florencia, Esther and William, estimated the effect of microcredit on household consumption expenditure and resulted in negative and insignificant effect of credit on consumption (Bruno.C, Florencia.D, Esther.D, & William.P, 2015).

Still study based on randomized control trial by (Abhijit.V.B, Esther.D, Rachel.G, 2015); microcredit effect on various socio-economy outputs, resulted on controversial outcomes on durable and nondurable goods expenditure. The study found that credit doesn't "significantly improves consumption". Both for treatment and comparison group households, the overall result of credit impact on expenditure of both form of goods was insignificant (Abhijit.V.B & Sendhil.M, 2010). Study on private transfers, informal loans and risk sharing among poor urban households in Ethiopia, identified how credit helps households to escape from "low and

uncertain incomes" and there by smoothing the overall consumption pattern (Eskander.A & Selfe.D, 2009).

Credit also improves household welfare by improving consumption and housing type both in short as well as long run (Guush.B & Cornelis.G, 2011). The study based on fixed and random effect model identified that credit has significant effect on "per-capita household consumption".

Study by Salia, found how credit contributes to reduction of poverty and improvement of household welfare by providing opportunity to "acquire more and long-term asset"; that will be used to finance education and medical expense of the household (Salia.P.J, 2014). Food related poverty which has been problem in many developing countries are majorly due to weak asset base of household and which can be resolved mostly by credit. Sivchou.T and etal. (2011) realized this situation while studying Prek Norin Commune in Cambodia. Credit improves standard of living through creating job opportunity that facilitate the increment of income and asset.

According to Langat, Mutai, Maina and Bett, "credit and household welfare has positive relationship". Household who participate in credit market has better welfare outcome than household who can't (Langat.J.K, Mutai.B.K, Maina.M.C, & Bett.H.K, 2011). That is, households with more credit amount has better welfare than household with less amount of credit (Agegnehu.B, Karantininis.K, Li.F, 2012). Credit also "increases the households' economic welfare" through improving per-capita income, expanding food and non-expenditure and increasing the market values of non-land assets (Dang.T.H.Y, Nanseki.T., & Chomei.Y, 2018). Study by Sung.J.K and Yasuyuki.S (2003), identified how credit crunch negatively affect

household welfare, reduce consumption of luxury items, reducing food, education and health expenditures.

Another study on “credit and capital [s]upport on economic behavior of farm households”, showed how economic activities of the household depends on credit (Bernardus.B.R, Bonar.M.S, Nunung.K, & Mohamad.H.S, 2013). In addition to this, difference-in-difference based study on credit impact of welfare identified that, more amount of credit has positive and significant impact on the household welfare than those earn less amount of credit. Least but not last, Siyoum, Dorothea and Alula, found disability of credit to take poor form poverty and ensure food security (Siyoum.A.D, Dorothea.H, & Alula.P, 2012). Thus, credit outcome of welfare is still controversial.

2.4 Rural Informal Credit in Ethiopia

As a developing country, Ethiopia is characterized by under developed financial sector. Beside this, “smoothing consumption in the face of shocks is challenging for subsistence populations given the low productivity characteristic of rain-fed agriculture” (Mark.C, Thomas.R, Mulye.G, 2015). The financial sector of the country is not only weak in capacity, but also less accessibility, less developed in composition, inefficient, and is not modern (Negussie.E.G & Catherine.N, 2017; Aderaw.G & Dr.Manjit.S, 2016). Especially, “formal financial institutions are inefficient and inaccessible in providing credit facilities to the poor” as citied by (Alemayehu.O & Fenet.B, 2016)(identified by Assefa et al., 2005). They are also more concentrated in urban areas and sceptic to lend for resource disadvantaged country side farmer (Negussie.E.G & Catherine.N, 2017; Gashayie.A & Singh.D, 2015).

To this matter, the rural Ethiopia is still much depend on informal financing for financial requirements. Informal sources are frequently used by households than formal sources (CSA, 2017)[3]. The rural informal credit sector of the country is endowed by different participants. Relatives, friends, neighborhoods, religious institutions, groceries, local merchants, local shops, "Idir"[4] and "Equib[5]" (Fichera.E, 2010) are the major actors. Also, the 2011 and 2015/16 socio-economy survey identified these means of informal financing for rural Ethiopians. They together summed-up a total rural credit of 68.17% in 2011 and 66.1% in 2015 (CSA, 2013; CSA, 2017).

Among informal credit sources, the last two are rotating saving and credit associations (RoSCAs) and are more known, participator (more individual and or households participate together), zero interest based and transparent. The remaining are characterized by less transparent and less participator and based on individual deep personal attachment and attached with some amount interest payments based on individual characteristic. In general, informal credit is more accessible and holds largest share in participation of rural households than formal credit services (Haileleul.G, 2001).

In Ethiopia, rural informal credit is accessed in two forms. Either in cash form or in-kind form. Households with large number of family sizes with huge burden in providing food for family member go for cash form credit in off-harvesting period. Households with small cultivation land takes credit in kind form such as food crop. Also, an individual or households who have problem with health condition tend to have informal credit in form of cash (Teressa.A & Franz.H, 2000).

[3] CSA denote Central Statistical Agency
[4] Idir is local association based on saving and credit motive organized by households who live in the same locality to escape from financial and psychological fall due to death of relatives.
[5] Equib is similar to rotating saving and credit association.

Either in cash or in-kind form, rural household's decision to borrow is influenced by risk and uncertainty (Karlan.D, Kutsoati.E, McMillan.M, & Udry.C, 2011). But, in terms of credit supply choices, informal credit suppliers are popular and dominant (Negussie.E.G & Catherine.N, 2017). To access informal credit, factors such as family size, farm size, number of oxen and land ownership and other resource ownership were identified as a major determinant (Teressa.A & Franz.H, 2000; Daniel.A, 2003). Households with large number of dependent family size, because of high consumption, forced to participate in credit market actively have better access to informal credit. Individual and or household with fertile and large land size have also good access to credit because of collateral power of the land.

Beside these, Temesgen.F.B, Bamlaku.A.A, Zerihun.G.K (2017), also identified "education level, participation in off-farm activities, membership in "equib," distance from the market" as determining factors for access to credit for rural household. Those with better educational qualification and households with additional form of off-farm business engagement have better access to credit either for consumption smoothing or production.

Even though, informal credit plays vital role in Ethiopian rural household, but from its informality nature as well as related to the economic stage of the country, have not well developed. There are factors that affects the development of informal financial market. The factors are government intervention, land property rights, population density, saving mobilization and institutional diversity. The factors determine development of the informal market by way of how government intervene in the market, with whether the land is owned by the government or private, with either population density is high or low and with prevalence of "reliable and safe" saving deposit. Beside these, institutional diversity which creates competition

among informal credit markets and lower the cost of borrowing to customers is also other source that determine the growth of informal financial institutions (Hussien.H.K, 2007).

3. Data and Methodology

3.1 Data

The study was conducted based on secondary data collected by collaborative project between the CSA and the World Bank based on Living Standards Measurement Study Integrated Surveys of Agriculture project with aim of collecting "multi-topic panel household level data with focus on agricultural statistics and the link between agriculture and other household income activities" (CSA, 2017). The data is named Ethiopia Socioeconomic Survey of 2015/16. The survey is undertaken particularly by CSA of Ethiopia.

Socioeconomic Survey data collection was beginning in Ethiopia in 2011 with focusing on rural area. The first socioeconomic data wave named "Ethiopia Rural Socioeconomic Survey" with focus on rural Ethiopia only. But, starting from the second wave, to give nationwide representative picture about the survey, the name "Rural" was dropped and renamed Socioeconomic Survey with inclusion of urban area. Thus, Socioeconomic Survey has been undertaken three times in Ethiopia.

The first one was in 2011/12, which only focused on rural households, the second one was undertaken in 2013/14 and the third one was undertaken in 2015/16. Both the second and the third-round surveys collected data from both rural and urban part of the country. According to CSA, the first Socioeconomic Survey was conducted on 333 enumeration areas and the second and the third were conducted in 433 enumeration areas. In the first enumeration, out of total area 290 were rural and 43 were small towns and the subsequent two are both from rural and urban.

Out of 433 enumeration areas 290 were rural, 43 were small town and 100 were from major urban centers of the country including Addis Ababa (CSA, 2017).

The survey has been undertaken by using five questionnaires on household, community, agriculture, post-planting, post-harvest and livestock. The household questionnaires were used to collect data from all households; community-based questionnaires were used to have information about "infrastructure; community organizations; resource management; changes in the community; key events; community needs, actions and achievements; and local retail price information". The remaining three questionnaires were agriculture activities related and used for collecting data from those households whose livelihood entirely or in some form attached with agricultural activities (CSA, 2017).

For this study we used 2015/16 Socioeconomic Survey which is obtained from World Bank Microdata Library. The survey includes data set of household consumption aggregate, land, food and crop, Geo-variables (geo-spatial), livestock, post-plant and post-harvest information and data set of community from which the households are drawn. In connection to this, for households in nine community s, credit and welfare related socio-economic data was extracted from different data sets of the survey.

In the study, household total consumption expenditure was used as proxy to indicate the welfare of the household. For informal credit data, the amount of credit obtained by households from relatives, friends, neighborhoods, religious institutions, groceries, local merchants, local shops, "Idir" and "Equib" are used. A total of 2,396 households' data was used to see the econometric relationship. To avoid the selection bias, we used both households who get credit and those households who didn't get credit.

3.2 Methodology

To investigating the relationship between informal credit and household welfare, this study tested a welfare equation in which the dependent variable is household welfare which is measured by proxying household annual consumption expenditure and the independent variable of total household informal credit, which is obtained by summation of all informal sources of relatives, friends, neighborhoods, religious institutions, groceries, local merchants, local shops, "Idir" and "Equib" (Quach.M.H, Mullineux.A.W, Murinde.V, 2007).

Following the previous works of (Fichera.E, 2010; Akudugu.M.A, 2014; Cuong.V.N & Marrit.vanden.B, 2014), the regression model will control for other factors supposed to influence household economic welfare. At the household level, welfare might be affected by household socio-economic characteristics, including gender and educational level of household head, total area of household landholding, household size, farm area, access to extension services, purpose of credit, owing of non-agricultural activities, and whether the household is affected by shock or not. At the community levels, household welfare is possibly influenced by the community-based characteristics in which the household dwell. These may include such as road and market access.

The study employed 2SLS method. It follows the works of (Cuong.V.N & Marrit.vanden.B, 2011) and (Akudugu.M.A, 2014) who followed similar approach to estimate the impact of Informal credit on poverty and inequality in Vietnam and the effect of formal and informal credit on farm household welfare in Ghana respectively. Initial informal credit will be estimated based on household and community related characteristics and Instrumental Variable that can have potential impact on getting credit but not on welfare and then welfare will be estimated by including the estimated credit and other variables.

Model:

$$\ln(\boldsymbol{Y}_{icr}) = \alpha \widehat{\boldsymbol{C}_{icr}} + \boldsymbol{\beta X}_{icr} + \boldsymbol{\rho}_c^{\boldsymbol{y}} + \boldsymbol{\mu}_r^{\boldsymbol{y}} + \boldsymbol{\varepsilon}_{icr}^{\boldsymbol{Y}}$$

$$\boldsymbol{C}_{icr} = \lambda Z + \Omega \boldsymbol{X}_{icr} + \rho_c^k + \mu_r^k + \varepsilon_{icr}^k$$

Where,

$\ln(\mathbf{Y}_{icr})$ represents logarithmic of household consumption expenditure measured in Ethiopian Birr (ETB) for household i from community c and region r. $\mathbf{C}_{icr}$ the total amount of informal credit obtained by household i in community c and region r from different informal credit providing agents. $\mathbf{X}_{icr}$ is a set of observed socio-economic characteristics of household i in community c and region r.

The control variables must be not affecting the amount of informal credit household get (Ravallion.M, 2001; Heckman.J.J, Robert.J.L, Jeffrey.A.S, 1999). **Z** is instrumental variable/s that can determine the amount of credit household i in community r can obtain but not welfare. α, β, Ω, ρ and λ are unknown variables to be estimated from both equations. ρ_c^k *and* μ_r^krepresents unobservable factor/s of community and region fixed effect that affects the amount informal credit received by household. $\boldsymbol{\rho_c^y}$ ***and*** $\boldsymbol{\mu_r^y}$ represents unobservable factor/s of community and region fixed effect that affects the amount consumption expenditure made by household. ε_{icr}^{y} is contained errors, representing other determinants of household welfare that vary across households, such that $E(\varepsilon_{icr}^{y} / \boldsymbol{C_{icr}}, \mathbf{X}_{icr})=0$ assuming that all factors are observable, the effect of informal credit on household welfare which measured by α is estimated without bias. ε_{icr}^{k} is contained errors, representing other determinants of amount of informal credit obtained, that vary across households in community c and region r, such that $E(\varepsilon_{icr}^{c} / \mathbf{X}_{icr}, \mathbf{Z}, \rho_c^k, \mu_r^k,)=0$.

If all independents variables are observable, the effects of informal credit on household welfare can been "α" and estimated without any bias (Akudugu.M.A, 2014). However, there is a

problem of endogeneity in the model. And, because of the endogeneity which is created due to unobservable household and or community level factors that affect amount informal credit obtained, the estimation will be biased if we don't take care of that. Thus, the problem of endogeneity should be solved. The problem of endogeneity can be solved by different means. But the ad hoc approaches and instrumental variables estimation technique are widely used. Ad hoc approaches follow, if the dependent variable is endogenous, replacing it with a proxy variable will make it free from endogeneity problem. The most common approach to deal with endogeneity problem is instrumental variables estimation technique (Wooldrige.J.M, 2006; Shepherd.B, Doytchinova.H.S, Kravchenko.A, 2019).

Thus, in this study we followed instrumental variables estimation technique to solve the problem of endogeneity. But, the problem with this approach is finding appropriate instrument for variable that create the problem of endogeneity. In our case, the problem was created by informal credit; and in this regard, applying the theory of demand is a good solution. Following the theory, demand is determined by price and thus, the price of a good or service is a good instrument for approximating the demand. In relation to this, the price of informal credit, which is the interest rate the loan provider going to charge, will be a good instrument. However, the difficulty of using interest rate as an instrument is, the amount of interest rate to be charged by the lender didn't vary among households. The credit provider charges the same amount of interest for every households. Therefore, it will not be a good instrument. Alternately, the study employed other instruments following review of previous studies output and literatures.

The study employed an instrument that are potentially will determine the amount of informal credit but not welfare of a household. The instrument is, average number of informal borrowing

participant households within community. This is from the fact that, given the low amount of available liquid fund in rural developing economies, the higher the proportion of informal borrowing participant households in the community, the lower will be the share of credit can each household obtain. The lower the number of informal borrowing participant households in the community, the higher will be the amount of cash available for each household who are participating in the credit market. Cuong.V.N and Marrit.vanden.B (2011), used similar instrumental variable while undertaking "Informal credit, usury, or support?" study in Vietnam. Based on the size of the ratio, the amount of fund size for credit vary and amount of credit received by household will increase or decrease.

The instrumental variable which is appropriate and identified well mean, the relationship between the dependent and independent variable will be estimated without bias (Wooldridge.J.M, 2002). Thus, to estimate informal credit amount obtained successfully, average number of informal borrowing participant households in community were employed as an instrumental variable. These instrumental variables also should fulfil three requirements to be good instrument 1) the instruments should uncorrelated with outcome variable 2) the instruments have correlation with endogenous variable and 3) the instruments should be randomly assigned.

Thus, the estimated credit model was:

$$\boldsymbol{C}_{icr} = \lambda Z + \Omega \boldsymbol{X}_{icr} + \rho_c^k + \mu_r^k + \varepsilon_{icr}^k$$

where:

$\mathbf{C}_{\mathrm{icr}}$ is the amount of informal credit received by household i in community c and region r from different informal credit providing agents. The Z variable is replaced by instrumental variable which is household levels average household characteristics that can influence the amount of

informal credit households will borrow. $\boldsymbol{X}_{icr}$ is a set of observed socio-economic household specific variables. Ω and λ are unknown parameters to be estimated from both equations. ρ_c^k *and* μ_r^k are community and region fixed effects.

$$\mathbf{ln}(\boldsymbol{Y}_{icr}) = \boldsymbol{\alpha}\,\widehat{\boldsymbol{C}_{icr}} + \boldsymbol{\beta X}_{icr} + \boldsymbol{\rho}_c^{\boldsymbol{y}} + \boldsymbol{\mu}_r^{\boldsymbol{y}} + \boldsymbol{\varepsilon}_{icr}^{Y}$$

where:

ln($\mathbf{Y}_{\mathrm{icr}}$) represents logarithmic of household consumption expenditure measured in Ethiopian Birr (1000 ETB) by household i in community c and region r as a proxy for welfare. $\widehat{C_{icr}}$ represents the estimated amount of credit can be obtained from informal credit market. $\boldsymbol{X}_{icr}$ is a set of observed socio-economic household level characteristics for household i from community c and region r. α and β are unknown parameters to be estimated from equations. $\boldsymbol{\rho}_c^{\boldsymbol{y}}$ ***and*** $\boldsymbol{\mu}_r^{\boldsymbol{y}}$ are community and regional level fixed variables that affect household welfare.

4. Descriptive Statistics, Result Presentation and Discussion

4.1 Descriptive Statistics

The total household who fulfill all required data for the study were 2,396 and this number of households are used to undertake the study. The major variables of the study are logarithmic of household Welfare, Informal Credit Amount, Farm Income, Non-Farm Income, Household Size, Extension Participation and Assistance Received. The mean of the household consumption expenditure is Birr 9,911, the richest rural household has annual consumption expenditure per household is approximately Birr 12,148 and the poorest make expenditure of Birr 7,157. When we see the informal credit amount received among households, there are two unique groups. The first groups contain household with no credit or zero credit benefit and the second group contain those households who have got some amount of credit. From the total 2,396 households about 77.9 percentage of the household haven't get any amount of credit. The remaining 22.1 percentage of the households got credit. Among the households who get credit, the maximum was about Birr 70,000 and the minimum was Birr 100.

Table 1: definition of variable and measuring units

Variables	Measurement
Logarithmic of welfare	Amount of Consumption Expenditure In thousand Ethiopia Birr
Independent Variables	
Informal Credit Amount	In thousand Ethiopia Birr
Farm Income	In thousand Ethiopia Birr
Non-Farm Income	In thousand Ethiopia Birr
Household Size	Number of people in Household
Extension Participation	Dummy Variable (household participated in extension program=1; Otherwise=0)
Assistance Received	In thousand Ethiopia Birr
Farm Area belongs to Household	Size of Farm Area Owned by Household in M.Sq
Credit Repaid or not	Dummy Variable (if the household repay Credit =1; Otherwise=0)
Source of Credit	Dummy Variable (Credit received from Relatives=1; Otherwise=0)
Owning Nonagricultural Activity	Dummy Variable (if household own Nonagricultural Activity =1; Otherwise=0)
Sex of Household Head	Dummy Variable (if household head is Male =1; Otherwise=0)
Reading and Writing of Household	Dummy Variable (if household head Read & Write=1; Otherwise=0)

Variables	Measurement
Shocked Affected	Dummy Variable (If Household is Affected by any Shock=1; Otherwise=0)
Instrumental Variable	
Average number of Informal Borrowing participant Households within community	Number of Informal borrowing participant households in community divided by Number of Households in community
Invers Mill Ratio to control for selection bias of dependent variable	
Invers Mill Ratio	Dummy Variable (If Logarithmic of welfare is report=1; Otherwise=0)

In relation to five other analysis variables, i.e. farm income, non-farm income, household size, household extension participation and assistance received, the statistical report is as follows. Among households about 30.63 percent of households participated in selling their products and have farm income. The remaining household doesn't get income from selling agricultural output. All sampled households on average gets Birr 1,483 income from other non-farming activities. The maximum nonfarm income was Birr 58,534.

Table 2: Descriptive statistical report of the variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Dependent Variable					
logarithmic of Welfare	2,396	9.911	0.712	7.157	12.148
logarithmic of Welfare reported (1 & 0, for probit regression to generate IMR)	2,396	0.994	0.076	0	1
Main Independent Variables					
Informal Credit Amount	2,396	2.161	10.628	0	70
Instrumental Variables					
Number of Informal Borrowing participant Households within community	2,396	0.038	0.043	0	0.475
Control Variables					
Farm Income	2,396	0.902	3.294	0	38
Non-Farm Income	2,396	1.483	4.701	0	58.534
Assistance Received	2,396	0.230	0.670	0	12
Household Size	2,396	5.215	2.318	1	17
Extension Participation	2,396	0.264	0.441	0	1
Owning Nonagricultural Activity	2,396	0.113	0.316	0	1
Farm Area belongs to Household	2,396	1.964	6.874	0	47.673
Credit Repaid or not	2,396	0.807	0.395	0	1
Source of Credit	2,396	0.098	0.297	0	1
Sex	2,396	0.611	0.488	0	1
Reading and Writing of HH head	2,396	0.389	0.488	0	1
Whether the Household is Affected by Shocked	2,396	0.043	0.203	0	1
Invers Mill Ratio	2,396	0.017	0.168	-2.866	0.676

Looking at household size, the study data contain a household size of minimum 1 and maximum 17. Around 78.58 percentage of the household has a size of 2 to 7 person per household. The mean household size is five person per household. From extension participation perspective on average 26.4 percentage of the household were participating in extension service and 28.4 percentage households gets some amount of assistance from third party someone who is not current member household.

4.2 Result Presentation

Table -3- Reduced form and Probit model

VARIABLES	(1) logwelfare	(2) ProbitWel
AInBHHsinCom[6]	-0.008	
	(0.809)	
Farm Income	0.024**	0.076**
	(0.010)	(0.034)
Non-Farm Income	0.017***	
	(0.004)	
Assistance Received	-0.036	0.249
	(0.026)	(0.244)
Household Size	0.153***	-0.006
	(0.011)	(0.048)
Extension Participation	0.370***	0.861*
	(0.067)	(0.444)
Owning Nonagricultural Activity	-0.067	-0.191
	(0.069)	(0.520)
Farm Area	0.012***	0.011
	(0.005)	(0.027)
Credit Repaid or not	-0.216*	1.095***
	(0.113)	(0.326)
Source of Credit	-0.272	-0.511
	(0.201)	(0.373)
Sex	-0.000	-0.020
	(0.043)	(0.243)
Reading and Writing of HH head	0.246***	0.349
	(0.055)	(0.256)
Shocked affected	-0.036	
	(0.046)	

[6] AInBHHsinCom:- Indicates Average Number of Informal Borrowing participant Households within community.

IMR2	4.300***	
	(0.239)	
Community 2	-0.156	-0.405
	(0.114)	(0.262)
Community 3	0.022	0.625
	(0.085)	(0.489)
Community 4	0.239***	
	(0.059)	
Community 5	0.595***	
	(0.086)	
Community 6	-0.721	-0.425
	(0.668)	(0.501)
Community 7	0.116	
	(0.073)	
Community 8	-0.028	
	(0.170)	
Community 9	0.587	
	(0.591)	
Community 10	0.086	
	(0.101)	
InFCredit		0.027*
		(0.015)
Constant	8.904***	1.332***
	(0.119)	(0.391)
Observations	2,396	1,061
R-squared	0.337	

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. logwelfare in the first column is the dependent variable, which is annual household consumption as a proxy for welfare outcome measurement of rural household. Its measuring unit is in logarithmic form.

Table -4- IV Regression first stage Results

VARIABLES	Informal Credit
AInBHHsinCom	-0282***
	(0.071)
Farm Income	21.347***
	(5.909)
Non-Farm Income	-0.013
	(0.0198)
Assistance Received	0.376**
	(0.137)
Household Size	-0.278***
	(0.060)
Extension Participation	-0.200

VARIABLES	Informal Credit
	(0.216)
Owning Nonagricultural Activity	0.523
	(0.332)
Farm Area	1.174***
	(0.045)
Credit Repaid or not	-3.477***
	(0.433)
Source of Credit	3.865***
	(1.043)
Sex	-0.028
	(0.170)
Reading and Writing of HH head	0.490**
	(0.246)
Shocked affected	-0.512
	(0.935)
Invers Mill Ratio	-1.039
	(0.935)
Community 2	1.688***
	(0.452)
Community 3	0.643**
	(0.252)
Community 4	1.139**
	(2.18)
Community 5	2.912***
	(0.316)
Community 6	-0.030
	(0.772)
Community 7	2.477***
	(0.416)
Community 8	1.180*
	(0.537)
Community 9	-2.260
	(1.666)
Community 10	-14.289***
	(0.563)
Constant	1.767**
	(0.546)
Observations	2,396

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. the dependent variable here is informal credit and the main independent variable is average number of informal borrowing participant households within community.

Table 5- OLS, Multiple OLS, IV without Hechman, IV with Heckman and IV with Heckman robust

	(1)	(2)	(3)	(4)	(5)

VARIABLES	Simple OLS	Multiple OLS	IV with credit related additional controls	IV with Heckman sample selection control	IV with Heckman sample selection control and community and region fixed effect
Informal Credit	0.007***	0.010***	0.028	0.031*	0.043**
	(0.001)	(0.001)	(0.031)	(0.018)	(0.021)
Farm Income		-0.008**	0.008	0.037***	0.067***
		(0.003)	(0.014)	(0.008)	(0.013)
Non-Farm Income		0.018***	0.019***	-0.000	0.002
		(0.003)	(0.004)	(0.004)	(0.006)
Assistance Received		-0.086***	-0.092***	-0.082***	0.002
		(0.025)	(0.024)	(0.023)	(0.025)
Household Size		0.198***	0.198***	0.170***	0.128***
		(0.011)	(0.011)	(0.007)	(0.012)
Extension Participation		0.309***	0.243***	0.502***	0.648***
		(0.043)	(0.045)	(0.037)	(0.069)
Owning Nonagricultural Activity			0.008	-0.444***	-0.607***
			(0.075)	(0.060)	(0.091)
Farm Area			-0.022	-0.009	-0.023
			(0.036)	(0.022)	(0.023)
Credit Repaid or not			-0.126	0.382***	0.413***
			(0.156)	(0.085)	(0.143)
Source of Credit			-0.544**	-0.878***	-0.742***
			(0.262)	(0.104)	(0.163)
Sex			0.011	-0.198***	-0.152***
			(0.041)	(0.031)	(0.034)
Reading and Writing of HH head			0.133**	0.146***	0.261***
			(0.053)	(0.034)	(0.039)
Shocked affected			-0.045	-0.137**	-0.106**
			(0.049)	(0.070)	(0.049)
IMR2				3.355***	3.603***
				(0.106)	(0.393)
Community2					-0.302***
					(0.090)
Community3					-0.198**
					(0.083)
Community4					0.149***
					(0.049)
Community5					0.566***
					(0.066)
Community6					-0.599*
					(0.346)
Community7					-0.239**
					(0.105)
Community8					-0.136

					(0.172)
Community9					-0.191
					(0.733)
Community10					0.462*
					(0.261)
Region2					0.475***
					(0.067)
Region3					0.034
					(0.077)
Region4					-0.074
					(0.073)
Region5					0.319***
					(0.078)
Region6					0.346***
					(0.095)
Region7					-0.351***
					(0.118)
Region8					0.573***
					(0.081)
Region9					-0.430***
					(0.092)
Region10					0.224**
					(0.114)
Constant	9.896***	8.778***	8.882***	8.482***	8.317***
	(0.022)	(0.050)	(0.145)	(0.083)	(0.130)
Observations	2,396	2,396	2,396	2,396	2,396
R-squared	0.005	0.241	0.260	0.567	0.662

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. The dependent variable, which is annual household consumption as a proxy for welfare outcome measurement of rural household. Its measuring unit is in logarithmic form.

4.3 Discussion

The regression results in table 3 and 4 show the statistical relationship between variables of dependent, independents and instruments. Table 3 presents the reduced form and probit model regression results. As placed in the table, the relationship between the instrumental variables and the outcome variable has statistically no significant relation. This proves the condition of instrument exclusion assumption of the instrumental variable estimation approach. The probit model result is for controlling selection bias. This is done by estimating Invers Mill Ration from probit model and controlling for it in many regressions. If the parameter of estimate for Invers

Mill Ration is significant, controlling for it, leads to better estimation. In table 4 we have first stage result of the main regression. Which shows how causal effect of instrumental variable and informal credit look. As shown in the result, the variable is statistically significant in determining informal credit. Also, the F statistics and instrument endogeneity assumption is fulfilled. Plus, the R-square result of the subsequent regression outcome was increasing; which confirms that, the additional of variables from column 1 to column 5 was not merely for considering different variables rather each addition of the variable have effect on outcome variable.

In table five we have simple OLS, multiple OLS, IV with additional credit related controls, IV with Heckman sample selection control and IV with Heckman sample selection control and community fixed effect. The presentation of the first four column of table five is just to show, how the relationship looks like with usual and Iv estimation technique and based on to make comparison. The result in column five estimate based on instrumental variable with selection control and fixed effect is to make discussion because of its appropriateness and methodological correctness of the result. In OLS estimation the result assumes credit amount was determined without bias and thus it is not endogenous. But, in instrumental variable case, endogeneity of credit was considered.

The opposite relationship between average informal borrowing participant households with amount of informal credit obtained in table four, indicate that households from highly competitive community have lower credit share and those from low competitive community s have better credit share. The result is similar to what was found by (Logan.C & Alec.T, 2017) while studying a socio-cultural analysis of smallholder borrowing and debt in southern Ethiopia.

According to their finding, among factors that lower the amount of loan provided to household was participation of more households for borrowing.

The above results for instrumental variables correctness was evaluated by testing for endogeneity, and instrument relevance. The endogeneity test was undertaken by Durbin test and the null hypothesis was variables are exogenous and we found that p-value for Durbin test is significant and the informal credit variable was endogenous. The instrument relevance test was undertaken by F statistics test; which show strengthens of the result, is valid (see the appendix for further).

In table five, we see that the informal credit and household welfare has positive relationship. Even though the result was different from the one found by (R.S.Manyaja, F.D.K.Anim, & E.T.Gwata, 2018; Akudugu.M.A, 2014), while studying similar case in South Africa and Ghana. But there are studies by (Kati.S, 2010; Cuong.V.N & Marrit.vanden.B, 2011) that generated similar results. Informal credit improves welfare expenditure of households. Ceteris paribus other determining factors, every thousand ETB obtained from informal lending market leads to 4.3 percentage increase in welfare of household.

Farm income effect on household welfare is also positive and statistically significant at 1 percent. Every thousand Birr increase in farm income, increases consumption expenditure of household by 5.4 percentage. The result was similar with (Cuong.V.N & Marrit.vanden.B, 2011; Shahidur.R.K & Rashid.R.F, 2003; Shahidur.R.K, 2005).

Considering the household size effect on household consumption expenditure, the regression result was as per expectation. The household size positively affects household consumption expenditure. Increase of household size by 1 unit increases the household consumption

expenditure by amount of 12.8 percentage point. The result was mostly expected; because of higher household size requires higher amount of consumption expenditure. And also, lower productivity of agriculture in rural developing countries forces the household to have additional food as well as non-food expenditure for every addition of new household member. Studies undertaken by (Angus.D & Christina.P, 1998; Ke, David , Kei, Riadh, Jan, & Christopher, 2003) also founded similar results. Thus, the higher the size of the family, the higher household consumption expenditure is.

Following the regression result, household's extension program participation has significant effect on outcome variable. Household with extension program participation have made 64.8 percentage more consumption expenditure than household who couldn't participate. This is may be due to monetary transfer from government because of extension program participation and improved farming technique support the extension participant households receive from the government. This result is similar to what (Kidanemariam , Erik , Jozef , Kindeya , Hans , & Miet , 2013) were found while studying the Economic Impact of a New Rural Extension Approach in Northern Ethiopia.

The case of non-farming income and assistance received impact on consumption expenditure of rural household is unusually result, but some of previous research works also confirms similar outcomes (Akudugu.M.A, 2014; Fred & Daniel , 2014). The regression result shows insignificant impact of the variables on welfare outcome of rural households. This is may be attributed to rural households spend non-farming and assistance related incomes in non-welfare improving land lease payments and other social participation contributions.

5. Checking Robustness of the result

The above result is robust for different expenditure groups and for per-adult equivalence consumption expenditure. Estimation results for Adult consumption equivalence, food and non-food consumption expenditure and educational expenditure. Informal credit has positive and statistically significant effect in all form of expenditures.

Table 6 Robustness check

VARIABLES	(1) Per-adult equivalent consumption expenditure	(2) Food consumption expenditure	(3) Non-food consumption expenditure	(4) Educational expenditure	(5) Household Consumption Expenditure[7]
Informal Credit	0.049**	-0.007	0.050**	0.075*	0.066**
	(0.021)	(0.026)	(0.022)	(0.039)	(0.029)
Farm income	0.050***	0.075***	0.064***	0.171***	0.076***
	(0.011)	(0.012)	(0.014)	(0.024)	(0.014)
Non-Farm Income	0.003	0.014***	-0.002	0.038***	0.001
	(0.005)	(0.004)	(0.007)	(0.007)	(0.006)
Assistance Received	-0.002	-0.066**	-0.011	0.059	-0.000
	(0.023)	(0.033)	(0.028)	(0.046)	(0.025)
Household Size	-0.075***	0.187***	0.129***	0.535***	0.135***
	(0.010)	(0.013)	(0.012)	(0.020)	(0.016)
Extension Participation	0.423***	0.663***	0.608***	0.817***	0.637***
	(0.059)	(0.068)	(0.070)	(0.090)	(0.074)
IMR21	3.133***				
	(0.305)				
IMR23		3.405***			
		(0.206)			
IMR22			3.537***		
			(0.387)		
IMR24				2.758***	
				(0.045)	
IMR2					3.683***
					(0.381)
Constant	8.425***	6.326***	8.167***	-0.829***	8.267***
	(0.111)	(0.114)	(0.131)	(0.136)	(0.130)
Observations	2,396	2,396	2,396	2,396	2,396
R-squared	0.550	0.727	0.633	0.871	0.647

[7] Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1 and the top raw variables are the dependent variables and they are in logarithmic form. The estimation in column five was based on using whether community leaders organized meeting for community members during last 2 years, as instrumental Variable.

Statistical as well as economical higher impact is observed in Per-adult equivalent consumption expenditure and non-food consumption expenditure than food and educational expenditure. All consumption expenditures are significance at level significant of 5 percentage. Higher effect on non-food expenditure verifies that rural households have better food access than non-food so that they look more cash for material related consumption. In relation to adult equivalent consumption expenditure, higher relationship with credit shows adult participation in credit market and spend what they received in welfare improving consumption expenditure.

The result in column 5 was generated by taking whether community leaders organized meeting for community members during last 2 years, as instrumental Variable.

Source: designed by author following the theoretical explanation of Michel 2003, Dean , et al. 2008 and Chai, S., et al. 2018.

The task was undertaken by following the works of (Michel , 2003; Chai, S., Y. Chen, , B. Huang , & D. Ye, 2018; Dean , Markus , Tanya, & Adam, 2008) where they found that Social Gathering affects social network and that further affects social capital and following social capital affects trust level on which most of rural informal credit depends. Thus, by using different IV also the welfare outcome of rural informal credit is positive and significant.

6. Conclusion and Recommendation

6.1 Conclusion

This study work is based on the idea of consumption smoothing theory which was demonstrated based on "life-cycle model of consumption". The model describes about the whole life time movement of individual is based on consumption and saving choices. This study focuses on credit related informal risk sharing mechanism, in which rural households obtain credit in informal form from relatives, neighborhood, religious institutions, friends, shops, groceries, etc,. for risk sharing mechanism. The focus of the study was, the amount of credit obtained and its impact on household welfare.

Following 2SLS regression analysis by taking average number of informal borrowing participant households within community as an instrumental variables for informal credit in order to avoid potential endogeneity, the study found that informal credit and households welfare have positive and significant relation and this result was similar with pervious works of (Kati.S, 2010; Cuong.V.N & Marrit.vanden.B, 2011).

Also, the robustness of the regression result was checked for different consumption expenditure categories, per-adult equivalence consumption expenditure and using whether community leaders organized meeting for community members during last 2 years, as another instrumental Variable.

6.2 Recommendation

Informal credit significantly influences rural household welfare and thus, considering it as a policy variable factor while in designing rural financial policy is necessary. In this regard, though, regulatory policies of government have no direct effect on informal credit, but to improve the household level

welfare outcome, facilitating social interactions and brotherhoods among rural households and giving policy support for more organized informal credit institutions such as “Idir” and “Equib” will improve the welfare effect of informal household.

The positive impact of farm income and household’s extension program participation on household welfare means, households get cash from selling their farm products and extension program participation, which helped them to improve their welfare. In this regard, policies that improves market access and expands extension program activities for rural households will be additional input for further improvement of household welfare. Additionally, this study was undertaken with single period cross-sectional data with non-perfect instrumental variables. In this regard, undertaking further studies with panel data and prefect instrumental variable/s is recommended for better result.

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Appendix
Test for Endogeneity and instrument relevance

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Tests of endogeneity
Ho: variables are exogenous

Durbin (score) chi2(1)          =  43.8408  (p = 0.0000)
Wu-Hausman F(1,2370)            =  44.1733  (p = 0.0000)
Robust score chi2(1)            =  26.5271  (p = 0.0000)
Robust regression F(1,2370)     =  16.9638  (p = 0.0000)
```

First-stage regression summary statistics

Variable	R-sq.	Adjusted R-sq.	Partial R-sq.	Robust F(1,2371)	Prob > F
InFCredit	0.8394	0.8377	0.0215	12.0732	0.0005

Table 6 Robustness check

VARIABLES	(1) Per-adult equivalent consumption expenditure	(2) Food consumption expenditure	(3) Non-food consumption expenditure	(4) Educational expenditure	(5) Household Consumption Expenditure
Informal Credit	0.049**	-0.007	0.050**	0.075*	0.066**
	(0.021)	(0.026)	(0.022)	(0.039)	(0.029)
Farm income	0.050***	0.075***	0.064***	0.171***	0.076***
	(0.011)	(0.012)	(0.014)	(0.024)	(0.014)
Non-Farm Income	0.003	0.014***	-0.002	0.038***	0.001
	(0.005)	(0.004)	(0.007)	(0.007)	(0.006)
Assistance Received	-0.002	-0.066**	-0.011	0.059	-0.000
	(0.023)	(0.033)	(0.028)	(0.046)	(0.025)
Household Size	-0.075***	0.187***	0.129***	0.535***	0.135***
	(0.010)	(0.013)	(0.012)	(0.020)	(0.016)
Extension Participation	0.423***	0.663***	0.608***	0.817***	0.637***
	(0.059)	(0.068)	(0.070)	(0.090)	(0.074)
OwnNonAgri	-0.744***	0.320***	-0.682***	0.102	-0.635***
	(0.082)	(0.057)	(0.091)	(0.086)	(0.083)
Farmarea	-0.038	0.036	-0.033	-0.013	-0.049
	(0.024)	(0.030)	(0.025)	(0.045)	(0.033)
CrRepayornot	0.350***	-0.043	0.398***	1.110***	0.514***
	(0.128)	(0.115)	(0.144)	(0.171)	(0.142)
SourceofCredit	-0.708***	-0.183	-0.766***	-0.184	-0.829***

	(0.141)	(0.134)	(0.164)	(0.175)	(0.162)
Sex	-0.157***	-0.065*	-0.135***	0.095**	-0.162***
	(0.030)	(0.035)	(0.034)	(0.048)	(0.035)
ReadandWriting	0.118***	0.408***	0.242***	0.836***	0.241***
	(0.035)	(0.043)	(0.040)	(0.064)	(0.049)
Shockaffected	-0.077*	-0.192**	-0.099**	0.040	-0.095*
	(0.047)	(0.085)	(0.049)	(0.091)	(0.051)
Community 2	-0.234***	-0.285***	-0.293***	0.224	-0.358***
	(0.081)	(0.095)	(0.091)	(0.139)	(0.099)
Community 3	-0.143**	-0.298***	-0.144*	0.022	-0.226**
	(0.072)	(0.087)	(0.086)	(0.119)	(0.090)
Community 4	0.189***	0.117*	0.181***	0.599***	0.131**
	(0.045)	(0.062)	(0.050)	(0.074)	(0.055)
Community 5	0.532***	0.747***	0.558***	0.721***	0.550***
	(0.061)	(0.084)	(0.069)	(0.102)	(0.068)
Community 6	-0.491	-0.102	-0.668**	1.312***	-0.617*
	(0.323)	(0.237)	(0.335)	(0.222)	(0.338)
Community 7	-0.257***	-1.151***	-0.100	1.626***	-0.305***
	(0.097)	(0.111)	(0.107)	(0.165)	(0.112)
Community 8	0.027	-0.685	-0.117	0.364	-0.170
	(0.171)	(0.545)	(0.193)	(0.367)	(0.179)
Community 9	-0.266	-2.138**	0.026	-1.408***	-0.147
	(0.740)	(0.956)	(0.713)	(0.325)	(0.723)
Community10	1.029***	0.384	0.599**	0.304	0.759**
	(0.276)	(0.339)	(0.280)	(0.512)	(0.379)
Region 2	0.204***	0.560***	0.450***	0.270**	0.429***
	(0.064)	(0.081)	(0.070)	(0.122)	(0.075)
Region 3	-0.103	-0.313***	0.038	-0.556***	0.060
	(0.070)	(0.081)	(0.080)	(0.105)	(0.085)
Region 4	-0.235***	-0.039	-0.111	-0.392***	-0.113
	(0.068)	(0.093)	(0.076)	(0.123)	(0.080)
Region 5	0.180**	0.172*	0.317***	-0.298**	0.300***
	(0.072)	(0.092)	(0.081)	(0.117)	(0.079)
Region 6	0.127	-0.644***	0.442***	-1.193***	0.260**
	(0.095)	(0.127)	(0.100)	(0.184)	(0.128)
Region 7	-0.466***	-0.141	-0.439***	-0.181	-0.380***
	(0.105)	(0.129)	(0.120)	(0.137)	(0.109)
Region 8	0.408***	0.686***	0.555***	-2.062***	0.539***
	(0.081)	(0.111)	(0.086)	(0.162)	(0.088)
Region 9	-0.213***	-1.617***	-0.346***	-0.889***	-0.452***
	(0.074)	(0.117)	(0.093)	(0.145)	(0.092)
Region 10	-0.074	0.375**	0.174	0.169	0.115
	(0.110)	(0.149)	(0.119)	(0.216)	(0.164)
IMR21	3.133***				
	(0.305)				
IMR23		3.405***			
		(0.206)			
IMR22			3.537***		
			(0.387)		
IMR24				2.758***	

				(0.045)	
IMR2					3.683***
					(0.381)
Constant	8.425***	6.326***	8.167***	-0.829***	8.267***
	(0.111)	(0.114)	(0.131)	(0.136)	(0.130)
Observations	2,396	2,396	2,396	2,396	2,396
R-squared	0.550	0.727	0.633	0.871	0.647