

Determinants of Rural Households Demand for and Access to Credit in Microfinance Institutions

The Case of Alamata Woreda- Ethiopia



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Abbreviations

| | |
|----------|---|
| AIDB | Agricultural and Industrial Development Bank |
| DECSI | Dedebit Credit and Saving Institution |
| FAO | Food and Agricultural Organization |
| FDREMFED | Federal Democratic Republic of Ethiopia |
| GDP | Gross Domestic Product |
| GFDRE | Government of the Federal Democratic Republic of Ethiopia |
| IPMS | Improving productivity and market success |
| LPM | Linear probability model |
| MFIs | Microfinance institutions |
| ML | Maximum likelihood |
| NGO | Non-governmental organizations |
| NOVIB | The Netherlands |
| OECD | Organization for Economic Co-operation and Development |
| OLS | Ordinary Least Square |
| PA | Peasant Association |
| REST | Relief Society of Tigray |
| TLU | Tropical Live Stock |
| VIF | Variance Inflation Factor |

Abstract

Access to credit is widely acknowledged as one of the important agents to lift up the rural poor from poverty. Using a sample survey data collected from Ethiopia, this study investigates the factors that determine the demand for and access to credit among the small holder farmers. The study results show that the average cultivated land size (3.53) of the respondents was larger than the national average. Rural farmers who demand for credit are older than those who do not demand for credit. This also applies in accessing credit, where farmers who have access to credit were older than those who do not have access. Moreover, it was shown that majority of rural households took credit for productive purposes. The econometric model revealed that family size, marital status, religion, education, cultivated land size and live stock are found to be the main determinants of credit demand while age, education, cultivated land size and distance are the important determinants of credit access. It was also found that, interest rate, group lending and the loan disbursement period are factors that negatively affect the demand for credit. Rural farmers indicated that loan processing time, loan size, the compulsory saving and the loan repayment period are some important areas DECSI microfinance is weak in and need to improve. In conclusion, it is difficult to say there is no supply of credit as there is forced demand or the farmers are required to buy fertilizer so as to get credit. The study recommended that new policies that encourage demand-driven financial services should be formulated. Policy makers should make an effort to design appropriate educational system as well. Government should create market for the products of the farmers and provide training and skill development. In addition, it should also encourage other financial institutions such as private institutions and NGOs that provide financial services.

Key words: *microfinance, credit demand, credit access, DECSI*

1. Introduction

1.1 Background

The Ethiopian economy is based mainly on agriculture which contributes for about 47 percent to Gross Domestic Product (GDP) (Fintrac Inc., 2010). The sector generates 90 percent of export (foreign currency) earnings and accounts for 85 percent of rural employment. Hence, agriculture is the main stay of the economy from which 80 percent of the population derives its livelihood (Haile & Assefa, 2005).

Even though farmers produce 96% of the national agricultural output, agriculture is unable to feed the fast growing population and reduce the dependence of food aid. Agriculture is characterized by small-scale subsistence farmers with average land holding of 0.5 hectare per farm household, yet using backward farming system which ultimately results in low productivity (Kahsay and Kugbei, 2004; Gebreselassie, 2006). The low level of households' farm income is a corollary of both the small size of landholding and the low level of productivity in agriculture (FAO, 2003). Overall, the low level of productivity and hence the inability of the agricultural output to improve the livelihoods of the rural poor is due to various factors. These include: limited access to credit services, poor infrastructure, small land holdings (Ogato et al., 2010) and the nature of land tenure systems (Devereux, 2000).

Potentially, provision of credit services to the poor has been considered as one of the strategies carved to reduce poverty and promote rural entrepreneurship. Increasing access to financial services holds the promise to help reduce poverty and improve development outcomes by enabling the poor to smooth consumption (in case of adverse shocks), start or expand a business, cope with risk and increase /diversify household income. Microcredit stands to benefit poor individuals who lack collateral, steady employment, verifiable credit history, or other requirements necessary to gain access to formal credit (Bauchet et al., 2011). By putting money into the hands of poor families, and particularly poor women, microcredit has the potential to increase households' health and education, empower women, and reduce poverty. Access to credit can help rural poor economy in several ways (Tenaw & Islam, 2009; Anyiro & Oriaku, 2011). Credit access can significantly increase the ability of households to meet their financial needs such as the purchase and use of improved agricultural inputs which are not available on the farm. Also access to rural credit may accelerate the households' ability to adopt modern agricultural technologies that increase the income of the small farm holders and break the perpetuity of poverty cycle they are entangled with. However, recent findings from microfinance have no encouraging news about its outcomes. Taking research from different developing countries, scholars find weak evidence of the impact of microfinance on use of healthcare, education, or female empowerment (no increase in consumption and no noticeable welfare improvement). Microfinance helps some households only to reprioritize their expenditure and smooth consumption (no change in the amount of expenditure but a change in how households spent) - a valuable function for poor households that suffer from irregular and unpredictable income streams. The group that benefited most from increased access to credit are men with relatively high incomes, not those targeted by

microfinance institutions (e.g., poor female entrepreneurs) (Bauchet et al., 2011; Hoque, 2007).

Many poor families in the developing world have limited access to formal financial services, including credit, savings, and insurance (Bauchet et al., 2011). They instead rely on a variety of informal credit relationships with moneylenders, relatives, friends, or merchants. These options are, however, not ideal as they tend to be unreliable and unaffordable. This is largely because banks and other formal financial service providers, such as insurance companies, traditionally have not considered the poor as a viable market and penetration rates for formal financial services in developing countries are extremely low. The inability to acquire formal credit support has constrained poor farmers' capability to expand their production and improve their living condition, technology adoption, nutrition and health (Bauchet et al., 2011). This situation has attracted the attention of the Ethiopian government to establishing and to popularizing specialized institutions in rural Ethiopia, such as microfinance which have targeted on the provision of credit to the rural poor. In addition, the government gave attention for the establishment of special financial institutions such as cooperatives and rural banks which are encouraged by commercial banks (GFDRE, 2003).

Formal institutions such as commercial banks and/or development banks, however, still cannot reach the poor smallholder farmers. Crucial factors contributing to the inability to get banking services on the part of the rural poor include the poor incentives created for smallholders in providing loans, unaffordable cost of delivering services or high transaction costs associated with small loans to targeted households and inability to enforce contracts and avoiding asymmetry of information (Nguyen, 2007). In recognition of this several kinds of microfinance institutions have been established and are working towards solving the access to credit problems of the poor small farm holders in different parts of the country (Kereta, 2007).

Despite these efforts from the government, microfinance outreach in Ethiopia is low and has not satisfied the demand of the rural poor. The institutions' selection criteria such as income, gender, credibility in community, age (active age group), permanent residence, character assessment, willingness to join credit group of self-selected members to co-guarantee the loan of fellow group members, prior experience of saving and loan repayment, support letter from their respective peasant association turn out to be the key challenges that small holder farmers have to face, limiting their access to credit (Kereta, 2007). This has a negative effect on the demand for and access to microcredit by small farm householders. For instance, in Ethiopia, out of the estimated 6 million demanders, only 900,000 clients were able to get access to microfinance institutions in 1996 (Meklit MicroFinance Institution, 2004). However, the crucial factors which play a central role in setting back the smallholders from participating in accessing microcredit service is not well understood.

Similarly, in Tigray, though credit provision reached for a number of small householders (e.g., for consumption and housing) and the numbers of borrowers grow from 67,057 to around 424, 000 with a maximum loan of 5,000 Ethiopian Birr (277.8 US dollar) in between 1997 and 2006, the number of borrowers in 2002 onwards started to decline. Age of the

borrowers, short term borrowing and physical incapacity of the borrowers were some of the factors constrained the farmers from accessing credit (Berhane & Gardebroek, 2008).

This paper aims to bridge this gap. More specifically, considering the importance of credit for smallholder farmers in changing their livelihoods by way of improving their agricultural productivity and the challenges in obtaining the credit services, this study will investigate the influence of factors that affect the rural household's demand for and access to microcredit in rural Ethiopia based on evidences from Alamata Woreda.

1.2 Problem Statement

Credit has become increasingly accepted as a powerful instrument to lift the rural poor out of abject poverty. It plays a crucial role in increasing agricultural productivity via building up production assets (Amha, 2000). It also enables smallholder farmers to invest in land improvements, and thereby to adopt new agricultural technologies such as high-yielding seeds and fertilizers that increase their efficiency and income (Zeller & Sharma, 2000). Credit improves the welfare of the rural poor through financing consumption and reducing the opportunity cost of highly valued assets and adopting labor-saving technologies (Zeller et al., 1997). Moreover, credit helps to insure the rural poor against the vulnerability of shocks (flood, drought and others) by reducing the cost of the farmer to cope up with those shocks. Credit in general is essential to attain rapid and sustainable development (Jemaneh, 2002).

Despite the significant role played by credit, Diagne (1999) indicated that the rural poor suffer from lack of access to formal credit. Failure to get formal credit support has limited the rural small farm holders' ability to increase their productivity and thereby improve their livelihood. The traditional commercial banks and development banks do not take an interest in providing financial services to the rural farmers. They have been able to extend credit to a limited clientele only. If they provide, they direct the credit to the specific production activities, ignoring part of the demand side (Jemaneh, 2002). To address these problems, the government of Ethiopia established microfinance institutions (MFIs) to reach a large number of rural poor. The MFIs, however, have no clear rules and criteria for targeting the poorest of the poor indicating that MFIs are drifting away from their original mission of reaching the poor (Ejigu, 2009). There is evidence which shows that a large number of rural farmers are marginalized, and thereby do not have access to micro credit (due to high transaction cost associated with small size of the loan and different requirements imposed by the lenders). Besides, due to high default and lack of effective enforcing mechanisms lenders restrict supplying credit to borrowers (Stiglitz and Weiss, 1981). For example, in rural Ethiopia, only 34% of the credit demand of the poor is reached by microfinance institutions (Ejigu, 2009). Rural poor face difficulty not only to access credit but also many factors influence their demand for credit. Determinants of demand for household's credit are issues that need to be investigated. Most existing studies focus on constraints of access to credit which is the supply side factors; suggesting that there are quite few studies that analyze rural households' credit demand and supply separately.

Neglecting the exploration of the possible factors that affect demand for credit in past analysis of credit caused the magnitude of credit rationing in the formal credit market to be overestimated (Kochar, 1997). One of the reasons for the failure of credit scheme in Africa was their supply-leading approach or their non-adaptation to the demand for the service by the rural households) (Mpuga, 2008)

In Ethiopia, while there is clear evidence about the gap between demand and supply of credit, there is no empirical evidence that has concerned itself with looking into what drives demand for and supply to credit. The study by Berhane (2009) focused on microfinance credit group formation, contractual risks and welfare impacts, even though it was done in Northern Ethiopia. Similarly, studies (e.g., Zaid, 2008; Stewart et al., 2010; Kereta, 2007) explore mainly the impact of access to finance on the livelihood of the rural poor. Even though Getaneh (2005) reviewed on demand and supply constraints of microfinance in Ethiopia, it has weaknesses in two important ways. First the study fails to look into the factors that influence borrowers and suppliers of credit in detail. Secondly, to draw the conclusions, the study relied on only descriptive statistics and literature.

Kedir et al. (2007) discovered that credit markets in Ethiopia are segmented and the poor are the most constrained. There exist a high potential for financial intermediaries such as micro finance at the rural level of Ethiopia. However, apart from lacking attention to demand factors, the study failed to identify the possible factors that constrain household's from accessing credit. With about two third of African's population living in rural areas and the high incidence of rural poverty, improving the financial market for rural poor is crucial in achieving pro-poor growth and poverty reduction (Onumah, 2003). Therefore, analysis of demand for and access to credit in rural areas could help the policy makers to design a sustainable financial system that will play a significant role in addressing the severity of poverty in rural Ethiopia. The purpose of this study is, thus, to investigate factors that influence the rural households' demand for and access to rural micro-credit in Southern part of Ethiopia-Alamata Woreda.

1.3 Objective of the Study

The main objective of the study is to investigate factors that determine rural households' demand for and access to micro credit.

The study aims to:

1. Explore the socio-economic characteristics of the rural household respondents in DECSI
2. Identify the factors that determine rural households' demand for and access to credit in DECSI
3. Assess small holder farmers' perception of the strengths and weaknesses of DECSI micro credit institution.

1.4 Organization of the Study

The remainder of the study is organized in to six chapters. The literature is reviewed in chapter two to provide theoretical and empirical framework for the study. Chapter Three presents an area description, an overview of microfinance in Ethiopia and the operation of DECSI in Tigray, Ethiopia. The fourth chapter presents the theoretical and empirical framework which includes the theory, brief description of the framework and the variables. The fifth chapter of this thesis highlights materials and methods that discuss the data sources, the sampling techniques and the model used. Chapter Six presents the major findings by way of descriptive statistics, econometric model and some qualitative data. The last chapter, Chapter Seven, is devoted to concluding remarks and future research areas.

2. Related Literature

Though there is no standard definition for micro-credit, it refers to small loans made to low-income individuals to sustain self-employment or to start up very small businesses (Kirchgeorg & Winn, 2006). Also micro-credit can be defined by the characteristics of the loan (where business loans below \$20,000) or by the characteristics of the client (where loans for productive purposes to clients with less than \$20,000 in assets are considered microcredit) (Jansson, 2001). Micro-credit can be granted by banks and other institutions.

2.1 Theory of Demand for Credit

The starting point in analyzing the demand for credit and the factors affecting demand is the “Life Cycle Model” (Franco Modigliani, 1966). In developing countries, individuals cannot maintain consumption at an acceptable level. With the change in family size and uncertainties of future, a household’s inter-temporal consumption pattern varies. The life-cycle hypothesis argued that consumers should inter-temporally reallocate their incomes (resources) over their life time to maximize lifetime utility (Morduch, 1995a) given the budget constraint. Consumers can smooth their consumption by using the saving from past income or investment but impossible to use future income in the present since it is not realized. Hence, the consumer can smooth consumption and/or increase utility by accessing an account that can act as inter-temporal intermediary between the future lender and the present borrower. This account is consumer credit or borrowing. Credit helps individuals to make inter-temporal choice and becomes additional spending power in the present in exchange for repayment (loan and interest) in the future (Soman & Cheema, 2002).

Modigliani (1986) also discussed about the inter-temporal-model of the life-cycle hypothesis and permanent income hypothesis. He argued that these models explain the consumption behavior of households, - the problem of dividing consumption between the present and the future. But the model assumes that the households have the opportunity (perfect market) to borrow. According to Chen and Chivakul (2008) in the life-cycle model, households have income flows over their life-time and they are faced with the problem of maximizing their utility by choosing the optimum consumption and saving. Moreover, in this model, current consumption depends on the households’ life time characteristics, but not on the current income. The “permanent income hypothesis”, on the other hand argued that, consumers current consumption depends on expected consumption in the future period (consumers first estimate their ability to consume in the long run and then set current consumption to the appropriate fraction of that estimate) which later depends on the characteristics of individuals (Hall, 1978).

The demand for credit also described from the theory of investment. Firms maximize utility subject to the production function. They need the flow of output, labor and capital accumulation. Though firms know that there is profitable investment opportunity, they do not do that since they found saving hard (Jorgenson, 1967). They will invest rather by using credit which later depends on the cost of the capital (interest rate) and the expected rate of return (Modigliani and Miller, 1958). In general, the firm will invest on a certain project provided that the investment on the project raises the market value of the firm’s shares.

Other scholars also theorize the demand for credit with production function of a certain firm. In Cobb Douglas production function theory, firms need to maximize their profit from production. According to this theory, production depends mainly on labor and capital given technology (Zellner et al., 1966). Cobb Douglas studies how production is affected by these important two factors of production- labor and capital, and how their variation change the income distribution (Felipe and Adams, 2005). This capital can be obtained from credit at different cost of capital (interest rate).

In the following topics, this study focuses on identifying the factors that influence rural household's credit demand and also those that influence credit access in microfinance institutions. Since we have household data that contains questions not only on actual credit received but also on loans applied for, this allows us to investigate both credit demand and credit supply factors and to model these factors using observed household characteristics.

2.2 Factors Affecting Demand for Credit by Small Householder Farmers

Credit demand refers that a household has chosen to borrow and has already borrowed (Tinh et al., 2010). But, this definition fails to include those who need credit but not applied (might be discouraged) and those applied already but constrained. Diagne (1999) defines demand for credit as: the borrowers' choice of the optimal loan amount. Demand for credit for our case follows from Balogun and Yusuf (2011) and Chen and Chiivakul (2008) definition which demand is: the probability that an individual answered yes to the question "did you apply for credit before?" and it includes also those who are discouraged. To this end, different literatures investigate various factors that affect demand for micro credit by rural farm households (from formal and informal sources) (Besley et al. ,2001; Okurut et al. , 2004).

The study of Mpuga showed that age of an individual positively related to the decision to apply for credit and the amount of credit applied for. The young and energetic individuals with ambitions to earn higher incomes and expand investment or engaged in different activities are expected to be more active in terms of saving so as to accumulate enough capital. The older are likely to rely more on their past savings and accumulated wealth for consumption. Mpuga (2008) further stated that the young may tend to save and/or borrow more for various activities while the old may be less. Those at the medium age have positive and significant demand while the old are less inclined to demand for credit. However, contrary to Mpuga's findings, the study result by Tang et al. (2010) proved that old farmers are more likely to borrow than younger farmers. This is because older farmers have more social network or social capital and, thus, have more access to credit market. The study by (Nwaru, 2011) in Nigeria contradicts this result and proved that age of the individual does not have effect on credit demand.

Women acquisition to capital is restricted by social identities. In rural areas there is gender segregation of activities. Women who step outside traditional gender roles by taking a more independent and entrepreneurial approach in their economic lives will be blamed with the traditional construction of gender and activity- regulating social norms. If these norms are

strong enough, such women may express no demand for credit even when they have profitable investment opportunities. If they do, the society will object them thinking that women who actively engage in market-oriented activities are not able to take adequate care of their home responsibilities (Fletschner & Carter, 2008). As a consequence the probability of demanding a loan in the formal financial institutions negatively correlated with being female headed household (Nwaru, 2011; Bendig et al., 2009).

Bendig et al.(2009) uses a comprehensive survey in Ghana to identify the possible drives that affect the different types of households' demand for financial services. Results from a multivariate probit regression method showed in contrast to their expectations. Household size was expected to negatively affect the demand for credit. This is due to the fact that the larger households (assumed to contain more children and elderly people and not households with more economically active adults) are likely to consume a large share of their income and have less collateral (Tang et al. , 2010). The result, however, revealed positive influence of household size on demanding microcredit as larger households are more exposed to shock (e.g., illness) from higher number of household members.

Tang et al. (2010) indicated education as one of important variable that affect households demand for credit. In their finding it was possible to show that additional year of education by head would increase the probability of borrowing by another 2.5 percent and doubling land endowment would increase the probability by 5.6 percent. However, the impact of these factors was not the same rather it varied considerably by kind of financial institutions (formal or informal). For example, while education increases households' probability to borrow from formal credit markets, it decreases or does not affect the informal credit demand at all. But this is not always true. Chen and Chiivakul, (2008) argue that, education, at primary and secondary level may affect positively, but at four-year university level, education has negative but insignificant effect. This could imply that highly educated individuals already enjoy high income and wealth and have little need to borrow. Bendig et al.(2009) demonstrated that better-educated heads are likely to use credit from formal financial services.

Households' credit demand was significantly affected by transaction costs. In rural village, individuals lack information about the time and transportation cost (Zeller et al., 1997) which increases their cost of accessing credit. For example, Tang et al. (2010) revealed that extra kms of distance between the village and the nearest bank would reduce the probability of borrowing from the bank by 1%. In contrary, the study by Mpuga (2004) failed to show concrete evidence about the influence of distance on demand for credit.

Individuals may desire a higher debt while they are in a high current income level and this may be the individual's rational decision as these individuals have higher future income expectations (Chen and Chiivakul, 2008). The other explanation is also, when income is very low, the marginal utility of consumption is very high, leading to strong demand of credit. In addition, individuals more likely to borrow once they acquire some assets which serve as collateral. Similarly, Magri (2002) argued that net wealth, as an indicator of household's current and future endowment, is major determinant of credit demand. When endowment

grows, households can automatically finance a greater share of their desire consumption and their demand for credit may decrease. At intermediate level of wealth, however, an increase in endowment can increase the consumption needs and hence the demand for loan increases. In the study, it was found that, the value of assets have significant and positive effect on the desired debt. But at maximum level, the relation between demand for credit and the value of asset and desired debt was found negative (Chen and Chiivakul, 2008)

In Madagascar, Zeller (1994) presented an analysis of credit rationing behavior by formal and informal lenders and examining the demand factors (that affect the decision to apply for credit) categorized under individual characteristics, human capital (assets) and household events. The study showed that individual characteristics of borrower (sick days, being a wage laborer, being the head of the household and having social responsibility in community) positively affect demand for credit. The social and economic factors (household's production capacity as supported by the fact that household size, agricultural land and head's occupation, education) also explain the farmers' credit constraints and influence farmers' decision (Tang et al., 2010).

Asset of the household is an important element households take in to consideration when borrowing decision is made. To this respect, the study by Duflo et al. (2008) indicated that the amount of livestock owned has a negative influence on demanding credit as households need no more capital. But the findings of Mpuga (2004) and Mpuga (2008) contend that it is not the number of the assets rather the value of assets (e.g., building, land) owned by household and other dwelling that strongly influence demand for credit.

The study by Bendig et al.(2009) concluded that asset endowment and regular (formal) employment status enhance financial service uptake. Households, who receive remittances, also do not show demand for micro credit. This supports the widespread assumption that poorer households are more likely to be excluded from the formal financial sector than better-off households (Mohieldin & Wright, 2000; Nguyen, 2007). The result also indicated that borrowers were characterized by high and steady incomes and great assets (that can serve as collateral). Since households' motivation for the demand for financial services differ with in the same source, it is difficult to conclude that the effect of certain determinants have necessarily the same magnitude for credit or saving demand. Households can demand credit for income generations, or for income and consumption smoothing or others. Thus a household who experiences a shock can more likely demand credit than a household who demands credit for saving.

The only exception, dependency ratio, which have no influence on demand confirms the findings of Nwaru (2011). Events that positively affect credit demand were migration or death of a family member, bad harvest, positive but costly social events such as marriage and circumcision. However, the influence of these factors differs depending on the source of the credit. For instance, earning income as a salaried worker; sick days and distance from the village positively affect demand for credit from the informal source. The findings in India

showed that skill, opportunities from off-farm investments and occupation of the individuals are key factors influencing borrowers to get a loan from the microfinance (Chaudhuri, 2011).

Another factor that affects demand for credit is the risk level in the residence area. If the level of background of economic risk is stronger, the consumer might be less inclined to ask for a loan. The risk attitude of the individual in the composition of financial portfolio is mentioned to be equally affecting credit demand. However, identifying demand factors is not panacea to analyze the credit market in developing countries. It is equally important to explore determinants that affect farmers in accessing credit.

2.3 Theory of supply to Credit

Rural credit markets are absent if exist they are ill functioning (Ray, 1998) and fragmented. It is challenging to meet the gap between demand and supply of credit in the formal financial institutions frontier (Kereta, 2007). Roth (1997) stated that, the vast majority of developing countries have formal lending institutions such as commercial banks and other lending institutions. However these are often inappropriate for providing credit to rural poor farmers and micro enterprises. Most of them are located to urban settings and therefore have limited information about rural customers. In addition, their credit allocation policies tend to be based on observable wealth or ability to provide collateral which exclude majority of the rural poor (Braverman and Guasch, 1986).

Traditional financial institutions are reluctant to serve the poor due to the lack of physical collateral by the poor (Li et al., 2011; Al-azzam et al., 2011). In a world of imperfect information and incomplete markets, the poor households will not get the amount of money they desire at the correct price (Magri, 2002). Similarly, Nguyen (2007) explained that borrowers are seen discriminated to have different level of access to certain types of loans and certain types of credit institutions. Some borrowers can be excluded from obtaining credit or some of them can be rationed.

Liberalizing interest rates or using collateral requirements to loosen credit rationing results in adverse selection and moral hazard problems. Credit rationing is the result of information asymmetry: some households are liquidity constrained (unable to obtain the same amount of credit they could receive if markets complete and information was perfect). Similarly, Stiglitz and Weiss (1981) investigate why adverse selection and incentive effects in the loan market exist and explore why the poor are rationed. The belief that interest rate can bring equilibrium on the credit market will no more work. Increase in the interest rate, as a result of information asymmetry, might attract the riskiest customers (*adverse selection*) or induce firms to implement the most difficult projects with the greatest return variability (*moral hazard*).

- a. **Adverse selection-** Banks or microfinance institutions have no full information about the borrowers; therefore, they cannot identify good borrowers from bad borrowers. It becomes, thus, difficult for banks to discriminate against the risky borrowers. This in turn causes the banks to increase the interest rate and push out the safe borrowers from

the market. At the end, adverse selection leads to credit rationing (Braverman and Guasch, 1986; World Bank, 2000; Zeller, 1994).

b. **Moral hazard**-refers to the difficulty of monitoring borrowers' actions once they receive the loan from lenders. Aghion & Morduch (2004) classify moral hazard in to two: *ex ante* moral hazard and *ex post* moral hazard. The *ex-ante* moral hazard "refers to the idea that unobservable actions or efforts are taken by borrowers after the loan has been given but before project returns are realized". This is more related to how the borrower uses the loan. On the other hand, the *ex post* moral hazard refers to the enforcement problem or to a situation where the lender cannot observe the borrower's profits. The lender is not in a position to know whether the borrower made profits or losses and even if the lender knows, he/ she cannot force the borrower to repay the loan (Aghion & Morduch, 2004).

The lender also may not be willing to use collateral requirements as a rationing device even when borrowers are risk neutral as increase in collateral can lead to adverse selection effects that decreases the lender's expected return from lending (Wette, 1983). Besides this, the availability of collateral against loans lent out could not secure banks from borrowers' default, rather it induces more the wealthier individuals to use credit as their main source of finance while the small holders are discriminated against (Gonzalez-vega, 1981)

Majority of the reviewed literature mainly looked from one angle: the supply side, when explaining why banks increase the interest rate and/or constrain the small borrowers. It is argued in the literature that, given the inter-temporal and risky nature of smaller borrowers, and repeated times of loan, the informational requirements and enforcement problems during the transaction are high and the agency costs (costs of monitoring and enforcing the contract) involved will negatively affect the profit of the financial institutions. These causes the banks to limit loans to the poor (Nguyen, 2007).

Availability of formal finance, characteristics of the lending contracts and requirements of formal lenders are major factors constraining rural households in accessing credit (Nguyen, 2007). Studies by Bigsten et al. (2000) and others are among the exceptions who tried to look at and relate market imperfection with the demand side factors and the type of policy which is developed in a certain country. They investigate whether agency and enforcement costs or limited demand are at the root of non-participation of firms or individuals in the credit markets. Also, whether the banks' lending policy is biased against certain firms, beyond monitoring and enforcement problems were what they focused on. Other studies also suggest for future researchers to be a bit caution that imperfect information not only lead to excess demand but also it can lead to excess supply equilibrium as well (Morduch, 1995; Stiglitz and Weiss, 1981). In general, it seems that economist like to turn their future attention to investigate how credit constraints affect households and which households are more challenged.

In addition, there are household and institutional factors that negatively affect farmers from getting credit. Risk nature of the household, high operating costs, weak institutional capacity (Pearce et al., 2004), guarantees from local officers, official identification documents (Nguyen, 2007) and complicated rules and regulations of the banks are the main reasons to constrain the poor from accessing credit (World Bank,2000).

2.4 Determinants of Access to Credit for Small Household Farmers

Great emphasis has been given that rural households' credit in developing countries plays a significant role in the welfare of the poor. Recognizing this, many studies focus their attention on the function of credit market (accessibility and outreach) and why certain borrowers prefer to use credit from a certain source (formal or informal). As reviewed by Zeller (1994) and Atieno (2001), empirically, various reasons were identified as factors that influence borrowers' credit access.

In contrast to previous empirical results in other countries, in which the older are less constrained (because lenders perceived them to have a smaller default risk), the relationship between the probability of being constrained and age follows u-shaped pattern with a minimum age of around 47. This implies that older individuals in a country may face higher uncertainty in their income or may have accumulated fewer liquid assets than their peers in the advanced countries and are therefore more prone to default risks. Lenders are likely to favor older borrowers as their ability to pay is assumed to be higher (Chen and Chiivakul, 2008)

Females have lower level of borrowing desire due to lower level of expected future income (Kochar, 1997). Women are largely low-literate and thus are not involved in financial activities, which need specific knowledge and skills, and require information. Therefore, men access finance more than their women counterpart (Devkota, 2006). Females at individual, household and wider community and national context are affected by financial, economic, cultural, political and legal obstacles (Nwaru, 2011). Female headed households are limited in their activities, for instance, they are less likely to adopt cash crops due to lack of extension services and the time constraint resulting from home and farm production (Zeller et al.,1997). This all constrained them from accessing credit. The study finding by Kaino (2005) proved this and reported that there was a positive influence of gender in accessing credit. In contrast to this, Goetz & Gupta (1996) argued that women have higher incentive to repay their loans than men- they are more vulnerable to pressure to repay, are easy to locate (much less able to leave a locality temporarily) and are easy to intimidate into repayment than men who can always threaten violence. Thus, they offset monitoring and enforcement costs.

Single-headed (e.g., widowed) households are often considered 'less lucky' or disadvantaged and thus have difficulties in social net works. They are older headed households who have less ability to smooth consumption by themselves if they face adverse shocks as they do not have enough working household members to increase income by increasing labor working hours. Thus, they are forced to borrow from informal institutions (Kochar, 1997). Married couples could be given more credit because they are less mobile and

loans may be jointly underwritten and his report proved that singles are 3.4 percent more likely to be constrained than married couples (Jappelli, 1990)

Farmers with formal education have high exposure with external environment and exposed to risk and possess more skills. Thus, they can acquire more credit for consumption and production than their counterparts who are uneducated (Li et al., 2011). In one hand, education is assumed to facilitate credit access through easing entry costs. On the other hand, lenders may not see that education can result in permanent income and do not take it into consideration in their criteria. In addition, highly educated individuals require much more debt than less educated individuals. Both situations can cause these individuals to be constrained in the credit market and as the educational level increases, demand for credit grows faster than debt supply. In their study, Chen and Chiivakul (2008), however, found insignificant relation between demand for credit and higher education. According to Tinh et al. (2010), since most of the poor household heads in Vietnam work in unskilled sectors, where education is not rewarded well, education does not influence credit demand.

Private information and its distribution are believed to be important to shape economic activities. Agents invest their time, effort and money to get information so as to gain advantage in ensuring transactions. Lenders need information regarding the borrowers' decision making and investment choice which is done by collecting data by loan officers. This implies that, directly, distance increases the transaction cost in assessing loan applicants or monitoring costs, which affect credit terms. Borrowers' proximity facilitates the collection and analysis of local information and thus distance indirectly affects loan transaction through its impacts on the quality of the lender's proprietary intelligence that can result in informational asymmetry (Agarwal & Hauswald, 2010) and exacerbate adverse selection problems (Deyoung & Glennon, 2004). Researchers such as Balogun and Yusuf (2011) found that distance negatively affects borrowers in accessing credit and increases loan default.

Other researches relate the credit constraints with the supply side such as costs. For instance Duflo et al. (2008) in Morocco revealed that, due to lack of collateral, group lending, involving in agricultural activities and costs from small loan sizes, small holder borrowers are assumed risky and constrained from accessing microcredit. The institutions' lending policies such as giving restrictions on credit for specific purposes (e.g., poor rural households whose income depends exclusively on agriculture and financing for start up businesses were not able to get financing services), time taking and complicated application procedures, repayment capacity and regulatory of revenues were the other factors that limit access to credit. Consistent with this, Tang et al., (2010) in China found the same result but added that group guarantee, monthly payments and prior credit experience are determinant factors to access credit (e.g., 32% of farmers engaged in off-farm were more likely to be constrained).

Farmers who are involving with farming for many years are well informed about the details and risks associated with farm enterprise within the context of their physical environment. This might make these experienced farmers to be sure that the returns from their farms will be able to repay the loan and its cost. This leads them to use repeatedly credit from

the financial institutions which makes them to be creditworthy. This can help them to obtain credit though they do not have collateral (Oluwasola & Alimi, 2008).

According to Crook & Hochguertel (2005), almost all variables that limit access to credit are country (location) dependent to affect the behavior of the borrower (application, credit constrained and rationed) and the lender. For example, in Italy because of greater information asymmetry between lenders and borrowers than Netherlands and US, collateral liquidation costs are higher which intern cause greater credit constraint from high default. Income has effect on Netherlands but not in US and Italy, while average age has same effect in all three countries, marginal age above 50 reduces the chance of credit application in US. Again wealth acts to reduce the chance of being constrained in all three countries but age reduces the chance of being constrained with each year in all three countries but greater effect in US (fit the theory of consumption-being retired reduces the chances of a household to be credit constrained). Being disabled and self-employed increases the chance of being credit constrained in all the countries.

Research conducted in Nigeria indicated that, long time lag between application and disbursement of credit and inadequate credit were mentioned as the major constraints the borrowers' face. Other elements, as Lawal et al. (2009) found, are years of experience, saving, decision making in associations and social capital which have negative and positive effect on the probability of getting loan. Balogun and Yusuf (2011) also reached the same result from Nigeria and added interest rate as another major factor. This implies that the significance of the elements depend on time and location. Anyiro & Oriaku (2011) reach the same conclusions except they found extension contact as another key variable that influence access to credit.

The kind of activity households involved in affects their ability in obtaining credit. Majority of rural farmers in poor countries engaged primary in agricultural production. But, in this sector, due to unknown rainfall and other factors, there is high degree of uncertainty and risk which can result in high default (Tan et al. , 2010). On the other hand lenders may be less inclined to accept and prefer to be away from borrowers in risk-conditions because of the high probability of loan default (Zelle et al., 1997). The study by Anyiro & Oriaku (2011) in China and Anyiro & Oriaku (2011) in Nigeria found that occupation affects significantly to farmers in accessing credit from formal financial institutions.

Teka & Mengesha (2006) classified the important factors that exclude the poor from accessing the financial services in Ethiopia including risk screening practices of the institutions, product inappropriateness to the poor, cost of accessing including distance, marketing and self-exclusions. It is also worth mentioning here that the majority of determinants of household access to credit are conducted more in other developing countries which differ in many aspects from Ethiopia (the geography, culture, religion, governance, institutions and others) and limited research is done on the Ethiopian financial markets especially microfinance. This study, on the determinants of credit demand and access by rural

households in Ethiopia- Alamata woreda, can thus contribute to the existing literature on demand for and access to credit in the Ethiopian context.

2.5 Summary of Literature Review

The starting point in analyzing the demand for credit and the factors affecting demand is the “Life Cycle Model. The basic assumption of economic theories for households’ consumer behavior is that individuals want to maximize their life-time utility, given the budget constraint. To maintain the utility, consumers should inter-temporally reallocate their incomes (resources) over their life time. Hence consumer can smooth consumption and/or increase utility by accessing credit. Credit helps consumers to shift their purchasing power between periods. However the amount of credit demanded is influenced by characteristics of individuals and other factors. Also, the demand for credit arises from the theory of investment and production. Credit enables firms and/or individuals to invest in profitable investment opportunity. The amount of credit depends on the cost of the capital (interest rate) and the expected rate of return. Credit demand is also important factor in production. Credit next to land is the recessive input to increase productivity.

Credit demand is defined in different ways. For this paper we followed the definition that defines it as: the probability an individual answered yes to the question “did you apply for credit before?” and furthermore, it includes also those who are discouraged. This demand however, was influenced by different factors. Absence of supply, high interest rate and high transaction cost involved in obtaining credit due to market failure are most important determinants. It was also mentioned that individual characteristics of the borrower (age, education, income, and occupations such as farm operator or low-skilled laborer) are the decisive elements for decision to apply to credit.

Due to adverse selection and moral hazard from information asymmetry and enforcement problems, lenders are not willing to provide credit at market interest rate as these things will cause the financial providers to incur high costs of monitoring and enforcing the contract. They increase the interest rate and if that is not working, they ration the potential borrowers. Moreover, borrowers are constrained by other factors including bank’s lending policy, weak institutional capacity and bureaucratic procedures of these institutions together with individual characteristics of the borrowers.

To investigate the factors that influence small farmer households, understanding of these sets of determinants from one side is not enough. One should look at both sides-demand and supply together. So as to explore the factors that affect credit access, individuals must first have a demand. But, again, the demand for credit is affected by the supply of the credit. In developing countries, market is segmented, some borrowers are seen discriminated or excluded and some are rationed. To compensate the credit amount they could not get from formal institutions, borrowers switch to informal institutions.

3. Micro Finance in Ethiopia

This chapter investigates the general description of the study area, overview of microfinance in Ethiopia, why DECSI comes to existence and how it is operating currently.

3.1 Overview of Micro Finance in Ethiopia

In Ethiopia, the financial market includes conventional banks (commercial bank of Ethiopia and Agricultural and Industrial Development Bank (AIDB), microfinance institutions, cooperatives, government projects, semi-formal & informal lenders, trade credit as well as private banks (Jemaneh, 2002). Despite their high excess liquidity and the low yield on safe assets, these institutions are highly criticized for being unable to satisfy the various credit needs of the poor farmers in the country.

Formal financial institutions prefer high-income clients with large loans. They are urban-based and give loans to those engaged in trade and industry and consider the demand for loan by the poor as unattractive and unprofitable (Carter et al., 2004; Jemaneh, 2002). Because of the inability to secure the loan with fixed asset, the poor are considered as “high risk” borrower and credit was only accessible to large commercial farmers and industrial business activities. Due to bureaucratic and lengthy procedures, high administrative costs, long distance, the unstable interest rate and the demand of small loans, rural poor households in Ethiopia are out of the reach of the formal financial institutions (Belay, 1998). Specific institutions like cooperatives are used as political tools and member’s willingness was not given priority. These institutions have been hampered by poor infrastructure of the country and their size to outreach the rural poor is very limited. Shortage of skilled manpower and financial management take greater contribution in this regard (Daniel, 2006). Even though institutions are availing themselves, those who need to borrow will not apply fearing that they do not have the capacity to repay or they will lose their collateral. These credit constraints were most severe among poorer households than the richer (Hoddinott & Dercon, 2005).

Cognizant this, in 1994/95 microfinance institution was introduced and taken as part of the government’s poverty alleviation strategies aiming at facilitating rural credit access by rural households and playing a greater role in the Millennium Development Goals agenda (Getaneh, 2008; Zaid, 2008). Microfinance spread all over the country and started to give services like accepting deposits, drafts, provision of credit for businesses and public savings (Getaneh,2007). Even though the microfinance institutions come and start to work in Ethiopia very recently, the institution shows a momentous growth in terms of outreach and coverage of clients (Amha, 2000; Berhane, 2009).

However, due to various factors, the poor people are not still served as intended. Distance is a major factor that hinders the accessibility of the rural poor. As Getaneh (2005) indicated, distance determines the transaction cost from poor infrastructure (transportation and communication) problems. In Ethiopia, for instance, it was proved that only 57 percent of the farmers are within 2 hrs walk distance to any road. Lack of entrepreneurial capacity and cultural taboos are also other factors that determine credit demand. This can be manifested by great number of people who are not involved in some activities like blacksmithing, weaving,

tannery, pottery, embroidery and other handicrafts. Another element is religion. For example, Muslims do not take credit or save in banks or microfinance institutions because paying or receiving “interest” is forbidden by religion. Earning money by the act of loaning is haram. In the case of the women, higher domestic labor burden is another practical problem that hinders to access credit (involved more at home, cooking food and take caring families). So, gender is an important issue that influences demand and supply for microcredit. As Berhane (2009) denoted, borrowing decision also influenced by group lending (the joint liability) system of microfinance institutions. In Northern Ethiopia-Tigray, for instance, borrowers are not willing to take credit from microfinance since joint liability from group lending cause them to face two major problems: risk of partner failure and risk of losing future access to credit. In the end, they were taking advantage of the informal institutions and other networks.

Gobezie (2005) indicated that, in Ethiopia, microfinance is not achieving its initial objective of poverty reduction. For instance, in case of women, the lending character of MFIs best suited to female clients, but there are certain undesired effects on them. This is manifested by the small size of the loan, the small returns from the use of the loan and the fact that the returns themselves are still not always the major contributor to the family income as compared to the male income.

Since development interventions put greater focus on promotion of export markets and international trade and medium scale farmers and entrepreneurs, the actual micro-credit clients are not the typical ‘hand-to-mouth’ poor (Alamirew, 2006). Group collateral requirement, restricted loan and small size loan are most frequently noted obstacles that prevent poor households from accessing credit (Alamirew, 2006). At present, the microfinance industry is serving only a small percentage of the potential demand of the people (Ejigu, 2009).

High transaction costs, weak institutional base, weak governance and a nominal ownership structure as well as dependence on government and mother NGOs are other factors that affect access to credit to the low-income households in Ethiopia (Ejigu, 2009). Vashisht et al. (2010) argued that high rate of interest is another impediment to the poor to access credit from microfinance institutions. Institutional and client level constraints are other major determinants to get credit (Amha, 2000).

Institutional constraints: limited and supply-driven financial services that do not match the cash flow and repayment capacity of clients, limited institutional capacity in governance, lack of loan capital, limited competition, lack of long-term loan, lack of information about clients, limited financial access to women.

Client level constraints: limited capacity of clients (lack of training and education) to identify profitable projects, limited awareness of the borrowers on role of loans, lack of business premises.

Being limited from accessing credit from the microfinance institution, the majority of the poor are left with access to financial services from informal sources such as Eqqub (Rotating Saving and Credit Association), money lenders, Iddir, Mahber, Debo friends and relatives (Bezabeh et al 2005; Belay, 1998). This was manifested by the result that almost 69 percent of the loan in Ethiopia was obtained from these informal financial sectors (Amha, 2010). In Ethiopia, the informal institutions are the dominant and sustainable traditional institutions that meet the financial and social needs of the excluded poor (Tenaw & Islam, 2009). As a result, 78 percent of the agricultural credit is from the informal rural finance (Ejigu, 2009). These informal credit institutions are more popular among the poor as they depend less on collateral and more on personal relationship. But still, they do not have the capacity to satisfy the current demand of the poor and the loan size is very small and they are not good either. Knowing that there are no enough competing institutions that provide financial services, they over-charge the poor (Ejigu, 2009).

3.2 Study Area Description

Tigray, most northern region of Ethiopia, has a total area of 50,000 square kilometers and a population of 4,314,456 as of July 2007 of which 49.2% constitute females (Ewunetu, 2011). It shares boundaries with Eritrea in North, Sudan to West, and with South and East with Amhara and Afar regions respectively (Zaid, 2008). Tigray region is divided into six major zones, namely: Western zone, North western zone, Central zone and Eastern zone, southeastern zone –where this study held and Mekelle, the capital city (also regarded as a zone of its own). Each of the zones contains a number of woredas¹ and every woreda or district, in turn, is subdivided into many tabias² or sub-districts.

¹ Woreda: A woreda is equivalent to a district or local administrative unit managed by a local government.

² Tabia: is the lowest administrative unit in Ethiopia.

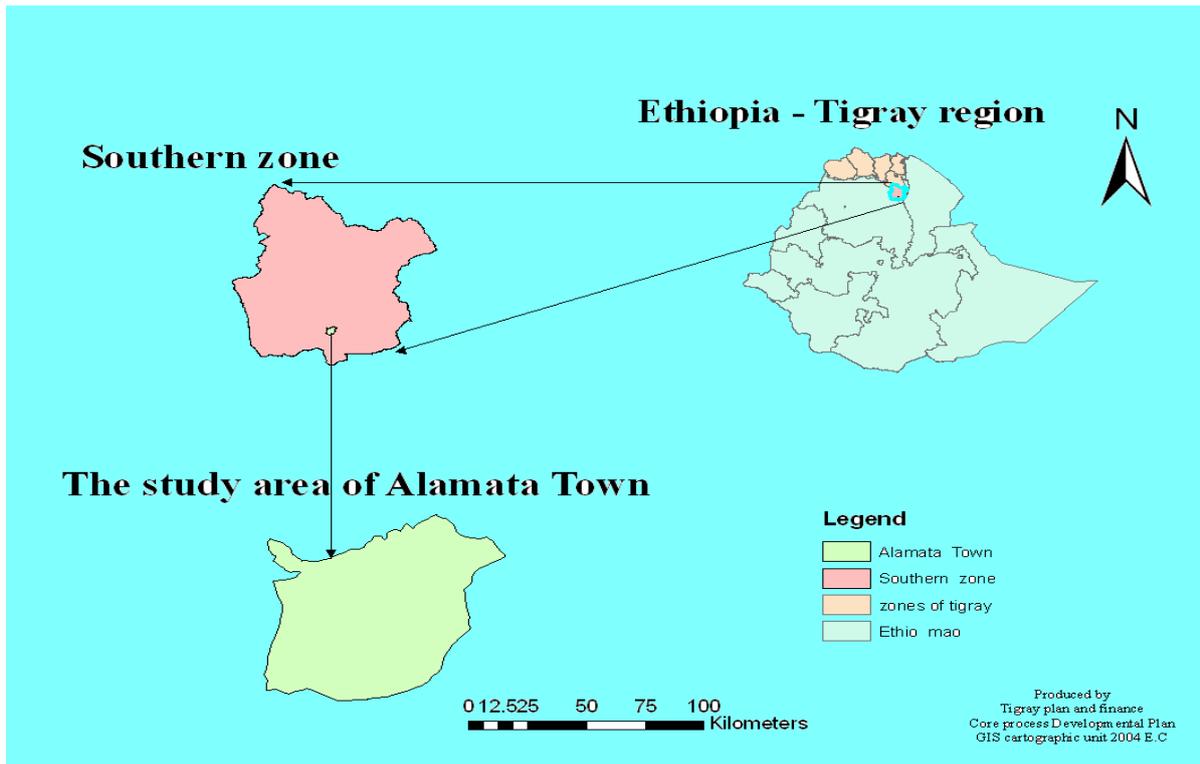


Figure 1 The study area

Tigray is a predominantly agricultural area, on which 80 up to 90 percent of the population depends. Tigray region is selected for this research because of the high incidence of poverty (Zaid, 2008). The region has been repeatedly affected by shortage as well as uneven distribution of rainfall (Gebregziabher, 2010). Poverty and food insecurity remain the most pressing problems of the region. Thus, to alleviate this persistence poverty, microfinance services are introduced in the region.

Alamata woreda is one among 34 woredas in Southern zone of the region, located about 600 kms North West of Addis Ababa and about 180 kms south of the Tigray Regional Capital Mekelle. Agriculture is the main stay of the economy for almost all of the population of the Woreda. Livestock is an integral component of the farming system. Oxen provide almost the entire traction and threshing power. In addition to agriculture, many people of the woreda, including rural people, are engaged in petty trade, particularly grain trade to supplement their unreliable income from crop production. The total population of the woreda is estimated at 128,872 of which 88 percent are rural households (IPMS, 2005). Alamata woreda covers 725.35 square kilometers which is subdivided in to 15 Tabias (Alamata Woreda Office of Agriculture, 2010) For this study, three tabias are selected: Selam Bikalsi which covers 68.855 sq.kms, Garjalle which covers 54.295 sq.kms and lastly Limeat covers 21.8 sq. kms.

3.3 Operation of Dedit Credit and Saving Institution (DECSI) Microfinance in Tigray

After prolonged years of civil war, drought and conflicts, Tigray regional state suffered from severe hardship for the last couples of decades. This causes 89 percent of the people to

be dependent on food aid. To lift these people from this poverty trap, researches proved the significance of establishing an institution which provides financial services to poor households (SOS, 2000). The regional government of Tigray then sends some of its staffs to get experiences with rural finance in Bangladesh, India and Ghana; in response, in 1993 Relief Society of Tigray (REST-a local NGO) was established (Borchgrevink et al., 2006).

REST, which is engaged in various development activities in Tigray region, initiated and in a move to depart from the more usual direct provision of relief created independent department to supply small credit to rural people called Dedebit Credit and Saving Institution (DECSI). DECSI later grew into a separate institution and was licensed as a microfinance share company in 1997 with the primary mission of improving the wellbeing of those individuals operating in the areas of subsistence agriculture and micro and macro enterprises in the region through increased access to lending and saving services (Dedebit Microfinance, 2011; Zaid, 2008). DECSI aims to fill the gap of formal institutions by meeting the needs of small scale borrowers in income generating schemes. Currently, DECSI delivers multiple types of financial services, namely: credit, saving, money transfer, current account, Gold management, pension payments and TV tax collection in 8 woredas of 143 functionally decentralized offices with 423,576 clients (as of 2005) (Berhane, 2009). However, DECSI focused much on credit provision while giving little attention to saving mobilization (SOS FIAM, 2000). Moreover, DECSI gives priority to rural areas through agricultural credit (constituting 70 percent of DECSI's current loan portfolio) and to women borrowers (Dedebit Microfinance, 2011; Segers et al., 2010).

DECSI replicates the Grameen Banking system of joint liability credit provision and implemented it strictly (Zaid, 2008). A group of 3-7 people who own “at least two-oxen”, screened by village officials are eligible to get credit. Individual members are liable for the full amount of their own and group debt in case of default. Anything less is considered default and can result future denial of credit including their village. Contrary to the “limited liability assumption in the microfinance literature, DECSI followed a policy of tracking down defaulters to take to the local courts regardless of realized outcome, in which case local leaders play a role” (Berhane & Gardebroek, 2008).

In DECSI, joint liability, group or social pressure and compulsory saving serve as collateral for the loan instead of physical asset. For instance lenders are required to put 5 percent of their loan in saving account that bears interest. Being used as collateral, it is not possible to withdraw group savings. DECSI uses tabia level committees (composed of Tabia administration representative, women, farmers, youth representatives, extension agent -in rural areas, and DECSI's sub-branch employees) that help DECSI to reduce its transaction costs.

With the above general information, in the following paragraphs, we will look at the detail about DECSI's operation manual, such as its objectives, target groups, interest rate, eligibility criteria for selection, the size of the loan, the restrictions of the loan, and others.

DECSI has three major objectives: 1) Provision of credit services to enhance the productivity of small producers, startup capital for entrepreneurs and raise the standard of living of clients and their families, 2) Provision of saving facilities and raise awareness on financial discipline in the region and 3) Creating employment opportunities by expanding DECSI's networks throughout the region, thereby attain its financial as well as institutional sustainability as a microfinance (Berhane, 2009; DECSI 2010 manual). In order to accomplish these objectives, DECSI developed strategies including: giving priority to agricultural sector in the rural areas and micro and small enterprises, ensuring that women get priority for financial services, securing and achieving sustainable financial income required to cover the institution's operational expense and increasing saving mobilization.

DECSI has target groups that are eligible to get credit such as the poorest of the poor who are capable of using credit in productive way, people who are dynamic enough to get away from their poverty, micro, small and medium enterprises and women who are in charge of their families (Dedebit Microfinance, 2011) However, due to the low average value of the loans, DECSI is not willing to extend credit services to risky borrowers and costly programs. Moreover, DECSI discourage loan for consumption purpose (SOS FIAM, 2003). Even though some indicators showed that DECSI helps people who are underprivileged, it leaves the poorest behind the program (SOS FIAM, 2000) and has no clear criteria to select the clients.

The loan terms and amount of loan granted to borrowers varies from customer to customer, but the maximum amount set to be 5,000 Ethiopian Birr (277.8 us dollar) at a fixed repayment date. Households can get finance for a range of activities (package) and loans are disbursed on an individual and group basis. Although the components of the financial services for which loans are granted differ from area to area, the basic ones include: rural package (Household Centered-including livestock seed and fertilizer), urban package loans, business loan, housing loans and TVET loans.

Depending on the type of activity, loan periods range from 1 to 4 years (Nega et al., 2010). Along with its regular credit, it also had "agricultural input loans specifically targeting rural areas. While regular loans have been extended to clients on cash for any productive activity chosen by borrowers, agricultural input loans were designed such that farmers obtain agricultural inputs (fertilizer, improved seeds, pesticides) from the input provider" (Bureau of Agriculture) against loans from DECSI (Zaid, 2008). Often DECSI charges a commercial declining balance rate, ranging 9 to 18 percent per year on the outstanding balance of the loan.

According to DECSI's own figures, about 60 percent of the number of loans and 45 percent of the total loan amount are for agriculture. While trading accounts for 30 percent of the number of loans and represents 45 percent of the loan amount, crafts belong to less than 1 percent of the loan (Dedebit Microfinance, 2011). But, the study by Borchgrevink et al. (2006) contradicts with this study and argued that most loans have actually been used for consumption, which implies a high fungibility. Even though DECSI discourages such a use, rural farmers argued convincingly, for instance, though the money was not used in an

approved purpose, they use it in another important way there by perhaps avoiding asset erosion or starvation in terms of crisis.

All in all in terms of outreach and impact, many findings proved that DECSI plays a significant role in Tigray region (e.g., Zaid, 2008; Berhane & Gardebroek, 2011). Similarly SOS FIAM (2000) added that, with the exception of urban areas, DECSI satisfies the majority of (91 percent) the local communities. It reported, however that, the poorest of the poor are still marginalized. This is because, in group-formation, the poor are considered to be a liability to co-groups which results in exclusion and marginalizing them from getting credit.

In Tigary, poor people are influenced by various factors in deciding to apply for credit in DECSI. SOS FIAM (2003) categorized these factors in to two: internal and external factors. External factors include the war with Eretria in 1998, drought in 1999-2000 and the lack of funds in the region. The internal factors, however, are the clients' fear of non-payment and DECSI's discouragement for non payers. On the supply side, clients were challenged by group lending, collateral requirement (in contrast to DECSI principle) and the amount of credit delivered. In addition, lack of knowledge and discipline of the borrowers' and selection process of the DECSI are some factors that affect significantly (SOS FIAM, 2003). Moreover, age of the borrowers', short term borrowing and physical incapacity of borrowers are other constraints to access credit (Berhane & Gardebroek, 2011). The presence of these constraints was manifested by the fact that drop outs of the potential borrowers reached from 100,000 to 150,000 (Berhane, 2009). For instance, following the Grameen bank, DECSI's potential borrowers are required to form a group of 5-7 members and approval is done by members themselves. Group members are responsible not only to repay their due credit on time but also their group members' credit in case of default. Also, borrowers will be punished not only for failing their willingness to pay but also their inability to pay (Zaid, 2008). In case of default, DECSI follows the procedures like hunting down of defaulters regardless of their condition they are in (e.g., in Tigray about 11 percent of group loan clients, 2 percent in urban and 9 percent per year in rural areas were supposed to pay for defaults by their group members).

In Alamata woreda, majority of the rural poor people get loan services from DECSI and it is the only micro financial institution in the area (Hailemariam, 2008). In this study, based on the above general background information and the primary data from 120 respondents, the factors that determine demand for and access to micro credit by small household farmers investigated.

4. Empirical Framework

In order to identify households who have or have not demand for and access to credit, there are two methods: consumption smoothing approach (the indirect approach) and analysis of determining factors approach (the direct one) (Diagne, 1999).

4.1 Consumption Smoothing (the Indirect) and Determining Factor (the Direct) Approach

The starting point of the theory of household demand for debt and credit constraint is the life-cycle model and the permanent income hypothesis, called the indirect approach (Chen and Chiivakul, 2008). The assumption of this approach is that, under perfect capital market, households' demand for credit arises for consumption smoothing. Households maximize their utility over their life cycle by borrowing during low transitory income and saving when they have high transitory income. According to this model, current consumption should be independent of current income. However, because of asymmetry information and enforcement problem, households in developing countries, like Ethiopia, can be credit constrained and might not smooth their consumption (Diagne et al., 2000). Hence, this method of analysis for credit demand and access is undermined. Following the concept from different writers, Doan et al., (2010) mentioned some of the limitations of this approach. First households can smooth their consumption using saving, remittances or other accumulated assets. Second, credit demand can arise from households' health care since they have no insurance and third, since households have no enough saving, investment from which return expected in the future initiated them to demand credit. Lastly, the demand for credit is not only for coping income shortage but also for financing household economic activities such as production projects and shocks (animal death, drought, flooding).

To overcome the shortcomings of the indirect approach, the direct method emerges as it captures better information by asking the respondents directly from household members on their experiences in the credit market (Chen and Chiivakul, 2008; Bendig et al., 2009; Balogun and Yusuf, 2011; Zeller, 1994). This method helps to classify households either credit constrained or unconstrained and capture information regarding the socio-economic factors affecting the demand for credit and the livelihood of a household being credit constrained. It fails, however, to measure the extent that the households are constrained and the impact of access to credit on their welfare outcomes, which is beyond the scope of this paper.

A household may have two kinds of sources of credit, formal or informal sources. Formal sources include credit and savings schemes of non-governmental organizations, governmental extension services in cooperation with the agricultural development bank, agribusiness firms and microfinance institutions which are regulated by the government and the central bank (Diagne, 1999). Whereas informal financial sources are those institutions that work through self-enforcing informal contract among friends, neighbors and members of extended family and arranged with in networks of informal institutions of diverse nature and money lenders and are beyond the regulatory framework of the financial system (Zeller, 1994). With respect to their relationship, informal lenders can be classified in to two: relatives and friends who

provide the bulk of short-term informal credit. The other informal lenders have a more socially distant relationship with their borrowers, and frequently provide credit linked with transactions in commodity or labor markets (Diagne, 1999).

These two forms of institutions fulfill different functions in rural households credit use implying that the two institutions are not substitutes (Diagne, 1999) and can be possible to look at determinants for rural farmers to demand and access to credit. But, due to time and budget constraint, the study consider only one aspect of financial market (formal institution), namely DECSI microfinance to answer its objectives.

4.2 Description of the Framework

Based on the literature, the following frameworks, represented by Figure 2 and 3, are developed. The frameworks show the most important determinant factors for demand for and access to credit of rural households in DECSI, Alamata Woreda.

Figure 2 below shows households’ model for demand for credit. So as to obtain credit from financial institutions, individual’s decision for credit demand is inevitable. A household may or may not have demand for credit. If the household has demand for credit, he/she may or may not apply for credit since he/she may be discouraged. The household who is not discouraged may applied for credit. The household who applied further can be rejected by lender or can receive the loan. If the household obtained the entire credit applied, he/she is unconstrained. Whereas, if he/she obtained part of the credit applied or refused or discouraged to apply, that household is constrained.

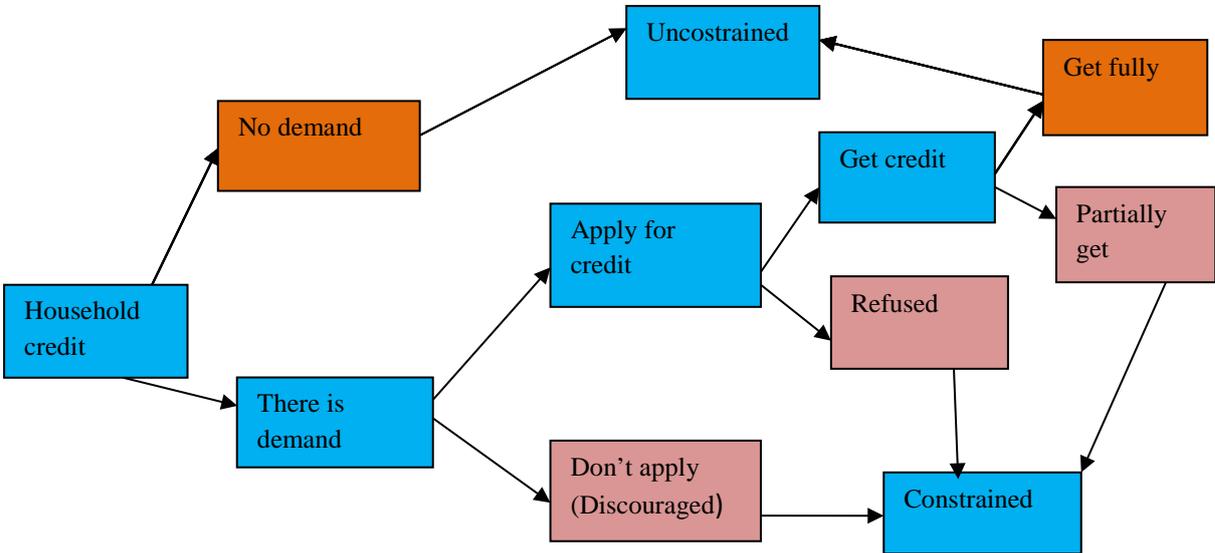


Figure 2: Multistage credit demand decision processes

Demand for and accesses to credit are different faces of the same coin. For the household in order to be successful in a credit market there are different factors that influence the decision. These factors in one or the other way affect both demand and access at the same time.

The framework in Figure 3 below shows empirical factors that determine rural households' demand for and access to credit. In this study, the dependent variables of the estimation are demand for and access to credit. In Alamata Woreda, DECSI is the only formal institution that provides loans to rural farmers; hence, we focus on DECSI microfinance.

In the literature several explanatory variables are considered, which are believed to be determinants of the demand for and access to credit in developing countries. These include the demographic factors, social, economic, market access and the government rules and regulations in the demand side. In the access side the major determinant factors considered include demographic factors, the type of policy a country developed and market failure (due to imperfect information and enforcement problems). Collateral requirement and high interest rate are the consequences of this market failure that affect access to credit.

Furthermore, geography (regional disparity), is other important factor mentioned in the literature that determine demand for and access to credit. However, since our research is conducted in a small area, geography is not taken in to consideration. The same is true for institutional factors (market, legal, social and economic institutions), even if it matter in demanding and accessing credit, the factor is the same for all respondents. Also, the variables being head of the household, being member of farmers association, availability of alternative and shock did not show any variation among sample farm households. For this reason, these variables are not included in the model. Hence, in this study, in the bivariate model, we used explanatory variables that seem relevant for decision of demanding and supplying credit for this tudy. Hence, we exclude interest rate, group lending, loan disbursement and loan repayment period, which should matter mostly in the demand function and are the same for all, in our model. But, we discussed on them qualitatively since we asked some questions to respondents and to answer the third objective. Thus, demand for and access to credit is the function of individual characteristics, socio-economic and other factors. We operationalize the individual characteristics by age, sex, marital status, religion, family size, dependent ratio, educational status of the households). And the asset holdings are measured by average cultivated land size and the number of livestock owned the household as measured by Tropical Livestock Unit (TLU)³. Other factors are also operationalized by factors like distance and shock. Hence, based on the findings in developing countries including Ethiopia, age, religion, family size, education distance and asset holdings are hypothesized to affect the demand for and access to credit for this study.

³ TLU conversion factors for matured livestock is for a camel = 1, for a cow = 0.7, for a goat or sheep = 0.1(Davies & Bennett, 2007)

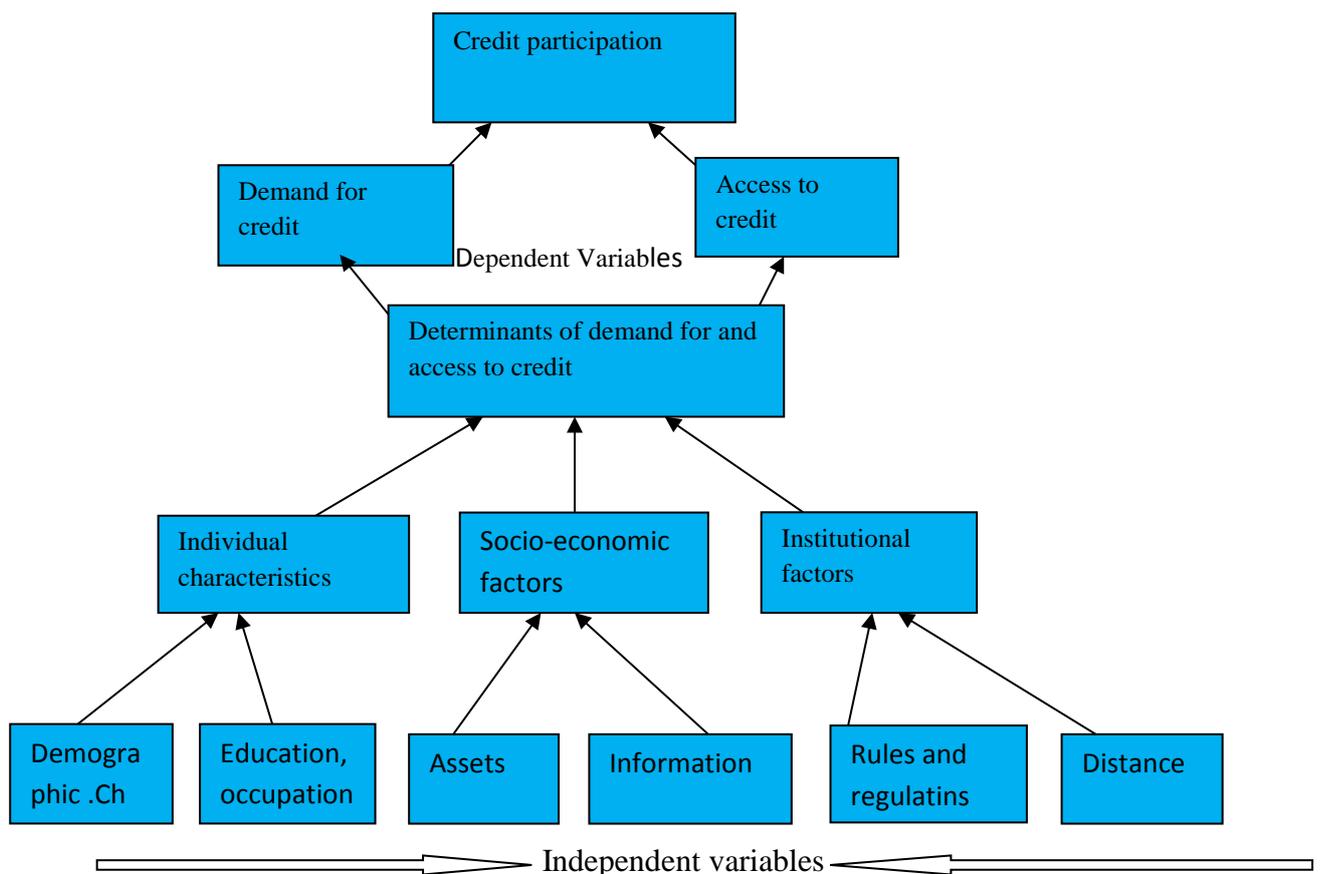


Figure 3 Determinants of demand for and access to credit

4.3 Description of Variables

In order to identify the respondents whether they have demand for credit or not and whether they have access to credit or not in DECSI, households were asked a series of questions. First households were asked if they applied for credit in DECSI. If they did not apply, they were further questioned why. Those who replied because of high interest rate, inadequate fixed asset, no enough output from the farm, bureaucratic procedure of DECSI, and lack of enough fund from DECSI are considered as they have demand together with those who applied. But those who replied because they have enough asset, they have saving and they do not need are considered as those who do not demand credit. If they already applied, the next question follows in case of receiving a credit or rejection of a credit. If households get a credit, they were asked further whether they get the entire amount they requested. If they do not totally get a credit, they were considered rejected (fully constrained).

Based on the reply we got, respondents who are credit constrained include those applied and rejected, applied and not received the entire amount they requested and those who are not applied because they are discouraged (e.g., due to previous unpaid loan, lack of enough fixed asset, bureaucratic procedure of DECSI, and lack of enough fund from DECSI). Unconstrained (who have access) households are those households who have no interest in loan and those who received the full amount requested (Doan et al., 2010; Chen and

Chiivakul, 2008; Magri, 2002). We present the descriptions of the variables that are considered important in Ethiopian context and their measurements as follows.

Dependent variables: the dependent variables of the model demand for and access to credit, have dichotomous nature representing the observed status of the respondents in deciding to apply and receive a credit.

Demand for credit: is dependent variable defined as the probability that an individual has applied for credit in DECSI in the last 12 months.

Access to credit: is the dependent variable defined as the probability that an individual has received any loan from DECSI in the last 12 months.

Independent variables: these are the variables which are expected to influence the demand for and access to credit of the household respondents. These variables are obtained from the literature. The hypothesis for the factors and their expected signs are described below (see also table 4.1).

Households' Demographic Characteristics

Age of the household head: It is hypothesized that young household heads with expectation of growing income and a high marginal utility income together with creating a new family, will have a high demand for micro credit. But will decrease beyond a certain age. In contrast, access to credit is assumed to increase with age, since lenders assume that older borrower's ability to pay is higher.

Sex: Male headed households are expected to have higher demand for and better access to credit than female headed households.

Marital status: It is hypothesized that married households have more credit demand than unmarried since their consumption from greater family size increases. Also because of their social respect and stability, lenders supply more credit to them.

Religion: A dummy variable with a value of zero for Muslims and one for Christians is included. It is expected that religion is an important variable that affects positively for Christians but negatively for Muslims in credit demand.

Educational status of a household head: better educated households are likely to have lower entry costs since they face less difficulty in collecting information and evaluating the information needed for decision to apply for credit. Also, the probability of not being credit constrained (access) will increase with education.

Head's occupation: Households who are involved in off-farm and other private activities have higher demand for credit since these activities requiring them huge capital. Access to credit increases for those engaged in off-farm activities since they are assumed to have capacity to repay the loan from their businesses.

Family size: Refers to the total number of family in the household. It is assumed that household with larger family size demand more micro credit (Schreiner & Nagarajan, 1998). Greater household size represents a bigger demand for consumption and less ability to repay the debt. So, they have less credit access from lenders.

Dependency ratio: Refers the total of family under 15 and 65 years (unproductive) to above 15 and below 65 years (productive people) (Diagne, 1999). The presence of more dependants in households may discourage lenders because it signals higher desired consumption instead of investment, limited earning capacity and higher probability of default (Nwaru, 2011; Diagne, 1999). However, households with high dependent ratio are more likely to have more demand for credit.

Households' Socioeconomic characteristics

Cultivated land (farm) size: is the farm size in hectares measured by the total land area under crop production. It includes own, rented and sharecropping arrangement cultivated land by the household head. It is hypothesized that increase in cultivated land would lead to increase in demand for credit. Moreover, lenders would prefer households who have high cultivated land.

Livestock (TLU): Is a continuous variable indicating total livestock holding of the household. This variable is expected to influence demand for credit negatively while access to credit positively.

Distance to the nearest credit source: It is a continuous variable measured in kilometers. It refers to the distance (in km) of the rural households from credit institution, in our case (DECSI). It is expected that as the distance increases demand for and access to credit decreases.

⁴Table 4.1 Variables and their measurements

| Concept | Indicator | variable | Expected relationship with demand and supply |
|-----------------------------|---|----------------------|--|
| Demographic characteristics | Age in years | Age of the household | +/- |
| | Sex is a dummy variable takes a value of 1 if the household head is male and 0 otherwise) | Sex of household | +/- |
| | A dummy variable 1 if married otherwise | Marital status | +/- |
| | Number of people in the household | Family size | +/- |
| | Number of people below 15 and above 65 divided by the age group between 16 and 64 | Dependency ratio | +/- |
| | The educational level of the farmer measured by the total number of years the farmer spent in receiving formal education. | Educational level | +/- |

| | | | |
|-----------------------|---|---|---------------|
| Social factors | A dummy variable which takes the value of 1 for Christian , 0 otherwise A dummy variable that takes 1 if a household has Information about DECSI | Religion of the household head Information | - - |
| Economic factors | Assets(wealth) of the household head: land in hectares, livestock in tlu, cultivated land in hectares | Land Livestock(tlu) Cultivated land | + -/+ + |
| | Head's occupation or activities the head is involved as primary and secondary source of income | A dummy variable equal to 1 if a household head engaged in a certain occupation | _/+ +/- |
| Other variables | Occurrence of flood, draught, death of membership | A value 1 if household head faced a shock otherwise 0 in the past 12 months | +/- |
| Institutional factors | The location of DECSI from rural households | distance | -/+ |

5. Materials and Methods

5.1 Data

The field work for the research was conducted between November 2011 and January 2012. In this research, to gather sufficient information regarding determinants of rural households' demand for and access to credit from DECSI microfinance, both primary and secondary data sources were used. The primary data were derived from the interview responses of the sample farm households both male and female headed from different Tabias of the Woreda, DECSI officers both head office and Sub-branch level and two key informants. Secondary data were derived from Alamata Woreda Office of Agriculture, Mekelle (head office)-DECSI and Alamata sub-branch and other relevant documents.

In collecting the primary data from interviewing respondents, we used structured questionnaire containing both close and open-ended questions. The questionnaire was pre-tested to evaluate for consistency, clarity, to avoid duplication and to estimate the time requirement during data collection. The closed ended questions were used to collect the respondents' background information covering household demographic and economic variables (e.g., age of head, sex of the head, marital status of the head, family size, head's education, head's occupation, household assets and land endowment), institutional variables (interest rate, group lending, distance), demand and access related questions. Besides, a wide variety of variables relating the respondent's condition were included (information whether or not credit was applied, received during the year, if not why and whether the household needed more credit), terms of credit, purpose and sources of the credit.

On the other hand, the open-ended questions were used to collect information regarding some factors that affect credit demand and access, the loan process in DECSI, the perception of borrowers about DECSI including its employees/staffs and the general operation of DECSI. The questions were translated into the local language, Tigrigna so that communication should be easy. In addition, conversation was made to other issues on which the respondents wanted to talk about, which some times contributed to this information and make us interact with them.

5.2 Sampling Techniques

To select the sample respondents, a stratified sampling method was used. Stratified sampling method is best method of sampling when the population has various attributes (Suhr, 2009). To make the selection as representative as possible, Tabias were stratified based on two major factors: diversity in activities respondents are engaged in and the socioeconomic factors (e.g., religion). For instance, in terms of economic activities, households in Garjalle are engaged in farming activities while the other two are both in farming and off-farming (e.g., petty trades). Besides, majority of households in Garjalle are Muslims, however, households in Selam Bikalsi and Limiat Tabias are Christians. Taking the list of rural households from Alamata Office of Agriculture as a sampling frame, within each Tabia, representative households were randomly selected. A total of 120 sample respondents proportional to the size of population in each Tabia were selected. 48 respondents were from Selam Bikalsi, 35 respondents from Garjalle and the rest were from Limiat. In addition, nine

employees of DECSI including (the general manager in main office, Mekelle, three DECSI woreda officers and three rural Tabia employees and two Alamata Woreda agricultural office employees) were contacted during the data collection.

5.3 Data Analysis Techniques

To answer the three objectives and analyze the collected data for this study, we used descriptive statistics, econometric model and qualitative methods.

5.3.1 Descriptive Statistics

Descriptive statistics such as mean, percentage and frequency distribution are used to analyze household characteristics. To access the characteristics of the respondents, demographic as well as the socioeconomic profiles including information about rural credit was examined. Also information regarding institutional factors was gathered. The descriptive statistics was helpful to provide some insight about the importance of various factors related to rural household's credit. The result from this descriptive statistics served for developing the econometric model. Hence, to deal with the determinant factors that affect small farm household's demand for and access to credit in Alamata Woreda, a Bivariate Probit Model is used.

5.3.2 Specification of Econometric Models

Demand for and accesses to credit are binary variables where demand and access to credit take a value of one otherwise zero. To analyze which variables and to what extent these factors will relate to the small householders' demand for and access to credit, the dependent variables will be dummy which will take a value of one or zero whether or not a small householder uses credit in microfinance. That is the regressed variable is a binary or a dichotomous. However, the independent variables will be either discrete or continuous (Gujarati, 2004)

Binary choice models assume that individuals are faced with a choice between two alternatives and that the choice depends on identifiable characteristics. In this case, the researcher will find a relationship between a set of attributes describing an individual and the probability that the individual will make a given choice (Pindyck et al., 1998). When the dependent variable is qualitative, the aim is to find the probability of happening of the event. The maximum likelihood (ML) estimation technique, than the ordinary least square (OLS) is a commonly used method in estimating the parameters that have discrete dependent variables. In this study, we applied the bivariate probit model, one of the econometric models that use ML, to estimate the parameters of demand for and access to credit (Gujarati, 2004).

Estimating the parameters of credit demand and access assuming that the two variables are independent to each other could result in biased estimates (Lung-Fei Lee, 1979; POLS, 2006). Bivariate probit models are applied when two related decisions are made by the same person or different persons. For instance a decision to vote or against property taxes (POLS, 2006). In this paper, demand for and access to credit are interrelated. That is the two decisions are dependent each other. Thus, the bivariate probit model (the two equations model) instead of a normal probit model is appropriate for this study to determine factors jointly.

The model includes the two dependent variables: demand and access variables that would equal one if the household has demand for credit and also if the household head has access to credit otherwise zero. Thus, the estimation models Cameron and Trivedi (2005) and Greene(2002) can be represented as follows:

$$Y_{1i}^* = \beta_i X_1 + \varepsilon_{1i} \dots\dots\dots (1)$$

$$Y_{2i}^* = \alpha_i X_2 + \varepsilon_{2i} \dots\dots\dots (2)$$

Y_{1i} will be observed only if:

$$Y_{1i} = 1, \text{ if } Y_{1i}^* \geq 0$$

$$0, \text{ otherwise}$$

Y_{2i} will be observed only if

$$Y_{2i} = 1, \text{ if } Y_{2i}^* \geq 0$$

$$0, \text{ otherwise}$$

Where:

Y_{1i} is a binary variable for the probability of rural household's demand for credit in DECSI, with:

$Y = 1$ if the rural household has demand for credit in DECSI otherwise 0.

X_1 are explanatory variables that affect the dependent variable household's demand for credit.

β_i is the unknown parameter that reflects the impact of the change in variable X on Y_i which will be estimated

ε_{1i} is the error term, and $i = 1, 2, 3, \dots, n$, where i is the number of observations

And for access,

Y_{2i} is a binary variable that represents the probability of households having access to credit services in DECSI

X_2 are explanatory variables that determine the dependent variable access to credit in DECSI

α_i is the unknown parameter that reflects the impact of the change in variable X and to be estimated

ε_{2i} is the error term

$i = 1, 2, 3 \dots n$ represents number of observations.

In both equations (1) and (2), the error terms are normally distributed with mean 0, that is,

$$E \{ \varepsilon_1 \} = E \{ \varepsilon_2 \} = 0,$$

$$(\sigma^2)=1,$$

$$\text{Cov}(\epsilon_{1i}, \epsilon_{2i}) = \rho,$$

Where, $\rho \neq 0$ implies that the two equations are dependent each other. However, if $\rho = 0$, the equations are independent and the parameters for demand for and access to credit can be estimated through an independent probit model.

Using results from the descriptive statistics and the econometric model mentioned above, information also obtained qualitatively to answer the perception of respondents about the weakness and strengths of DECSI.

5.3.3 Qualitative analysis

Lastly, in order to answer the third objective of the study, various questions were included. For instance questions like the perception of household responds about credit services in DECSI, (interest rate, group lending, loan disbursement period, loan repayment period, and office hours of DECSI) were asked. In addition, to capture some information regarding the strengths and weaknesses of DECSI, sample respondents were asked questions such as whether the amount of loan DECSI delivers is enough or not, whether the focus of DECSI is to the rural poor or not, its credit specificity and general attitude towards service provision of DECSI. Furthermore, information captured from DECSI staff was also incorporated into the qualitative result.

Multicollinearity test

According to Mansfield & Helms (1982), prior to running a model, examination of a set of data for the explanatory variables for the existence of multicollinearity should always be performed as an initial step in any multiple regression analysis. Menard (2002) noted that, multicollinearity is a problem that arises when independent variables are correlated with one another. In analyzing regression results, multicollinearity is a crucial test. If it is not taken in to consideration, variables that correlate may result in various problems including: larger variances (extremely large estimates or non significant coefficient estimates even though the overall regression is highly significant and wrong signs of the coefficients or their sign may disagree with known theoretical properties of the variables), unstable parameter estimates, highly dependent and unreliable F-statistics which is used for selection of variables.

In this study, all variables are assumed to be predetermined at the time of survey. To test the correlation of the variables, in stata the *correlation* command is applied and the correlation coefficients are used to test the correlation between the variables. The correlation value varies between 0 and 1, but it will be a problem if R^2 for one of the independent variables is above 0.8 and will certainly a problem for R^2 greater than 0.9. In this case, the solution is to drop the variable which has high correlation value (Grewal et al., 2004).

In addition there are two ways that can be applied to detect multicollinearity, the variance inflation factor (VIF) and the Tolerance (TOL) given by:

$$\mathbf{VIF}_i = \frac{\mathbf{1}}{1 - R_i^2}$$

Multicollinearity will not be an issue if VIF is not larger than 10 or tolerance of less than .10. Here, we tested the independent variables for multicollinearity using correlation matrix, we found no multicollinearity among the variables. The mean VIF was found 1.6. In addition to test of VIF, to avoid the multicolliniarity problem, a dummy variable was dropped from each group.

6. Results and Discussions

6.1 Descriptive statistics

Rural households demand for and access to microcredit is influenced by demographic, socio-economic characteristics of households and institutional factors. Therefore, the following section presents summary statistics of basic sample household's information.

6.1.1 Percentages of households who have and have no demand for credit and who have and have no access to credit.

Table 6. 1 Percentage of households versus demand and access to credit

| | Count (n) | Percentage | Cumulative count | Cumulative percentage |
|---------------------------------|-----------|------------|------------------|-----------------------|
| Demanders | 95 | 79 | 95 | 79 |
| Non demanders | 25 | 21 | 120 | 100 |
| Who have access | 74 | 62 | 74 | 62 |
| Who have no access(constrained) | 46 | 38 | 120 | 100 |

Source: Own survey, 2012

In the surveyed villages, out of 120 respondents, the majority (79 percent) reported that they want to borrow from DECSI (see Table 6.1). However, there seems to be forced demand in the area. First credit orientation given to households is not complemented by other facilities (e.g., market) and households need credit for buying fertilizer which is forced by the government.

Of the sample households, 62 percent reported that they are not constrained in accessing credit from DECSI. The constrained number, from the whole 120 respondents, includes household respondents who are partially constrained, fully constrained and discouraged households to access credit. This may indicate that, at present, the microfinance industry is not serving well the rural poor; rather it is only for few of the poor who are able or forced to take credit so as to buy fertilizer from government.

Among the respondents who have no access to credit, very few households (13 percent) were classified as partially constrained since they did not receive the full amount of loan they requested from DECSI. 24 percent of the respondents found to be fully constrained since they applied but totally rejected: while 63 percent were constrained because they were discouraged to apply. This might show that the discouraged group constitute the highest number of the constrained sample households, which happens in most developing countries (Jappelli, 1990).

Those who are discouraged were also asked the main reasons that discouraged them from applying for credit. Accordingly, high interest rate of DECSI, inability to pay the previous loan they took and default of their group members were cited as the main reasons that discouraged respondents to apply for credit. Furthermore, bureaucratic procedure of DECSI

which takes long time before taking a loan, together with lack of funds in DECSI and shortage of enough farming output were other reasons mentioned by respondents.

6.1.2 Socio-economic and Institutional Characteristics of Households and Demand for Rural Credit

The age distribution of the sample shows that the respondents' average age is 43 years. The gender composition of the respondents shows more men (73 percent) than women. This ratio of the sample reflects the social and cultural system of the society, where men are the predominance in the labor and credit market. Regarding on marital status, the majority of the respondents (81 percent) are married.

The average cultivated land holding size for the samples is 3.53 hectares, which is above the estimated national average of around 1 hectare (Bewket & Sterk, 2002; Croppenstedt & Demeke, 2006). But Jemaneh (2002) in his research on rural households in Loume Woreda, Ethiopia, found that average land holding size of the farmers was 2.25 which confirms the higher cultivated land size.

Similar with Zerihun (1997) study, in Southern Ethiopia, in this study, the average family size of the respondents is 5 persons (see Table 6.2). This number is very high which creates high dependency of farmers on a small hectare of land (which is the main source of their income). The average educational level of household respondents in Alamata Woreda is found to be around 2 years of schooling indicating that farm household respondents still lack basic education. It is also worth mentioning that there are households who are engaged in farming activities after completing a certain college level education. Moreover, the average distance to travel from a certain household to DECSI's location is about 15 kms. This means that greater percentage (43 percent) of farmers are located far from the financial sources (more than 2 hours) (Zeller, 1994).

Table 6.2 also summarizes household characteristics for the whole sample with respect to demand for microcredit. In order to test whether the mean values of the household variables between demanders and non-demanders of credit were statistically different, t-test was used. To test for the association between the discrete variables and demand to microcredit, Chi-square was used. The influences of the variables, their sign and their significance on households' demand for microcredit are analyzed in section 6.2.2 of table 6.4 using a bivariate probit model. There was no association between demand for credit and gender and marital status of the respondents (see table 6.2).

Table 6. 2 Profile of respondents with demand for credit

| Variable | Demanders(N1=95) | | Non-demanders(N2=25) | | Total(N3 =120) | | Statistical test |
|------------------------------|------------------|-----------|----------------------|---------|---------------------|---------|----------------------|
| | count n1 | % o to N1 | count n2 | % to N2 | sub-total(N3=N1+N2) | % to N3 | |
| Demographics: | | | | | | | |
| Gender: male | 68 | 72 | 20 | 80 | 88 | 73 | $\chi^2 = 0.72$ |
| Marital S : Married | 77 | 81 | 20 | 80 | 97 | 81 | $\chi^2 = 0.01$ |
| Religion: Christian | 81 | 85 | 17 | 68 | 98 | 82 | $\chi^2 = 3.94^{**}$ |
| Average (mean) age | 45.46 | | 37.4 | | 43.78 | | $t = -2.57^*$ |
| Average family size | 5 | | 4 | | 5 | | $t = -3.23^*$ |
| Dependency ratio | .99 | | .67 | | .92 | | $t = -1.50^{***}$ |
| Average yr of Education | 1.67 | | 3.48 | | 2.05 | | $t = 2.32^{**}$ |
| Economic | | | | | | | |
| Main occupation: Farming | 90 | 95 | 23 | 92 | 113 | 94 | $\chi^2 = 0.27$ |
| Asset | | | | | | | |
| Average (mean) TLU | 3 | | 3 | | 3 | | $t = 0.66$ |
| Average cultivated land | 3.76 | | 2.64 | | 3.53 | | $t = -1.94^{**}$ |
| Social | | | | | | | |
| Information DECSI: Yes | 72 | 76 | 11 | 44 | 83 | 69 | $\chi^2 = 9.38^*$ |
| Member farmer Ass: Yes | 88 | 93 | 23 | 92 | 111 | 93 | $\chi^2 = 0.01$ |
| Other characteristics | | | | | | | |
| Shocks : Yes | 87 | 92 | 21 | 84 | 108 | 90 | $\chi^2 = 1.26$ |
| Average(mean) Distance | 14.38 | | 16.14 | | 15 | | $t = 1.22$ |

* 1%, ** 5% and ***10% significant levels

Source: Own Survey calculation, 2012

Younger households who are economically active are not demanding credit from formal financial institutions. It was found that households with higher family size (6 persons) show demand for credit. Dependency ratio seems also another characteristic that differs between demanders and non demanders of credit. It was shown that households with high dependency ratio (0.99 versus 0.67) are more likely to demand for microcredit.

The chi- square test for religion shows the presence of an association between religion and demand for credit. To this respect, the respondents who demand for credit are Christians. The fact that only few people demand credit among the Muslims may indicate that, their religion prohibits them from demanding credit. With regard to households' years of education, it is found that non-demanders of credit are better educated than the demanders.

In their economic background, households who demand for credit are involved more in agricultural activity as their primary occupation than the non-demanders (95 percent versus 92 percent). However, the chi square result failed to show the association between a kind of activity a household engaged in and demand for credits. While the t-test result shows that TLU does not matter in demanding credit, households who demand for credit owned on average greater cultivated land size than the non-demanders (3.76 versus 2.64). This implies that households with larger farm size are more likely to demand credit than those households with smaller land size.

The social characteristic of the sample respondents is also assessed. The result shows that demanders of credit are more informed about DECSI than the non-demanders (76 versus 44 percent). The high number of the non-demanders who have information about DECSI microfinance has strong message. Even if the sample households were fully aware about DECSI and its financial provision, they are not interested to take credit from it. This may be because the loan processing of DECSI is cumbersome and the interest rate is high. In addition, this may be because of the forced demand from the government to sell its fertilizer. We do not find any association between being membership in farmers association, shocks and distance and demand for credit though many scholars assumed so (Mpuga, 2008 ; Nwaru, 2011)

6.1.3 Socio-economic and Institutional Characteristics of Respondents and Access to Credit

We analyzed descriptively using chi square and t-test results to see whether the variables used in bivariate probit model have differences in accessing credit. There is no gender bias and no discrimination of religion by DECSI microfinance as can be observed from the chi square test result (Table 6.3). It was found that younger households are more likely to be constrained from accessing credit. Similarly, larger share of married households have access to credit than single (88 versus 70 percent). In contrast to the hypothesis, we found that households with high average family size have access to credit (6 versus 5 persons). This may be because households have relatively more economically active labor. However, there was no significant association between dependency ratio and access to credit.

In the study area, educated households have better access to credit than the non-educated. The data showed that from the total sample respondents, more people who have access to credit (71) relied on agriculture (crop farming and raising livestock). This implies that, agriculture is the major source of income for the rural farmers. DECSI also gives priority to agricultural credit (constituting 70 percent of DECSI's current loan portfolio). But the chi square result does not confirm this.

In Ethiopia, livestock next to land is the basic sources of livelihood to the farmers (Bewket & Sterk, 2002). On average the number of livestock (TLU) a household owned is 3 but the variation in TLU holding does not affect to access credit in DECSI microfinance.

Table 6. 3 Profile of respondents with access to credit

| Variable | Access(N1=74) | | No access(N2=46) | | Total(N3 =120) | | Statistical test |
|------------------------------|---------------|-----------|------------------|---------|---------------------|---------|--------------------|
| | count n1 | % o to N1 | count n2 | % to N2 | sub-total(N3=N1+N2) | % to N3 | |
| Demographics: | | | | | | | |
| Gender: male | 57 | 77 | 31 | 67 | 88 | 73 | $\chi^2 = 1.35$ |
| Marital S : Married | 65 | 88 | 32 | 70 | 97 | 81 | $\chi^2 = 6.11^*$ |
| Religion: Christian | 63 | 85 | 35 | 76 | 98 | 82 | $\chi^2 = 1.55$ |
| Average (mean) age | 46 | | 40 | | 44 | | $t = -2.47^*$ |
| Average family size | 6 | | 5 | | 5 | | $t = -2.49^*$ |
| Dependency ratio | .92 | | .93 | | 0.92 | | $t = 0.06$ |
| Average yr of Education | 3 | | 1 | | 2 | | $t = -1.79^{***}$ |
| Economic | | | | | | | |
| Main occupation: Farming | 71 | 96 | 42 | 91 | 113 | 94 | $\chi^2 = 1.11$ |
| Asset | | | | | | | |
| Average (mean) TLU | 3 | | 2 | | 3 | | $t = -1.04$ |
| Average cultivated land | 4 | | 3 | | 4 | | $t = -3.0060^*$ |
| Social | | | | | | | |
| Information DECSI: Yes | 62 | 84 | 21 | 46 | 83 | 69 | $\chi^2 = 19.34^*$ |
| Member farmer Ass: Yes | 68 | 92 | 43 | 94 | 111 | 93 | $\chi^2 = 0.10$ |
| Other characteristics | | | | | | | |
| Shocks : Yes | 68 | 92 | 40 | 87 | 108 | 90 | $\chi^2 = 0.77$ |
| Average(mean) Distance | 13 | | 17 | | 15 | | $t = 3.58^*$ |

* 1%, ** 5% and *** 10% significant levels

Source: Own Survey calculation, 2012

The descriptive result of the survey shows that (Table 6.3) households who have access to credit have larger cultivated land size. This may indicate that lenders encourage those borrowers whose income is high as this would enable them to repay their loan. In addition, respondents who have information about DECSI and located near to DECSI have better access to credit. However, variables such as membership, main occupation and shocks are not found to be important factors in accessing credit.

6.1.4 Purposes of Credit

Respondents were asked about the purpose of the loan obtained from DECSI. The highest proportion (88 percent) of the respondents replied that they got loan for the purchase of livestock. The other options include purchase of fertilizer and seeds, purchase of food and household goods, start off-farm business and health and education expenses. Very few households received credit to start off-farm business, while purchase of fertilizer and seeds takes greater percentage of the sample households.

Using probit model and ERHS data (secondary data), Kedir et al., (2007) conducted a research in urban Ethiopia to investigate the constrained households. The research result revealed that households mostly use micro-credit for non-productive (consumption) finance. Unlike the research results by Kedir et al.(2002) but similar with Diagne (1999), our result shows that rural household borrowers took loan for productive purposes. The difference in the result with Kedir et al., (2007) might be due to methodological difference, the data used and the setting (urban versus rural areas). In this study, the majority of the respondents replied that they received credit for purchase of livestock and some of them for purchase of seeds and

fertilizer: only few respondents received credit for consumption purposes. But this does not mean that the borrowers necessarily used the loan for the intended purpose: there could be a possibility of fungibility (it could be possible to shift loan to its unintended purposes). Segers et al.(2010) proved that DECSI provides loans to rural households which are used for all kinds of productive purposes, not for consumption. This implies on the other hand that, DECSI seems to restrict the loan to specific activities, not willing to lend risky borrowers and discourage loans for consumption purposes (Greene, 2002). Also, DECSI, as indicated by the study Borchgrevink et al. (2006), does not understand that using the loan for consumption smoothing will help by perhaps avoiding asset erosion or starvation in terms of crisis. This was also confirmed by the statistical result displayed in Table 6.3 above those respondents who have access to credit found to be relied more on farming activities (crop farming and livestock raising).

6.2 Econometric Results and Discussions

The study is aiming to investigate the factors that determine the rural farmers demand for and access to credit in Alamata Woreda and the socioeconomic characteristics of the respondents.

6.2.1 Determinants of Demand for and Access to Micro Credit

As presented in section 5.4.2 above, the bivariate probit model is used to investigate the factors that determine demand for and access to credit. The results of the bivariate model are summarized and presented in table 6.4. It is observed that the overall performance of the model is fit at 1 percent significant level and is adequate as can be shown from the Wald test statistics (χ^2). This implies that the independent variables are important explanatory factors to understand the variation in credit demand and access

Table 6.4 also shows the p value of 0.0045 which is less than the critical value of 0.05. This result leads to the rejection of the null hypothesis ($H_0: \rho=0$) which says there is no correlation between the two dependent variables, demand for and access to credit. Hence, it is possible to conclude that there is a strong dependence between demand for and access to micro credit (the two equations are endogenously interdependent). This justifies the use of bivariate probit model to review the factors that determine the demand for and access to micro credit by small farmers.

6.2.2 Estimated Credit Demand and Access Functions

There exists a positive and significant relationship between access for rural credit and age of the respondent. *Ceteris paribus*, in contrast to demand for credit, the probability of credit constraint is higher at younger ages and decreases as age increases until it reaches the minimum level. Beyond that age, however, credit access decreases as lenders prefer to grant loans to middle aged individuals'(economically active groups) rather than to the young and the old since the middle aged individuals have more stable income and saved money which leads to lesser risk of credit default (Chen and Chiivakul, 2008; Doan et al., 2010; Crook & Hochguertel, 2005). This confirms the result of Kereta (2007) when they observed that young and old people in Ethiopia are less likely to access credit than the middle age. The financial institutions have several criteria for selecting the potential clients. Among these criteria are

individuals should not be very young and should not be above 60 years old. Magri (2002), however, reported that the probability of demanding credit increases with the age of the household head.

From Table 6.4, it is seen that households relatively with big families tend to demand for credit. This might be attributed to large families which are more likely to exert consumption stress on the household borrowing than those in a smaller family as the larger family is more likely to have a higher dependency ratio, which is reflected through an increased probability of demand for credit (e.g., Chen and Chiivakul, 2008; Tinh et al., 2010). This may mean that households with larger families cannot invest in farm capitalization since the large portion of their farm output is used to maintain their family. In this study, respondents with larger family size stated that, during summer season farm output reaches its minimum, they need credit to fulfill their consumption gap and buy other stuffs for their family. Oluwasola & Alimi (2008) also found similar result in Nigeria that big family size (11 averagely) increased agricultural credit demand. And also Bendig et al.(2009) reported from Ghana that larger households are more exposed to shock (e.g., illness) because of higher number of household members which ultimately caused them to have more demand for credit. On the other hand, similar with the findings of Al-azzam et al. (2011), this study does not found results for dependency ratio on credit demand.

Table 6. 4 Estimation of the bivariate probit model

| Variables | Demand | Access |
|-------------------------|-----------------------------------|----------------------------------|
| | Coefficients | Coefficients |
| Sex | .0522995 (.4012665) | -.0694632 (.3602744) |
| age | .0032448 (.010427) | .0176704*** (.0099151) |
| Marital status | -.7399067*** (.4407277) | .4287076 (.4292244) |
| Family size | .2713223* (.0869591) | .0706499 (.0711838) |
| Dependency ratio | .0233001 (.127848) | -.1084255 (.1366021) |
| Religion | .6508256*** (.3730133) | .2319538 (.3760412) |
| Education | -.0740488** (.0391287) | .113869* (.0395848) |
| Occupation | -.5486748 (.4775425) | .3535919 (.4839439) |
| Tropical livestock(TLU) | -.1432885** (.0655664) | -.0209121 (.0603311) |
| Cultivated land | .1591057* (.063652) | .1360847* (.0575752) |
| Distance | -.0066209 (.021486) | -.0569112* (.0211056) |
| _cons | .0543676 (.774762) | -1.32802 (.7490452) |

Number of observations = 120

| | |
|-------------------------------|-----------|
| Mean VIF | = 1.61 |
| Likelihood- ratio test of rho | = 0 |
| Prob>chi2 | = 0.0045* |
| Wald chi2(22) | = 86.69 |

* 1%, ** 5% and *** 10% significant levels

Values in parenthesis: standard errors

Source: Own Computation from field data

In addition, religion of the household head seems to make a significant difference in the demand for credit. The result shows that Christians more likely demand credit than Muslims. Cultural factors like religion can affect demand for credit. In an area where the social ties and religion contributes to attitudes and beliefs of individuals, religion affects the credit behavior of the society (Getaneh, 2005). In Muslim religion, credit or saving is not allowed since paying or receiving interest is considered as haram (Getaneh, 2005) and hence people refuse to take credit even though they are unable to finance themselves. This can be witnessed from the study of Ageba & Amha (2006) who found that 1.8 percent of the respondents in their sample did not apply for credit due to religious reason. In addition, Getaneh (2005) reported that in certain areas of Ethiopia such as in the Oromia and in the Amhara region, earning of money by the act of loan is haram⁵. On the contrary, religion dummy has no influence on access to credit. This indicates that, DECSI does not discriminate borrowers by their religion.

Though we expect the variable “marital status” to positively affect demand for credit, as we hypothesized married individuals are more likely to demand for credit since they established and maintain family and hence their consumption from great family size increases, however, this relationship was not supported. Contrary to our hypothesis, married people were less likely to have a demand for credit. It could be because of the fact that married households are financially better off than single households since couples can help each other and/or can have different sources of income. The other possible explanation is that, to take a credit the couple should enter in to contract with the financial institution. But, it may not be easy to get agreed and trust each other about the credit and the risk taking ability of the couples may differ. On access side, the variable marital status was found not significant, implying that being married or single does not matter for accessing credit from DECSI micro finance institution.

It was interesting to note that the educational level has an impact on the loan demanding behavior of small household farmers. Educated individuals have the potential to expand income and thereby own assets necessary for collateral, better able to appreciate the need of credit and have less entry costs as they face fewer difficulties in collecting and evaluating the information needed to apply a loan (Magri, 2002). However, we found inverse relation between demand for credit and educational level of the respondents. This might be attributed to the contribution of education on the understanding of the individuals who take credit. The level of education and the socio-economic achievement of individuals have very high linkage in different social and cultural, time and places. Many aspects of life, especially in developing

⁵ haram : This explains that credit is forbidden in Muslim

countries, can be changed by the use of knowledge gained through education. And also education gives the individual skills and opportunities to assess and to choose the best alternatives among the available choices. Merely accessing credit will not be a solution to improve the livelihood of the society. This is because, in developing countries markets are not functioning well and there are no investment opportunities especially for those small and poor groups (Bills, 2004), These people cannot compute in the market as there is lack of business premises (Amha, 2000). Realizing this, educated individuals might be reluctant to take credit and can be risk adverse of market failure. Sample respondents also explained that, they do not demand for credit since they cannot get enough money that enables them to start a better investment like buying Motor for pumping water and others. Even though they can get the credit, they lack other complementary assets like land (space) to get the water from and other facilities. And the credit is limited most of the time for specific investment activities. These all might be associated with the inverse relation of credit demand and education level (Table 6.4). This might be also because relatively educated household heads might have little liquidity constraint since they can engage in off-farm employment activities and have high income that can make them demand less for credit.

Accessing credit was also determined by the educational attainment of rural farmers. As hypothesized, keeping other factors constant, better educated households in the sample are accessing credit more than the less educated. This might be because higher education is associated with better understanding of the loan regulations as well as the borrowing procedures of the formal financial institutions of educated individuals (Lensink and Ngan, 2007). Similar with our result, Gryseels (1988) reported that in Italy, the probability of credit rationing falls by 10 percent when the household head is a diploma. However, the coefficients of primary occupation of rural small holder farmers and dependency ratio exhibit no influence for both demand for and access to credit. .

The coefficient of the tropical livestock indicates that households endowed with high number of live stock are not suffering from budget constraint and hence less demand for credit. Livestock is an integral part of farming system on which above 85 percent of Ethiopia rural farmers depend on (Gryseels, 1988). Furthermore, livestock is an asset which can be easily changed to cash and a security against shock such as when crop fails (Zeller, 1994). As households own high number of animals, they would be less likely to demand for credit. This can be attributed to increase wealth and income from these animals makes more money available in the household that minimizes demand for credit. However, in accessing credit, the coefficient of tropical livestock exhibit unexpected sign and statistically insignificant.

The other variable that affects both demand for and access to credit is cultivated land size of the respondents. That is, the larger the cultivated land size, the farmers utilize more farm inputs such as the labor (higher additional labor), fertilizer and others that demand additional capital that might be obtained through credit. Our result shows that rural households with large cultivated land size more likely demanding credit than those households with less land size. The other possible explanation will be, *ceteris paribus*, an increase in farm income would lead to increased saving and there by increased investment. This investment will lead to

increased business activities which require households' huge money that is possible only through credit. This result is in agreement with Mpuga (2008) who reported the existence of relationship between credit demand and farm income in rural Uganda. Relatively, wealthy households are less risky and preferred by lenders and easily access to credit. The value of the coefficient ($b=.1360847$, $p<0.05$) of the cultivated land size implies that, DECSI more likely prefers to give credit to farmers whose income is high because they have higher chance of repaying the loan. Formal lenders may also require fixed asset (cultivated land size) as collateral to rescue themselves from risk default of information asymmetry (Zeller, 1994; Stiglitz and Weiss, 1981; Aghion & Morduch, 2004). Our result also shows that the probability of accessing microfinance credit can be significantly improved when households have large size of cultivated land size. Also, in group lending, asymmetry information problem is very less since borrowers know well each other and have better information on each other's risks than does the lender and there is social pressure (Van Tassel, 1999). Group lending applies self selection procedure where group members are of the same type and area (e.g., in asset endowment). Hence, as individual's cultivated land increases, the probability of joining the group and accessing credit will be increased.

There exists a substantial area of literature which explains distance is one of the most important determinants of credit demand and access by rural farmers. The result of the bivariate model (Table 6.4) shows the estimated coefficient of the variable distance is negative and significant for accessing credit but insignificant for demanding credit. This negative relation with demanding credit implies that the longer the distance to the financial institution the less the likelihood of the rural farmer in demanding credit. This non-insignificant result was similar with Mpuga (2004) and Mpuga (2008) study that there is no concrete evidence about the influence of distance on demand for credit. Also, this negative relation of demand with distance for credit supports the result of the study by Balogun and Yusuf (2011) in Nigeria but their finding for the variable was significant, which indicated that longer distance decreases the demand for credit. With the same token, holding other factors constant, the probability of accessing credit getting less as distance increases. This might be due to the perceived high transaction costs arising from travel expenses, opportunity costs of time and deficiencies in communication with lenders (Zeller & Sharma, 2000; Oluwasola & Alimi, 2008). The result is consistent with the findings of Diagne (1999) in Malawi, Duflo et al.(2008) in Morocco and (Okurut et al., 2004) in Ethiopia.

6.3 Other Determinants of Demand for Credit and Smallholder Farmers' Perception Regarding Weaknesses and Strengths of DECSI

Some qualitative information was gathered from the rural households' survey to investigate the determinants of demand for and access to credit in rural farmers in Alamata woreda, other than those econometrically analyzed. And also while filling the questionnaire, respondents were asked and allowed to talk freely their feeling about these influential factors and why as presented the result below.

a. Interest rate

High interest rate and lack of fixed asset are the two important factors that influence rural households to apply for credit. For lenders, interest rate serves as a screening device to limit the probability of default by borrowers (Okurut et al., 2004) that results from imperfect information (due to the fact that borrowers know better than lenders about their potential risk of default) (Segers et al., 2010). However, high interest rate again negatively affects borrowers and causes high default. DECSI is the only microfinance institution that avail itself in Alamata woreda to give financial services to smallholder farmers (Segers et al., 2010). To get better services, one of the decisive factors is the availability of alternative financial institutions. Hence to understand how the people in the area feel about DECSI's services, different questions were asked including interest rate, group lending, loan disbursement period, general view about the loan amount and other qualities of DECSI.

As mentioned in section 3.2 above, DECSI charges a commercial declining balance rate, ranging 9 to 18 percent per year on the outstanding balance of the loan. Accordingly, respondents were asked their feeling about the current interest rate of DECSI. Respondents have different perceptions on the amount of rate of interest to be charged. Results showed that more than three-fourth (76 percent) of them replied that interest rate is high and they are unable to get a loan; and added that, it is not stable as well. In 2007, it was 12 percent and now in 2011, it rises to 18 percent. DECSI have no reason for that, if not may be because of limited competition and lack of information about clients (Segers et al., 2010); rather rural farmers are facing the drought and other shocks. In this regard, one stated: "Paying interest rate of 180 Eth Birr from a loan of 1,000 Eth Birr 180 Birr for a farmer means, it is just pushing the farmer to be poor, getting worse and causing him/her to migrate from the place where he/she settled".

b. Group lending

From 120 respondents, 45 percent of them complained about group lending and replied that group lending is one of the major reasons that constrained them to get a loan from DECSI. One individual mentioned that because of other member default his application for loan was turned down and one individual also mentioned that he paid for the default of one of the members around 500 Birr (30 US dollar at current exchange rate), implying that the group as a whole will be sanctioned in the case of default by any of the members. Even though the form of sanctions taken to penalize defaulting groups varies, penalties, taking legal action (prison sentences) on individual defaulters and denying of future access of credit for the group as a whole are some of the common practices that DECSI took. Defaulters can be also excluded from participate in safety net and food-for-work programs. Punishments also apply to individual borrowers as well. Hence, regardless of their condition they are in, borrowers are encouraged to repay their loan on due time. Generally, the majority of the respondents have a view that group lending benefits for DECSI (since it facilitates collection and reduces costs of services) than for borrowers. As the DECSI staff members explained further, the aim of group lending apart from promoting saving and share of experience, are to minimize cost of management and risk of default. Berhane (2009) reported also the same result that in Tigray, borrowers were not willing to take credit from DECSI microfinance since joint liability from

group lending cause them to face two major problems: risk of partner failure and risk of losing future access to credit.

Respondents indicated that, DECSI encourages them to form a group that provides group pressure in monitoring and enforcing members to pay the loan. Furthermore, DECSI has field workers who remind borrowers to pay on time and if not taking timely action. Some respondents also were not silent to appreciate what DECSI is doing for the poor. They said that, nowadays to get credit from friends or relatives is not easy; people do not trust each other as before. DECSI does not need the poor any physical collateral; what it needs is the farmer should have 'Metesha'⁶ where he or she is living. However, respondents also mentioned DECSI's weaknesses. DECSI knows that they do not get credit on time because the PA committee do not make it and pass their application to DECSI on time. But, DECSI does not seem working in coordination with PA to shorten the lengthy process of application for credit. They also strongly forwarded their opinion that loan amount is not enough and hence it should be increased.

c. Loan disbursement period

Loan disbursement period is another key challenge that influences borrowers demand and access to credit. Lawal et al.(2009) mentioned that, the time lag between application and disbursement of credit service was indicated as the major constraints borrowers' faced. In similar way, sample farmers in Alamata Woreda thought that the loan period of DECSI micro finance is not appropriate for the rural poor. Around 58 percent of them replied that the loan disbursement period is too late for them to use the loan in productive way. This is because, before their application reaches to DECSI officers, it should be screened out by the peasant association's screening committee in the agricultural bureau. This procedure takes long time and the loan will not be received on due time.

The respondents stated that they may apply for loan in the month of November or December. At this time, they can buy ox for ploughing and thereby produce enough agricultural production. If they do not have enough food production in that particular year, they can use part of the loan to buy some food that will be used in summer when things get expensive (since food products are cheap during the month of November, December and January). Another important reason they mentioned was, if they get the loan on the right time, they can repay their loan back. However, since the loan is not given on time, this causes borrowers not to pay their loan from their agricultural output on due time. And also borrowers might be forced to repay the loan by selling the livestock they already bought using the loan. And they will use much amount of loan for consumption. When he was telling us his deepest feeling about his discomfort from DECSI's credit provision period, one respondent stated: *"Even if borrowers are hoping to get credit, it may not be possible to get it on right time and that causes them to sell their important assets such as cows and others. While hoping to get credit and taking long time, farmers can lose their asset like livestock which are productive*

⁶ 'Metesha': a small space (land) given to the farmer where he /she can built a house

for them". This was proved by Berhane (2009) who revealed that many clients of DECSI were dropped out (e.g., from 150,000 to 100,000 clients decreased).

About 84 percent of the respondents who applied for credit replied that there was no problem in the lending procedures of DECSI; the application processes within DECSI are even filled by the employees of DECSI themselves. Another critical problem respondents stated was a criteria attached with the micro loan. In the area, respondents stated that, to get credit, they have to buy fertilizer from governmental agricultural agents irrespective of the need of the farmer (their land may not need it); otherwise, they are not eligible to get. The government forced them to buy. This shows that there is also a forced credit demand in the area so that government will get fertilizer market.

d. Provision of saving services

In group lending, DECSI does not need directly physical asset as a guarantee. When we look more closely, the issue is a bit different. For example, DECSI provides two kinds of saving services for borrowers: the voluntary and the involuntary (compulsory) savings. In the voluntary saving clients can save whatever amount of money they have and they can also withdraw the amount of money at any time at request. But this is not the case in involuntary (compulsory) saving. This saving, which is required only from borrowers, is kept in a blocked account which serves as a guarantee for DECSI. Respondents, however, have a negative attitude towards this saving for two reasons. One, the amount of loan DECSI provides is not enough to invest; it is a limited amount. Second, compulsory saving is a closed money; you cannot use it or withdraw it when need arises. Because of this respondents are not happy with the lending system. Even in the voluntary saving itself, they mentioned that, the interest rate paid for their saving is 5 percent while they will pay 18 percent if they borrowed. This may be an implication that DECSI focused much on credit provision while giving little attention to saving mobilization. But, one important thing respondents appreciate was that DECSI encourages clients to save and always tell them the importance of saving to realize the need of investment using own capital and number of the clients who save increases.

e. Loan Repayment Period

The loan repayment period is another important issue respondents are concerned with. The respondents replied that DECSI gives one year to start repaying the loan and the time is not short. The problem is that DECSI is not flexible enough and does not take in to consideration the circumstances they are in. For instance, if the season is good and they get enough farming output, that is not a problem. But the difficulty is when there is drought. In this case, DECSI as usual continues to take its actions to enforce them: if they fail to pay back, DECSI takes them to court rather than allowing them to pay when they get good production. We understand from the respondents discussion while they fill the questionnaire that DECSI fieldworkers are providing door-to-door services to collect the outstanding balance and this is very appreciated by clients.

7. Summary, Conclusions and Recommendations

7.1 Summary of the Findings

This study was initiated to answer three main questions: to understand the socio-economic characteristics of the rural household respondents, to identify the factors that determine rural households' demand for and access to credit and to assess rural households' perception of the strengths and weaknesses of DECSI micro credit institution. Primary data, using structured questionnaire were collected from 120 rural farmers in Alamata Woreda. The chi square and the t-statistics were used to analyze the socio-economic characteristics of the respondents. To identify the factors that affect demand for and access to credit, the bivariate probit model was applied. In addition, discussion with rural households and DECSI officers and other secondary data were used to assess the strengths and weaknesses of DECSI microfinance. Below we presented the summary of the major findings from the three objectives.

The study found that greater number of the respondents has demand for credit consisting mainly male household heads. Neither sex nor marital status showed any association with demand for credit. In addition, older household heads, with greater family and larger cultivated land size have demand for credit. On the contrary, years of education and the distance travelled were higher for non-demanders of credit than for the demanders indicating that non-demanders are better educated and located far from DECSI.

The statistics result showed that Christians have a higher demand for credit than Muslims and households who are engaged in agriculture demand credit than those involved in off-farm. Lastly, it was shown that demanders of credit have information about DECSI than the non-demanders.

In the access side, it was shown that still there is greater gap between demand and supply of credit which is indicated by the 39 percent of respondents who have no access for credit (partially constrained, fully constrained and the discouraged). The main reasons that discourage the respondents include high interest rate, inability to repay the loan from high interest rate and shocks faced from drought, illness, long waiting time and others.

There is no association between gender and access to credit. Married respondents are more likely to have access to credit than single. It was shown that religion does not matter in accessing credit. Furthermore, except dependency ratio and distance, the mean values of age, family size and years of education were greater for those households who have access to credit. And also, it was revealed that those respondents who have access to credit owned great asset endowment (TLU and cultivated land size). Consistent with demand, households who have access to credit are engaged more with agricultural activities and have information about DECSI. However, both being membership of the farmers association and shock do not show any difference among those who have and those who do not have access to credit.

From the bivariate model, the variable sex show the same result with the statistics method; no influence on both rural households' demand for and access to credit indicating absence of gender discrimination in demanding and provision of credit in DECSI. The study found that access to credit increases with age implying that productive ages are excluded from getting

credit. However, age was not important factor in demanding credit. In contrast, family size and marital status affect rural households' demand for credit though in different sign. Both of the variables, however, were not found important in accessing credit.

Education was another important demand side factor and also influencing access to credit since educated individuals can better understand the loan regulations as well as the borrowing procedures of the formal financial institutions and thereby reduce costs of gathering information. Moreover, religion was found to be an important determinant factor but only affect demand for credit. It was found that, Muslims do not need credit as interest rate is prohibited and regarded as haram. Tropical livestock (TLU) related only with demand for credit as it is liquid asset and owners can sell it easily and the income from it can be used to solve their financial constraint. Cultivated land size influenced both demand for and access to credit. Borrowers who owned large cultivated land are considered less risky and preferred by lenders and they access credit easily. Lastly, the study showed that distance from DECSI was not a matter for demanding credit but was influential for accessing credit indicating that the longer the distance, the more likely rural households are constrained from receiving credit from microfinance institutions.

Group lending, interest rate, loan disbursement period and loan repayment period were other variables analyzed in the study. Majority of the respondents complained that the high interest rate of DECSI is challenging them in accessing credit and causes repayment default. This happens because DECSI is the only microfinance institution in the area and the only option for borrowers to take credit at whatever interest rate DECSI set. Also, almost half of the respondents complained about group lending as it makes them jointly liable. Respondents added also that the loan disbursement period together with the compulsory saving of DECSI constrained them from accessing credit.

DECSI does not seem work in coordination with the PA committee as a consequence borrowers cannot receive loan on appropriate time and unable to invest the borrowed money on its intended purposes. The loan size and repayment period are fixed and lack flexibility with the situation the borrowers are in. But, under normal circumstances repayment period is not a problem as it starts year after the loan taken. One important quality of DECSI is that it encourage saving which matters for investment and door-to-door collection of outstanding loan. And also, within DECSI there is no any complex application and if any the employees themselves do it.

7.2 Conclusions and Recommendations

For rural smallholder farmers, household characteristics including asset endowment of the households and institutional factors were the main determinants of demand for and access to credit. Over all, there seems to be greater gap between demanding and accessing credit. Though majority of rural households were found demanding credit, it was only 62 percent who have access. However, it is not possible to say that there is no access of credit as it was possible to observe a kind of forced demand in the area. First, in order to get credit, government set a precondition that rural farmers must buy a fertilizer which will require additional capital. Second, though farmers may not have demand for credit, they are highly encouraged to take credit so as to buy the fertilizer from the government. This pressures farmers to take credit and later to repay the loan not only used for their agricultural production but also for unwillingly bought and high priced fertilizer from the government itself. In addition to that, DECSI microfinance is not working in the way credit can help to users as it simply agitate the demand for political reason (e.g., it does not understand the situation of the borrowers, not look market for them and not helping them in training and awareness creation). DECSI only cares about the distribution and the collection of the loan disbursed irrespective of the impact it has on users of the credit.

Therefore, based on the above summary and conclusion, for policy makers, designing new and demand-driven services to address the credit needs of the rural poor households are imperative. Moreover, additional interventions such as facilitating of market for the products of the farmers, training and skill development are important. It is also advisable for policy makers to make an effort in designing appropriate educational system in such a way that rural farmers will get knowledge that will assist them in demanding and accessing credit at less cost.

DESCI and other financial institutions should advertize themselves and the type of services they will deliver through different local Medias (village meetings or social gatherings) and mass media such as Radio, Television and Newspapers so that the rural poor will have an increased awareness towards the benefits of such institutions.

Last but not least, DECSI microfinance should work together with PA committee to make the selection time short and become transparent, its lending policies will be improved (such as simplifying the lending procedures, focus on individual lending) and its credit services be redesigned with the ultimate goal of rendering such services flexible (e.g., terms and conditions that better suit the needs of the rural households). And also the government should encourage other governmental NGOs and private financial institutions to emerge and provide financial services.

7.3 Limitations of the study and Recommendations for Future Research

Despite the fact that the sample could be even more representative, as time and financial constraints contributed negatively to a point, it must be stressed at this juncture that this would not compromise the reliability and validity of the findings of the study. Also, obtaining the necessary data was hard. This can be explained by the fact that I was forced to get a permission letter from the head office in Mekelle and had to go back to the woreda which lies 180 kms South of the regional capital, Mekelle, making it time consuming because of the relatively poor transportation service —negatively affecting the study time schedule. Also, even if there are different parts of Ethiopia that could have been included in the sample, the budget, time and other constraints limited this study only to the Southern part of Tigray, Alamata Woreda. In the study, the only variable of interest are the demographic, socio-economic characteristics of individuals and some few institutional factors. There are many variables affecting demand for and access to credit that are not included in the study such as resettlement of the household (migration), experience in credit use, risk attitude of the household head, household events and others. The study focused only on formal institution-DECSI microfinance for the same reason mentioned above. It would be important to focus on both the formal and the informal institutions in the future and compare them.

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9 Appendix

Survey Questionnaire

Wageningen University- Development Economics Group

Determinants of Household Rural access and Participation to Micro Finance Credit Institutions and the Socio Economic Characteristics of Beneficiaries (A case of Alamata Woreda , Tigray- Ethiopia)

Part I: Individual Respondent Questionnaire

A. Respondents Characteristics(Profiles)

1. Area or name of the village_____
2. Sex..... Male Female
3. Age(in years)
4. Marital status.....
 1. Married
 2. Single
 3. Widow
 4. Divorced
5. What is your educational level in years ? _____yers
6. Religious affiliation....
 1. Christian
 2. Moslem
 3. Other (Specify)....
7. How many individuals are living in this household?
8. How many individuals are above 70 years old in this household?
9. How many individuals are below 15 years old in this household?
10. Are you the head of the household....
 1. Yes
 2. No
11. What is your main source of income in the household?
 1. Farming
 2. Non-farming
 3. Others (Specify)_____

12. What is your secondary source of income in the household? , ,

1. Farming
2. Non-farming
3. Other(Specify)_____ -

13. In the last 12 months, have you ever faced a problem of shock from flood and draught?

1. Yes
2. No

B. Total household assets

1. Do you own land.....

1. Yes
2. No

2. If yes, how many plots of land you have?

3. What is the size of the land

| | Plot one | Plot two | Plot three | Plot four | Plot five | Total size |
|--------------|----------|----------|------------|-----------|-----------|------------|
| Size of plot | | | | | | |

4. How many plots of land cultivated?

5. Do you rent land?

1. Yes
2. No

6. If yes, how many plots you rented?

7. Do you have live stocks (Cow, Ox, Camel, Horse, Donkey, Sheep, Bees etc)?

1. Yes
2. No

8. Livestock holdings of the household during the last 12 months:

| Specious of livestock | | | | | | | |
|-----------------------|-----|----|-----------|-------|-------|--------|------|
| | cow | Ox | Cam el | Horse | Sheep | Donkey | Bees |
| No. of livestock | | | | | | | |

9. Do you have a building that can be used for collateral?

1. Yes
2. . No

10. Do you have a car/s?

1. Yes

2. No

11. If yes, how many cars you have?

C. Credit Demand

1. Do you know about DECSI?

1. Yes

2. No

2. If no, escape part D.

3. If yes, what is the distance of the DECSI from your home in kilometers_____

4. During the last 12 months did you apply for credit from DECSI?

1. Yes

2. No

5. If no, why did you not?

1. I do not need

2. I have enough saving

3. I afraid to borrow

4. Interest rates is too high

5. Too many required documents to submit

6. Inadequate fixed assets

7. The farming not give me enough money

8. I do not want to put my land at risk

9. I do not want to be worried, I am afraid.

10. Other (specify)

D. Access to Credit

1. If your answer in question number four of part C above is yes, did you get any loan?

1. Yes

2. No

2. If your answer is no, , what were the reasons that you did not get the loan?

1. I have insufficient income/assets

2. I incurred previous loan (bad credit history)

3. I had no enough fixed assets(land, building, livestock)

4. I had difficulty in providing required documents

5. Others (specify)_____

3. If yes, did you get the entire loan you requested?

1. Yes

2. No.

4. Did you need more loan?

1. Yes

2. No
5. If the amount you got from DECSI was not enough, what did you do?
1. borrow from Commercial Banks
 2. borrow from families, friends and individuals
 3. borrow from Money lenders
 4. use own saving
 5. other (specify)_____
6. For what purpose you got the credit from DECSI? , ,
1. Purchase of fertilizer and seeds
 2. Purchase of food and household goods
 3. Purchase of livestock
 4. To start off farm business
 5. Payment of taxes, debt
 6. Health expenses, education expenses
 7. Others specify_____
7. When did you need to borrow from DECSI_____
8. Did you repay the loan you got from question number one above?
1. Yes
 2. No
9. Are there lending institutions other than DECSI?
1. Yes
 2. No
10. If yes, which of the following are there? , ,
1. Commercial Banks
 2. NGOs
 3. Cooperatives.
 4. Others(specify)_____
11. If so, in the last 12 months how many times did you borrow or obtain funds from the above mentioned institutions?

| | Commercial bank | Cooperatives | NGOs | Others | |
|----------------------------|-----------------|--------------|------|--------|--|
| No of times money borrowed | | | | | |

12. Why did you prefer these sources? ,,
1. Their flexibility in repayment
 2. Low interest rate

3. They do not need collateral
4. Closeness to their residence
5. Other(specify)_____ -

13. Who borrowed the money?

1. Husband
2. Wife

E. Extension Contact

1. In the last 12 months, do you get extension services?

1. Yes
2. No

2. If yes, for how long have you been served? Years

3. Who provides you the extension service?

1. Development agents?
2. NGOs
3. Others specify

F. Participation of household in the Extension Package Program

1. Did you participate in the Agricultural extension package program in the last 12 months?

1. Yes
2. No

2. If yes, what was the type of the package you participate?

1. crop production
2. animal rearing
3. animal fattening
4. small-scale irrigation
5. others specify_____

3. How did they provide you the packaging program?

1. On cash
2. On Credit

4. If on credit, who or what was the source?

1. Commercial banks
2. DECSI
3. cooperatives,
4. private money lenders
5. friends, families
6. NGOs
7. others specify_____

G. Risk Taking ability of Farm households

1. Are you a member of cooperatives in your area?
 1. Yes
 2. No
2. What is your view on the constraints and difficulties to access credit from the formal (DECSI) and other financial sources financial sources?

| Constraints or difficulties | DECSI Yes/No | Cooperatives Yes/No | NGOs Yes/No | If others |
|--|-----------------|------------------------|----------------|--------------|
| Group lending | | | | |
| Individual collateral | | | | |
| High Interest rate | | | | |
| Time of credit availability | | | | |
| Repayment time | | | | |
| Repayment period | | | | |
| Non member ship of farmers cooperatives | | | | |
| Lack of opportunity to take a second loan | | | | |
| Distance from lending institutions | | | | |
| Working time of the institutions | | | | |
| Working ethics and efficiency of employees | | | | |
| Preparing application letter and filling out different forms | | | | |

3. What is your perception about formal (DESCI) institution?

| | Agree | Neutral | Disagree |
|---|--------------------------|--------------------------|--------------------------|
| -The very poor are the main credit target of DECS | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| -The loan size from DECSI cannot satisfy the farmers' needs | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪- DECSI control loans not to be used for quite different ends | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ It is convenient to save in DECSI | | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Time and distance is a problem to save regularly in the Organizations | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

A. Perception on group lending and group responsibility for repayment

1. What is your perception on the aim of group lending?
2. What are the predetermined criteria for group formation?
3. Have you ever been unable to form a group for credit due to the criteria for group formation?

 1. Yes

2. No
4. If yes, what was your alternative solution to satisfy your credit needs?
5. What do you feel about the responsibility of the group for repayment?
6. Does the group have any responsibilities other than loan repayment?
 1. Yes
 2. No
7. If yes, what are they? _____
8. What are your recommendations for other institutions? _____

B. Farmers Perception in the general working procedure of DECSI in the area

1. What is your perception in the lending procedures of formal institutions:
 1. Ability in preparing an application letter and filling different formats
 2. Convenience of working time for the clients
 3. Working ethics and efficiency of the officials of institutions

Part III: Interview Guide for DECSI Officials

1. When was DECSI established in Tigray Alamata Wereda?
2. What are the goals of DECSI in Tigray Alamata Wereda?
3. Why is DECSI located in Tigray Alamata Wereda?
4. What criteria do DECSI use in the selection of clients for credit?
5. Do you apply all the criteries you mention in question number 4?
6. How does DECSI reach out its clients?
7. How much credit does DECSI give its clients?
8. Do your clients need to have collateral before credit is given to them?
9. What is the share of clients not to being able to pay back the credit they receive from your organization?
10. How long does it take them to pay back the credit?
11. Is there interest attached to the credit your clients get from your organization?
12. If yes, what is the percentage?
13. Does DECSI organize training sessions for your clients about how to manage the credit they get from your organization?
14. If yes, when before or after training is given?
15. And what are the objectives?
16. Are there other organizations in Alamata wereda working on microcredit issues?
17. If yes, do you have good working relations with them? Explain your answer.
18. Can you identify problems confronting your clients?
19. Do you encounter problems in your activities?
20. What efforts are you making in order to overcome the problems identified in no 18?

Figure 4. Correlation matrix

```
. correlate sexresp age education famsize info irconstraint farmassoc tlu cultsize dependencyratio Occupation maritalstatus religio
> n Distance
(obs=120)
```

| | sexresp | age | educat-n | famsize | info | ircons-t | farmas-c | tlu | cultsize | depend-o | Occupat-n | marita-s | religio |
|--------------|---------|---------|----------|---------|---------|----------|----------|---------|----------|----------|-----------|----------|---------|
| sexresp | 1.0000 | | | | | | | | | | | | |
| age | 0.1288 | 1.0000 | | | | | | | | | | | |
| education | 0.1751 | -0.2437 | 1.0000 | | | | | | | | | | |
| famsize | -0.0288 | 0.2070 | -0.1905 | 1.0000 | | | | | | | | | |
| info | 0.0054 | 0.2795 | -0.1705 | 0.3442 | 1.0000 | | | | | | | | |
| irconstraint | 0.0117 | 0.0873 | -0.0141 | 0.2156 | 0.0868 | 1.0000 | | | | | | | |
| farmassoc | -0.1002 | 0.0068 | -0.0050 | -0.0799 | 0.0154 | -0.0129 | 1.0000 | | | | | | |
| tlu | -0.0397 | -0.1201 | -0.0930 | 0.4615 | 0.1452 | 0.0939 | 0.0106 | 1.0000 | | | | | |
| cultsize | 0.0351 | 0.0424 | -0.0894 | 0.3983 | 0.4191 | 0.1828 | -0.0769 | 0.5566 | 1.0000 | | | | |
| dependency-o | -0.1940 | 0.0254 | -0.1594 | 0.2597 | 0.0789 | 0.0681 | -0.0489 | 0.1858 | 0.2336 | 1.0000 | | | |
| Occupation | 0.0107 | 0.1389 | -0.2396 | 0.2038 | 0.0648 | 0.1917 | -0.0709 | 0.1536 | 0.2022 | -0.0324 | 1.0000 | | |
| maritalsta-s | 0.3766 | 0.0060 | -0.0232 | 0.4227 | 0.2709 | 0.0218 | 0.0221 | 0.2513 | 0.3288 | -0.0041 | 0.2401 | 1.0000 | |
| religion | -0.0909 | 0.1565 | 0.0558 | 0.0011 | 0.1034 | 0.0847 | 0.0286 | -0.2354 | -0.1582 | -0.1332 | 0.0659 | -0.0119 | 1.0000 |
| Distance | -0.0735 | -0.2734 | 0.0347 | -0.0590 | -0.3317 | -0.0327 | -0.0901 | 0.0308 | -0.0812 | -0.0462 | 0.0624 | -0.0306 | -0.1160 |

| | Distance |
|----------|----------|
| Distance | 1.0000 |

Figure 5. Normality test for age.

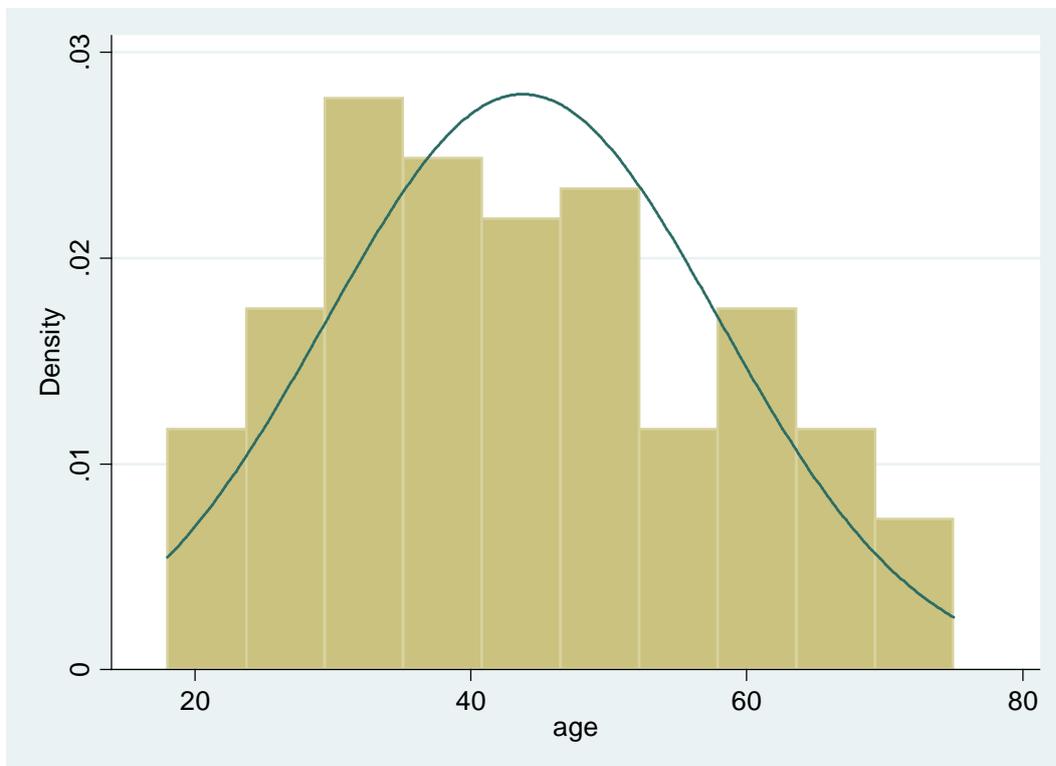


Figure 6

```
biprobit demand access sexresp age education famsize tlu cultsize dependencyratio
Occupation maritalstatus religion Distance,
> vce(robust)
```

Fitting comparison equation 1:

```
Iteration 0: log pseudolikelihood = -61.408809
Iteration 1: log pseudolikelihood = -46.945343
Iteration 2: log pseudolikelihood = -46.128078
Iteration 3: log pseudolikelihood = -46.110711
Iteration 4: log pseudolikelihood = -46.110699
```

Fitting comparison equation 2:

```
Iteration 0: log pseudolikelihood = -79.880688
Iteration 1: log pseudolikelihood = -62.300798
Iteration 2: log pseudolikelihood = -61.676618
Iteration 3: log pseudolikelihood = -61.672324
Iteration 4: log pseudolikelihood = -61.672324
```

Comparison: log pseudolikelihood = -107.78302

Fitting full model:

```
Iteration 0: log pseudolikelihood = -107.78302
Iteration 1: log pseudolikelihood = -102.30923
Iteration 2: log pseudolikelihood = -102.1878
Iteration 3: log pseudolikelihood = -102.18749
Iteration 4: log pseudolikelihood = -102.18749
```

```
Bivariate probit regression          Number of obs =      120
                                     Wald chi2(22) =      86.69
Log pseudolikelihood = -102.18749   Prob > chi2 =      0.0000
```

| | Coef. | Robust Std. Err. | z | P> z | [95% Conf. Interval] | |
|---------------------|-----------|------------------|-----------|---------|----------------------|-----------|
| ----- | | | | | | |
| demand | | | | | | |
| sexresp | .0522995 | .4012665 | 0.13 | 0.896 | -.7341683 | .8387673 |
| age | .0032448 | .010427 | 0.31 | 0.756 | -.0171917 | .0236813 |
| education | -.0740488 | .0391287 | -1.89 | 0.058 | -.1507395 | .002642 |
| famsize | .2713223 | .0869591 | 3.12 | 0.002 | .1008856 | .4417589 |
| tlu | -.1432885 | .0655664 | -2.19 | 0.029 | -.2717963 | -.0147807 |
| cultsize | .1591057 | .063652 | 2.50 | 0.012 | .0343502 | .2838612 |
| dependency~o | .0233001 | .127848 | 0.18 | 0.855 | -.2272773 | .2738775 |
| Occupation | -.5486748 | .4775425 | -1.15 | 0.251 | -1.484641 | .3872914 |
| maritalsta~s | -.7399067 | .4407277 | -1.68 | 0.093 | -1.603717 | .1239037 |
| religion | .6508256 | .3730133 | 1.74 | 0.081 | -.080267 | 1.381918 |
| Distance | -.0066209 | .021486 | -0.31 | 0.758 | -.0487327 | .0354909 |
| _cons | .0543676 | .774762 | 0.07 | 0.944 | -1.464138 | 1.572873 |
| ----- | | | | | | |
| access | | | | | | |
| sexresp | -.0694632 | .3602744 | -0.19 | 0.847 | -.7755881 | .6366617 |
| age | .0176704 | .0099151 | 1.78 | 0.075 | -.0017628 | .0371036 |
| education | .113869 | .0395848 | 2.88 | 0.004 | .0362842 | .1914538 |
| famsize | .0706499 | .0711838 | 0.99 | 0.321 | -.0688679 | .2101676 |
| tlu | -.0209121 | .0603311 | -0.35 | 0.729 | -.1391589 | .0973346 |
| cultsize | .1360847 | .0575752 | 2.36 | 0.018 | .0232395 | .24893 |
| dependency~o | -.1084255 | .1366021 | -0.79 | 0.427 | -.3761606 | .1593096 |
| Occupation | .3535919 | .4839439 | 0.73 | 0.465 | -.5949207 | 1.302104 |
| maritalsta~s | .4287076 | .4292244 | 1.00 | 0.318 | -.4125567 | 1.269972 |
| religion | .2319538 | .3760412 | 0.62 | 0.537 | -.5050734 | .968981 |
| Distance | -.0569112 | .0211056 | -2.70 | 0.007 | -.0982775 | -.0155449 |
| _cons | -1.32802 | .7490452 | -1.77 | 0.076 | -2.796121 | .140082 |
| ----- | | | | | | |
| /athrho | -.6506449 | .2287643 | -2.84 | 0.004 | -1.099015 | -.2022752 |
| ----- | | | | | | |
| rho | -.572104 | .153889 | | | -.8001448 | -.1995609 |
| ----- | | | | | | |
| Wald test of rho=0: | | | chi2(1) = | 8.08932 | Prob > chi2 = | 0.0045 |

During interviewing farmers

