

Farm Household Economic Behaviour in Imperfect Financial Markets

Empirical Evidence and Policy Implications on Saving,
Credit and Production Efficiency in Southeastern Ethiopia

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Abstract

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Financial markets in developing countries are imperfect and are likely to affect decision-making behaviour of economic agents, especially smallholder farm households. This thesis, comprising four articles, aimed to understand and explain farm household economic behaviour with reference to saving, credit and production efficiency under imperfect financial market conditions. It is based on data obtained from farm household survey conducted in two districts of southeastern Ethiopia from September 2004 to January 2005. Data was analysed using stochastic frontier analysis and limited dependent variable econometric tools. In article **I**, farm household saving behaviour and its determinants were studied. Results show that, on average, a farm household saved 37% of its farm income in financial and physical assets. However, more than 90% of savers held their savings outside formal financial institutions. Such saving behaviour of farm households was affected by factors related more to incentives and opportunities to save than to ability to save. In Article **II**, borrowing behaviour of farm households was analysed by considering sectoral choice of farm households among formal, semiformal and informal credit sectors and factors contributing to their choice. The informal credit sector was found to dominate sectoral choice of the farm households even though this sector charged the highest interest rates. Factors other than the interest rate, i.e., loan processing time, type of loan, credit information and loan size, significantly affected this borrowing behaviour of the farm households. In Article **III**, technical efficiency of smallholder farmers was estimated using a stochastic frontier analysis. There was about 12% efficiency differential between credit-constrained and credit-unconstrained farm households, *ceteris paribus*. In Article **IV**, farm households' demand for credit and its determinants were investigated. It was found that farm households had credit demand for production and consumption purposes, whereas the formal credit sector targeted credit only for production purpose, although production and consumption purposes are closely related. In conclusion, imperfect financial markets adversely affect saving, credit demand, credit sectoral choice and production behaviours of farm households. This study suggests some policy measures, which may help to redress the adverse effects identified and to enhance development of rural financial markets and institutions.

Keywords: agricultural finance, asymmetric information, credit demand, formal finance, informal finance, rural credit, smallholder farmers, technical efficiency.

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Dedicated to my mother Hawi Sheko, my father Hamda Komicha and my son Fuad Hussien, for their irreplaceable love which remains with me forever although we are physically separated by their sudden death.

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Appendix

Articles I-IV

The present thesis is based on the following articles, which will be referred to by their Roman numerals (I-IV):

- I. Komicha, H. H., Öhlmer, B. & Emanu, B. 2007. Saving behaviour of farm households under imperfect rural credit markets: The case of Southeastern Ethiopia. *Ethiopian Journal of Agricultural Economics*, 6 (2): 1-39.
- II. Komicha, H. H. Credit sectoral choice of farm households and its determinants in imperfect credit markets of Southeastern Ethiopia. Submitted to *The Developing Economies*.
- III. Komicha, H. H. & Öhlmer, B. Influence of credit constraint on technical efficiency of farm households in Southeastern Ethiopia. Submitted to *Food Economics*.
- IV. Komicha, H. H. Farm household demand for credit and its determinants in imperfect credit markets of Southeastern Ethiopia. Submitted to *Quarterly Journal of International Agriculture*.

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1. Introduction

Almost three decades ago, Theodore W. Schultz, in his 1979 Nobel Prize lecture, stated: "Most of the people in the world are poor, so if we knew the economics of being poor we would know much of the economics that really matters." The core message of this quotation prompted the initiation of the current work, resulting in this thesis. In particular, this thesis looks at the economic behaviour of smallholder farm households under imperfect financial market conditions in Ethiopia, one of the poorest countries of the world.

The study focuses on the role of an imperfect rural financial market in saving, borrowing and production behaviours of farm households. Rural financial markets in developing countries in general, and in Ethiopia in particular, are imperfect. They are typically segmented into formal, semiformal and informal sectors, with very small market shares of the formal and semiformal sectors in rural areas. The major reasons for the small shares of the two sectors of the market in rural areas are related to asymmetric information, monitoring and contract enforcement problems. Besides, underdeveloped physical and communication infrastructures enormously influence farmers and rural entrepreneurs' access to financial markets. As a result, farm households face credit constraints in financing their farming operations, on-farm investment and consumption.

Although institutions providing financial services to rural residents, who are the majority in developing countries, are vital for proper functioning of the rural economy, such institutions are either lacking in most areas or inadequate, if they exist. Absence of effective financial institutions in rural areas has compounded effects on the economic performance of farmers and rural entrepreneurs. Among these, saving, borrowing and production behaviours of farm households are studied in this thesis.

This thesis is a synopsis of the main results of four related studies. The articles focus on economic behaviours of farm households in saving, credit demand, credit sectoral choice and technical efficiency, and on factors affecting these behaviours under imperfect financial market conditions prevalent in southeastern Ethiopia. Moreover, the thesis contains additional background information and a brief discussion.

The thesis is structured as follows. The next section presents background information on the Ethiopian economy in general, and the rural/agricultural and the financial sectors, in particular. It also discusses what motivated the research, questions addressed, and the scope and limitations of the study. The next three sections discuss methodological considerations, a review of related literature and the main results. The last three sections present conclusions and policy implications, contributions of the thesis and suggestions for further research.

2. Background

2.1 Ethiopia and its economy

Ethiopia is located in East Africa (which is also known as the Horn of Africa region) between geographic co-ordinates of 3°24' and 14°53'N and 32°42' and 48°12'E, covering a land area of 1.12 million square km, of which 7,444 square km is covered by water (World-Factbook, 2007). It has a population of about 77 million and per capita income (in purchasing power parity measure) of about US\$ 1000 in year 2006 (World-Factbook, 2007). In most economic measurements, Ethiopia is one of the poorest countries of the world. Its economy depends heavily on the agricultural sector, evident in agriculture's contribution to the national economy, which is about 46.7% of GDP, 90% of export earnings and 85% of employment of economically active population, whereas the industrial and service sectors comprise the remaining 12.9% and 30.4% of GDP, respectively (EEA, 2004). The major export commodities of Ethiopia are coffee, *khat*¹, oilseeds, cutflowers, livestock and livestock products, and more recently gold, with coffee having the lion's share (e.g., about 41% of export revenue in 2004/05) (World-Factbook, 2007; EEA, 2004). Since the share of manufacturing and service sectors of the economy is small, the Ethiopian economy is predominantly agrarian. The larger share in labour of the agricultural sector relative to the sector's contribution to the GDP indicates that agriculture is at lower level of productivity than the other sectors of the economy. Between 1962 and 2002, the agricultural sector grew annually by 1.89% with 2.1%, 1.5% and 2.2% during the Imperial, Military and EPRDF regimes, respectively (Tafesse, 2005), whereas population grew by an average of about 2.9% during the period (CSA, 2006). The low performance of the agricultural sector may be attributed to underdeveloped rural infrastructure such as roads, transportation, communication, electricity and water supply, and absence of rural financial institutions that facilitate rural economic development. Moreover, agricultural production depends heavily on rainfall and is often affected by frequent weather fluctuations. Nationally, less than 4% of the farms are irrigated although the country has large potential for irrigation farming, given its water resource (MOA, 1995); indeed, many refer to Ethiopia as "the water tower of East Africa". Yet, Ethiopia lacks the necessary economic growth to cope with the growing population.

With regard to economic policies, three milestones can be considered. That is, the country had a market-oriented economic policy during the Imperial Period (1930-1974). Prior to 1975, there was private land ownership but most farmers were tenants of a few large landowners of the feudal system. During that period, there were private banks in the country engaged in the provision of financial services, among others. During the Military Regime (1974-1991), the country was under

¹ Khat (*Catha edulis*) is a shrub or small tree with ever-green leaves native to the tropical East Africa and the Arabian Peninsula, chewed for its use as a mild to moderate stimulant. It generates the highest foreign exchange earnings next to coffee for Ethiopia in exports to some Middle-East and European countries (EEA, 2006).

socialist command economy. During that period, private ownership of land was abolished and state ownership of land was enforced after the 1975 “land to the tiller” proclamation, in which farmers were given the right to cultivate land without ownership rights. The land use rights were frequently redistributed among households by local administrative bodies. That led to the continuous decline in per capita land available for households (Adinew, 1991). During this period, private banks were also nationalized, and subsidized public formal credit system targeted farmers’ cooperatives, which were collectivized involuntarily. Farmers who were not members of cooperatives were excluded from public formal credit system. When a new government, the EPRDF, came to power in 1991, it reintroduced a market-oriented economic policy. In particular, Ethiopia began implementing structural adjustment program (SAP) in 1992 similar to on-going structural changes in most developing countries (Balassa, 1982) at the time and particularly in Sub-Saharan African countries. Under the current government, land still remained under state ownership and farmers continued to have only use rights through further redistribution of land.

In the process of implementing SAP, Ethiopia has laid out different policies and strategies. It devised a comprehensive development policy referred to as *Agricultural Development-Led Industrialization* (ADLI) in 1994, which put the agricultural sector at the centre of the development process. To this effect, it has devised and implemented several complementary reform programs, one of which was the financial sector reform. The financial sector reform has focused on liberalizing the financial sector to improve the efficiency of financial services in rural and urban areas by allowing private investment in the sector. Due to this reform, private banking has begun and the number of such banks has increased ever since. This has led to the decline in the credit market share of the public banks from 90% in 1999/2000 to about 70% in 2005/06 (NBE, 2007). However, the public banks have continued to dominate the financial system of Ethiopia. Despite their dominance, the public banks have contributed little to the rural economy in general and the farm households in particular. As a result, the informal and semiformal sectors have significant role in rural credit supply. However, farm households, and especially the smallholders operate under credit constraints.

2.2 Rural/Agricultural sector and farm households

Schultz’s 1979 Nobel Prize lecture also emphasized agriculture and its economics, where he stated: “Most of the world’s poor people earn their living from agriculture, so if we knew the economics of agriculture, we would know much of the economics of being poor.” The importance of the rural/agricultural sector thus relates to the share of rural inhabitants in total population that make a living from this sector. The Ethiopian countryside hosts about 85% of the Ethiopian population, who make livelihoods from agriculture and related activities. Most farm households are engaged in crop-livestock mixed farming, diversifying in different crops and animals (Kassa, 2003). They diversify in order to cope with the risks inherent in the agriculture, related to weather, diseases, pests, prices, and so on. Smallholder farmers produce more than 90% of total agricultural production from 95% of the total farm land (MOA, 1995). However, the agricultural sector experiences very

low productivity, by any standard, which may be attributed to low level of adoption of yield-enhancing technologies, poor farm management practices and inefficient production systems. As a result, farm households produce at subsistence level and hence generate inadequate surplus to the market. The nonfarm sector is also generally underdeveloped in rural areas. The rural sector experiences inadequate public infrastructure such as roads, transportation, electricity, telecommunication, and lacks supporting financial institutions. Clearly, lack of these essential infrastructure and institutions prevents the agricultural sector from developing to a higher productive stage. It has to be noted that a farm household is both a producer and a consumer unit, whose objective is both revenue/profit and utility maximization subject to various constraints. On the one hand, a farm household is the main source of farm labour supply for agricultural production. On the other hand, it is the consumer of agricultural and industrial products. The rural factor and product markets are imperfect, and, as a result, production and consumption decisions are often inseparable or weakly separable (Singh et al., 1986). Yet, formal financial institutions lend (if at all) only for production purposes. Although the agricultural sector is short of adequate investment, it is still the main strategic sector in Ethiopian economy and is vital to spur meaningful economic growth and development (Legesse, 2003). A failure in this sector would affect major components of the national income accounts besides creating food deficits, reduced private consumption, savings and investment levels, among others (Gudeta, 2003).

2.3 Financial sector and farm household economic behaviour

As explained in the previous sub-sections, the Ethiopian rural economy in general, and the agricultural sector in particular, operate under imperfect rural financial market conditions. This is partly because the rural economy is dependent on agriculture and agriculture, inherently risky, creates disincentives for financial institutions affecting their lending decisions and investment decisions (Pederson, 2003). Inappropriate government intervention in providing legal, property, regulatory and financial frameworks that facilitate the development of rural financial markets can also cause such disincentives. Since the 1990s, several economic policies and programs have been designed and implemented in Ethiopia, *viz.*, rural development program, food security program, industrial development program and poverty reduction program (Diao and Pratt, 2007; IMF, 2006). Attempts have also been made to liberalize the financial sector as part of the overall economic reform program. As a result, the banking sector, which stayed under government monopoly for several decades, has opened itself for domestic private investment², and since then several private banks and insurance companies have entered the financial market. Towards the end of 2006, the Ethiopian financial sector comprised 1 central bank (i.e., the National Bank of Ethiopia), 9 commercial banks (of which 2 are publicly owned), 1 development bank (i.e., the Development Bank of Ethiopia), 27 microfinance institutions (MFIs), 1 pension fund (i.e., the

² The reform has not allowed foreign financial institutions to enter the banking sector in Ethiopia, which means that the sector is subject to limited international competition.

Social Security Authority) and several savings and credit associations (IMF, 2006; NBE, 1996).

Compared to the public sector banks, the private financial institutions that recently entered the financial market are smaller and have smaller market shares. With the exception of the microfinance institutions (MFIs), private banks have limited coverage in rural areas, mainly due to their sizes but also for other reasons such as high transaction costs and default risk aversion. In view of this, for example, agricultural input credit has recently been organized through third-party guarantee of regional governments for loans from commercial banks. The third-party guarantee, as linked to the guarantor's own budget, is supposed to shield against default risk that commercial banks would not be ready to face in the absence of such a mechanism. However, it is reasonable to think that as long as the credit supply is pegged to the guarantor's annual budget, which obviously has an upper bound, this scheme is also likely to exclude some farm households who would like to participate in the credit market. Thus, the third-party guarantee scheme renders little to reduce the adverse effect of the credit market imperfection.

Imperfect financial market conditions constrain farm households' access and use of crucial financial services such as saving, borrowing and other financial transactions, which are important in facilitating savings mobilisation and resource allocation in the economy.

2.4 Research motivation and purpose

Many previous studies have shown that financial market conditions affect economic growth and development of countries (Bencivenga and Smith, 1991; Benhabib, 2000; Goldsmith, 1969; Jeanneney et al., 2006; Levine, 1997; McKinnon, 1973; Romer, 1986; Shaw, 1973). It is a general notion that rural financial markets in developing countries are imperfect (Yadav et al., 1992). This imperfection generally affects economic performances of these countries but more seriously that of farm households. Several previous studies in Ethiopia also indicate that farm households operate under constrained financial market condition (EEA, 2007; EEA, 2005; Emanu et al., 2005; Gobezie, 2005; EEA, 2004; Kassa, 2003; Croppenstedt et al., 2003; Legesse, 2003; Jabbar et al., 2002; Mekonnen, 2002; Freeman et al., 1998). This is likely to affect saving and borrowing behaviours and technical efficiency of farm households. However, empirical studies showing the effect of imperfect rural financial markets at microeconomic level, particularly at farm household level, are generally few in Ethiopia but absent in the areas studied.

As argued initially, underdeveloped financial markets adversely affect economic agents, and governments strive to reduce the adverse effects by devising appropriate intervention policies and supporting institutions to enhance the development of financial markets. This requires careful consideration of salient factors in the intervention process. Many studies suggest factors to be considered in developing rural financial market of developing countries (e.g. Lamberte et al. 2006; de Aghion and Morduch, 2005; Gonzalez-Vega, 2003; Ghosh et al., 2000, Feder, 1993; Feder et al. 1988). These are related to *e.g.* government intervention, land property rights, population density, saving mobilization and institutional

diversity. They suggest that (1) appropriate level of government intervention, in terms of macroeconomic stability and institutional infrastructure, is necessary to support financial market development; (2) since evidence shows that land ownership security strongly correlates with capital investment in farms and easier access to credit at lower rates of interest, farm households need to have legally acceptable land property rights; (3) given low population densities in rural areas, a broader array of products (such as credit, payment, transfer services) need to be developed to many customer segments (*e.g.* poor, nonpoor, farmer, rural entrepreneur) for the financial market to expand to rural areas; (5) the importance of saving mobilization for financial deepening and sustainable financial intermediation (Shaw, 1973); and (4) there needs to be institutional diversity in financial markets such as the existence of banks for the smooth functioning of nonbank institutions and the positive role of informal finance.

The aim of this study is to understand and explain the behaviour of farm households with respect to saving, credit demand, borrowing and technical efficiency under imperfect rural financial market conditions of southeastern Ethiopia. Understanding the behaviour of farm households under imperfect financial market conditions would help in devising appropriate policies to reduce the financial market imperfection and minimize its adverse effects. This thesis has focused on four specific objectives contained in four articles. The first article analyses the nature of farm household saving by identifying and explaining the types and extent of savings and demographic, socioeconomic and institutional factors affecting saving behaviour of farm households. The second article analyzes farm households' choice probabilities among informal, semiformal and formal credit sectors, and identifies demographic and socioeconomic factors affecting their sectoral choices. The third article estimates technical efficiency of credit-constrained and -unconstrained farm households by disaggregating the sample based on credit-constraint status of the farm households, and identifies factors additionally affecting their technical efficiencies. The last article estimates farm households' demand for credit and its influencing factors.

In light of the above-mentioned factors, the results of this study are relevant to devise appropriate intervention policies and institutions that can improve the financial market conditions that affect the behaviour of farm households. Improving financial market conditions in general but those of the rural financial market in particular is likely to improve the economic behaviour of the farm households and hence the rural economy.

2.5 Research questions

The research problem was approached by answering the following main research questions:

- In light of imperfect rural financial market in the study areas, how do farm households save their financial and physical assets and what factors affect their saving behaviour?
- What is the nature of farm households' demand for credit under imperfect rural credit market, and what factors affect their demand?

- How do farm households choose among credit sectors under credit market imperfection?
- Does credit constraint influence technical efficiency of farm households, and what are other factors contributing to their technical inefficiencies?

2.6 Scope and limitations of the study

This study is a microeconomic analysis based on data obtained in a cross-sectional survey of farm households in Merti and Adamitullu Jido Kombolcha districts of Oromia Regional State, Ethiopia. In a strict sense, the findings are pertinent mainly to the study areas, but may also be extended to other areas with similar agroecological and socioeconomic characteristics. However, since there can be heterogeneity among farmers in even slightly varying socioeconomic and agroecological settings, more of similar studies in other areas will allow to develop comprehensive policy recommendations. More importantly, further studies require large and rich dataset, such as longitudinal and panel dataset, which was not obtained for this study due to time and budget constraints.

3. Methodological considerations

3.1 Description of the study area

The survey was conducted from September 2004 to January 2005 in Merti and Adamtitullu-Jido-Kombolcha (AJK) districts of Oromia Region, Ethiopia. These districts are located about 200 and 160 km, respectively, to the southeast of the capital, Addis Ababa (Finfinne) (see the map in Fig. 1). Currently, Ethiopia is divided into nine regional states and two autonomous city administrations. Oromia is the largest regional state in terms of land and population sizes, each accounting for about 40% of the country (CSA, 2006). Oromia comprises 14 administrative zones at the time of the survey, including Arsi and East Shewa. The study area focuses on two districts in these two zones (see the map in Fig. 1).

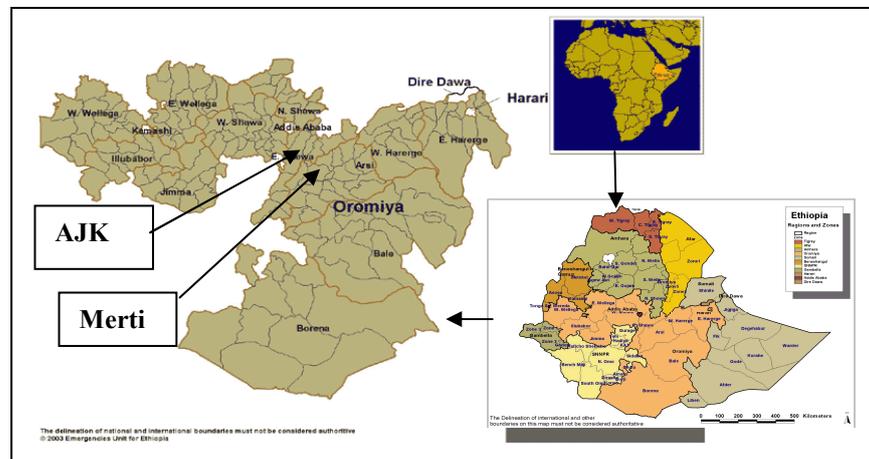


Figure 1: Map showing the study areas

3.2 Sample selection and data collection procedure

The study used farm household survey data collected using structured questionnaire, which covered crop and livestock production, off-farm and non-farm activities, income, consumption, saving and borrowing activities of the farm households. The farm households were randomly selected from six Farmers Associations (FAs), based on agro-ecological zones of the two districts – four from Merti and two from AJK (Fig. 1). The districts have diverse physical and socioeconomic characteristics. Using FA-level list of farm households as a sampling frame, 240 sample farm households were randomly selected. About 70% of the total sample farm households were selected from Merti and 30% from AJK district (Table 1). Survey enumerators interviewed heads of farm households by using a structured questionnaire by visiting the farm households at their farmsteads. Individual visits minimized external noise that might affect response behaviour of

farm households in dealing with sensitive questions such as income and savings. They also helped minimize the usual problem of survey research – the non-response rate – as the interviewer and the respondent heads of farm households directly interacted with each other, allowing clarification of any possible misunderstandings in the questions during the interview sessions and taking appointments at times appropriate for the respondent.

Table 1: Total and sample farm households by location

District/Farmers' association	Total farm household	Sample farm households
Merti	1584	169
Golugota (<i>L</i>)	443	50
Waticha-dole (<i>L</i>)	370	34
Homba (<i>M</i>)	438	40
Re'ee-Amba (<i>H</i>)	333	45
Adamitullu-Jido-Kombolcha	672	71
Walinbula (<i>M</i>)	312	30
Haleku (<i>L</i>)	360	41
Total	2256	240

Note: *L*, *M* and *H* refer to lowland, midland and highland altitudes, respectively.

3.3 Data analyses

For each article, a specific analytical tool was used. However, descriptive statistics were used in all articles and limited dependent variable econometric models were used in most of the articles. More specifically, censored regression (tobit) model was used in Article **I** and **IV** and multinomial logit model in Article **II**. In Article **III**, a stochastic frontier analysis was used in the first stage estimation and the ordinary least squares (OLS) regression method was used in the second stage. The rationale for the selection of these methods is briefly discussed below.

3.3.1 Efficiency measurement

In the literature, there are two widely used methods of measuring technical efficiency: the nonparametric data envelopment analysis (DEA) and the parametric stochastic frontier analysis (SFA). The main difference between the two methods is that in DEA, a functional form is not specified for the production technology and the error terms are not accounted for, whereas in SFA, a functional form is specified for the production function and the error terms are accounted for in the efficiency estimations. In other words, all deviations from the frontier are considered inefficiency in DEA whereas this is decomposed into inefficiency and random errors in SFA (Dorfman and Koop, 2005; Wadud and White, 2000; Sharma et al., 1999; Battese and Coelli, 1995; Bravo-Ureta and Pinheiro, 1993; Färe et al., 1990; Farrell, 1957). Since the data used in this study are obtained from responses of farmers based on mental accounting, because farmers are unable to do proper accounting, it is reasonable to prefer SFA to DEA, which accounts for such data noise. Technical efficiency measurement can be either output oriented or input

oriented. In Article **III**, output-oriented technical efficiency of farm households was measured by specifying the Cobb-Douglas production function of SFA.

3.3.2 *Limited Dependent Variable Models*

This study focuses on farm household economic behaviour based on responses to survey questions. Some of these responses are discrete choices of the farm households. In Article **I**, since some farm households did not have savings (or had zero savings), while others had positive savings, use of OLS regression, which truncates the zero observations away in estimations would bias the estimates and hence be inappropriate. Instead, under such a condition a censored regression (tobit) is appropriate (Tobin, 1958). In Article **II**, where credit sectoral choice probabilities of farm households were estimated, the dependent variable was limited between discrete choices of the respondents among options of *no credit*, *formal credit*, *semiformal credit* or *informal credit*, in which either multinomial logit (MNL) or multinomial probit (MNP) would be appropriate. However, MNL was preferred to MNP due to its computational convenience (Maddala, 1983). In Article **III**, although the technical efficiency estimates are bounded between zero and one (Battese and Coelli, 1995), because neither zero nor one occurred, the OLS regression method was used in the second stage estimation. In Article **IV**, where farm household demand for credit was estimated, the fact that some farm households had zero demand for credit, made use of censored regression appropriate. This prevents the data in which observed credit was zero from being discarded. Since the observed variables other than the credit variable – demographic and socioeconomic characteristics of farm households – are relevant for the study, tobit regression was pertinent to use in this case as well.

4. Review of related literature

4.1 Finance and economic development

This thesis focuses on the role of *rural financial markets* in saving, borrowing and production behaviours of farm households in the context of a developing country. It is thus important to make a conceptual distinction among some related terms: *finance*, *rural finance*, *agricultural finance*, *rural credit* and *agricultural credit*. *Finance*, in general, is the broadest concept encompassing all the other terms and representing the provision to meet operating and investment costs of an economic activity (Nelson and Murray, 1967). *Rural finance* is one of the broad divisions of finance, which comprises agricultural and non-agricultural finance, excluding financial services to urban households and firms. *Agricultural finance* specializes in the financing of the agricultural sector, which goes beyond provision of credit (Nelson and Murray, 1967). *Rural credit* is a narrower concept that specializes in provision of credit for rural households and firms, not only necessarily agricultural firms. *Agricultural credit* is the most specialized division, which provides credit service only to agricultural firms. Based on this distinction, “*rural financial market*” in this thesis refers to a market for rural financial services comprising agricultural finance, rural credit, and agricultural credit.

To understand the role of finance in economic development, it is worthwhile to consider macroeconomic theories. In this respect, we find three major developments: *traditional growth theories* (Goldsmith, 1969; McKinnon, 1973; Shaw, 1973), *early endogenous growth literature* (Romer, 1986), and *recent endogenous growth literature* (Greenwood and Jovanovic, 1990; Bencivenga and Smith, 1991). In the *traditional growth theory*, factor accumulation is considered the main driving force behind economic growth. Financial development can contribute to the growth of total factor productivity by either raising the marginal productivity of capital (Goldsmith, 1969) or improving the efficiency of capital allocations so as to increase the aggregate saving rate and investment level (McKinnon, 1973; Shaw, 1973). However, in the traditional framework, the capital stock suffers from diminishing returns to scale, which greatly limits the impact of financial development on growth.

Emergence of the *endogenous growth* literature pioneered by Romer (1986) provides important insights and new theories, underpinning the analysis of the relationship between financial development, productivity and growth. In this category of literature, endogenous technological progress might result in non-diminishing returns to capital through research and development, along with their positive externalities on aggregate productivity.

Consequently, the role of financial intermediation in raising productivity has been re-enforced in *recent endogenous growth literature*. Greenwood and Jovanovic (1990) develop an endogenous model, in which they highlight two essential functions of financial intermediaries in enhancing productivity and promoting growth, i.e., collecting and analyzing information on investment projects, and increasing investment efficiency through allocating funds to the projects with the

highest expected returns. Similarly, Bencivenga and Smith (1991) argue that by enhancing liquidity and mitigating idiosyncratic risk through risk diversification, the development of financial intermediaries improves the allocation efficiency of funds, thus contributing considerably to productivity growth.

Furthermore, the importance of *portfolio diversification and risk sharing* via stock markets in inducing *sustained growth* is explored in a number of studies (e.g., Levine, 1991; Saint-Paul, 1992). All these studies suggest that financial development can affect long-run growth through different channels and various aspects of innovation or productive activities (Jeanneney et al., 2006). Levine (1997) summarizes theoretical arguments that support more efficient and better functioning of financial systems for economic growth. He argues that financial institutions might foster capital accumulation and higher productivity growth by increasing diversification and reducing risk, mobilizing savings and allocating resources to their best uses, monitoring managers and exerting corporate control, reducing monitoring cost and facilitating exchange of goods and services.

The positive relationship between finance and growth has also received considerable support from empirical studies (e.g., King and Levine, 1993; Beck, Levine & Loayza, 2000; Levine, Loayza, and Beck, 2000). For example, Benhabib and Spiegel (2000) examine whether financial development affects growth solely through its contribution to factor accumulations via the channels suggested in the traditional growth theory, or whether it enhances economic growth via the channels of productivity improvement attributed to knowledge creation and technological progress, as predicted by the endogenous growth literature. Their results suggest that financial development is positively correlated with growth in both total factor productivity and capital accumulation. Recently, modern economic theories have shown that productivity is the sole viable engine for sustainable long-term economic growth. In this sense, the contribution of financial development to productivity enhancement should be more important than that to factor accumulations (Jeanneney et al., 2006).

In this connection, it is necessary to note that financial systems in developing countries comprise formal, semiformal and informal sectors, reflecting financial market segmentation and thus underdevelopment. This has implications for sectoral choice of farm households in their saving and borrowing decisions. Moreover, the formal sector is characterized by credit rationing (Ghosh et al., 2000), in which credit supply to the farm households and rural entrepreneurs are limited, with negative effects on production behaviour of farm households.

4.2 Effects of rural financial market on economic behaviour of farmers

Many studies suggest that rural financial markets affect performance behaviours of economic agents (Das and Ghosh, 2006; Hackbarth et al., 2006; Benhabib, 2000; Ghosh et al., 2000; Zeller et al., 1998; Levine, 1997; Deaton, 1992; Braverman and Guash, 1986; Adams and Vogel, 1986; Eswaran and Kotwal, 1986). One of these behaviours is saving behaviour of farm households. Rural financial market can affect saving behaviour directly and indirectly. Directly, the financial market is a

venue where interest income is paid for an asset saved at a financial institution, whereas indirectly it provides the farm household the possibility of borrowing in case of income downturn, smooth consumption and production (Liu and Hsu, 2006; Latruffe, 2004) so that the farm households do not need to save for precautionary reason. Since borrowing opportunity minimizes the farmers' need for precautionary holding of financial assets, it frees such financial assets for possible investment activities.

Contrary to perfect financial markets, imperfect rural financial markets negatively affect farm household saving behaviour (Lamberte et al., 2006; Guirking, 2005; Rioja and Valev, 2004; Pederson, 2003; Meyer, 2002; Odedukun, 1988; Lipton, 1976). Firstly, even if lending institutions have adequate loanable capital to lend, existence of asymmetric information deters lending institutions from sufficiently lending to farmers (Pederson, 2003). Thus, this results in significant credit rationing of the farm households. Secondly, when farmers anticipate borrowing constraints, they limit their consumption and investment activities in the current period in order to save for the future period as a precautionary measure (Deaton, 1992; Deaton, 1991). This, in turn, leads to suboptimal resource allocation both at farm household and higher levels.

Rural financial market can also affect borrowing behaviour of farmers (Ndikumana, 2005; Jimenez and Saurina, 2004). If perfect, the rural financial market offers an opportunity for farmers to borrow to cover operational and investment costs, based on their creditworthiness. Imperfection in the rural financial market, to the contrary, limits this opportunity and hence constrains the production and investment frontiers of the farmers (Jabbar et al., 2002; Freeman et al., 1998). Especially in developing countries, where the resource base of the farmers is very limited, lack of access to credit amounts to inability to use modern productive inputs (Croppenstedt et al., 2003) such as inorganic fertilizers, herbicides and pesticides, which hampers their productivities.

Use of the right mix of production inputs, choice of appropriate production technologies, and investment behaviours of farm households have implications for production efficiency of a farm household (Blancard et al., 2006; Latruffe, 2004). Rural financial markets directly and indirectly affect procurement of optimal levels of productive inputs, choice of production technologies and investment behaviours of farm households in their decision-making process. As explained in the previous paragraphs, imperfection in the financial market is likely to affect all these and hence production inefficiency of farm households. Theory offers three possible approaches to the relationship between credit and technical efficiency (Latruffe, 2004). The first approach, referred to as the "*free cash-flow*" approach, stipulates a positive impact of credit on technical efficiency in that the indebted farm households face repayment obligations, which encourages them to increase their efforts and limit waste of factors of production. The second approach, which is based on *agency theory*, postulates a negative effect of credit on technical efficiency. It argues that information and monitoring costs linked to credit, borne by farm households, not by lenders, weigh on the technical efficiency of borrowers. The third approach, referred to as the *credit evaluation approach*, stipulates a reverse causality between credit and technical efficiency and argues that technical

efficiency positively acts upon the level of credit, which also suggests that lenders would rather lend to the most efficient farmers.

4.3 Factors for rural financial market development

As the literature reviewed in the previous section asserts, financial market development strongly affects the economic development of nations. However, nations differ in the extent of their financial market development. In particular, developing countries have lagged behind the developed economies in their financial market development. Recently, several studies have investigated what factors have to be considered in developing rural financial markets of developing countries. Such factors are reviewed below.

4.3.1 Government intervention in rural financial markets

This factor relates to the role and extent of government intervention. The experience in most developing countries shows that governments play significant roles in rural financial development (Lamberte et al., 2006; Besley, 1994; Hoff and Stiglitz, 1990). Among others, maintaining macroeconomic stability and building institutional infrastructure to support financial market development (*e.g.*, independent central bank, creating credit bureaus, strengthening creditor's rights, increasing capacity of courts to fairly adjudicate commercial disputes, promoting the accountancy and auditing professions) are important areas for government intervention (Pederson, 2003). However, evidence also shows that excessive and inappropriate government interventions are counterproductive. Moreover, financial reform requires proper sequencing of the different components of the financial system (Levine et al., 2000), in which government plays an important role in setting priority areas in the reform process.

4.3.2 Land property rights

Several studies show that individual rights to own land influence rural financial markets (Besley, 1995; Bardhan and Rudra, 1978). Although land is a source for potential wealth for rural households, some countries restrict land property rights to only use rights for an extended period (*e.g.* Ethiopia). However, evidence from studies of land ownership in Thailand, for example, demonstrates that with secure ownership comes greater capital investment in farms, as well as easier access to credit at lower rates of interest (Feder, 1993). Secure titling should promote more widespread use of land as collateral for loans, giving a boost to lending in rural areas which would deepen rural financial markets (Lamberte et al., 2006; Gonzalez-Vega, 2003).

4.3.3 Population density

As is common in any market development, population density is a crucial factor in rural financial market development. The usual assumption in rural finance has been that low population density makes provision of financial services by formal sector institutions on a profitable basis almost impossible. However, Lamberte et al. (2006) argue that Mongolia, with its 1.5 persons/square km (compared with 114:1 in Indonesia) achieving a remarkable success in its formal financial institution both

in terms of outreach and viability, disproved this assumption. Given the low population densities in rural areas, providing a broader array of products (*e.g.*, credit, payment, transfer services) to many customer segments (*e.g.*, poor, nonpoor, farmer, rural entrepreneur) makes a strong economic sense for banks to expand to rural areas (Lamberte et al., 2006). The conclusion is that population density is one key challenge – among many – that must be considered in developing workable business models for rural financial institutions, but if innovative financial products are developed and used, the problem of low population density cannot be insurmountable for rural financial market development.

4.3.4 Saving mobilization

Evidence in Latin American and Asian countries shows that saving mobilization is a key activity in building a sound financial system (Lamberte et al., 2006; Amel et al., 2004; Gonzalez-Vega, 2003; Roberts and Hannig, 1998; Deaton, 1992; Bencivenga and Smith, 1991; Braverman and Guash, 1986; Begashaw, 1978). If there is demand for reliable and safe deposit services, and if the financial system is to carry out its major functions effectively and efficiently, saving is essential. However, in developing countries savings are often undermobilized. Two commonly cited underlying causes are: (1) prevalence of inappropriate saving products and poor services by depository institutions; and (2) lack of confidence in the safety or liquidity of financial institutions by rural people (de Aghion and Morduch, 2005; Gonzalez-Vega, 2003; Ghosh et al., 2000; Feder, 1993). Therefore, in order to effectively and efficiently mobilize savings, not only do saving products appropriate for rural savers need to be developed and depository institutions need to improve their services to this category of the population, but also the institutions need to win the confidence of the rural people by building easy and friendly saving and withdrawal procedures.

There is a murky experience of financial cooperatives in several developing countries. This is because they are promoted enthusiastically before proper regulatory and supervisory requirements were put in place, leaving a loophole for mismanagement of funds (Lamberte et al., 2006) and inadequate resources are provided for upfront education about cooperative enterprise management and the importance of transparency (*i.e.*, accounting, control and audit). This situation leads to mistrust of farm households to channel their savings through these institutions. Moreover, credit unions are community based and member owned and they often exclude some members of a wider community. Thus, such institutions fail to mobilize all potential resources outside a particular community. For example, microfinance institutions are oriented towards reducing poverty by targeting the poor, and yet exclude the non-poor who do not have access to credit, and therefore are not inclusive (Lamberte et al., 2006; Coleman, 2006; Buckley, 1997). For such institutions to play significant role, they need to adopt an inclusive client approach.

4.3.5 Institutional diversity

Institutional diversity play central role in the development of rural finance. Banks, nonbank financial institutions and others bring competition into service provision to the rural areas, and strengthen the rural economy (Lamberte et al., 2006; Conning,

1996; Conning, 1999). One of the reasons for low level of rural financial market development in LDCs is the presumption that farmers in LDCs are too poor to save, as they produce little marketable surplus. Formal financial institutions find them too costly to give service to the poor and as a result, the majority continued seeking services from informal institutions even if these institutions charge higher interest rates because of their monopoly power. Under this condition, nonbank financial institutions play important roles in meeting financial requirements of farm households and rural entrepreneurs (Carpenter and Jensen, 2002; Chakrabarty and Chaudhuri, 2001; Bose, 1998; Chung, 1995; Bouman, 1990; Braverman and Guash, 1986; Begashaw, 1978). Although core financial services can be efficiently provided through banks, banks demonstrated bias towards bigger business clients (Bigsten et al., 2003) and were concentrated in urban centres, which is a clear indication of exclusion of the rural areas. Since banks provide core deposit, payment and monetary transfer services (Lamberte et al., 2006), they are necessary to expand financial services to rural areas. Moreover, institutional diversity is likely to bring the competition into rural financial market and thereby lower costs of borrowing to the rural poor.

4.3.6 Informal finance and rural financial markets

Traditionally, there seems to be antagonism towards informal finance and a tendency to undermine its contribution to economic development (Emana et al., 2005; Carpenter and Jensen, 2002; Aredo, 1993; Christensen, 1993; Bolnick, 1992; Adams and Fitchett, 1992; Bouman, 1990; Adams and Vogel, 1986; Begashaw, 1978). However, rural financial markets in developing countries continued to be dominated by high proportion of users of informal finance. According to a World Bank report, over 80% of the world population rely on informal financial arrangements (WorldBank, 2001). This has led to a considerable recognition among development thinkers and practitioners that informal finance should not be considered anti-development in the broader rural financial system, although there are arguments that the informal financial sector cannot legitimately offer deposit services (Lamberte et al., 2006). More importantly, salient features of informal rural financial market can provide useful information to policymakers on how semiformal and formal markets can be developed to provide more demand-driven services (Lamberte et al., 2006).

Evidence elsewhere (e.g., Lamberte et al., 2006; Feder and Feeney, 1991; Carter and Olinto, 2003; Demsez, 1967) shows lack of access to large, long-term loan (or equity capital) by more successful farm households makes financing of additional land acquisitions difficult and in many cases impossible. This means that the necessary process of farm consolidation needed to achieve an optimal size for efficient crop production is constrained by poorly developed rural financial systems, with clearly negative implications for the rural economic growth. There is a critical need to expand the capacity of rural financial institutions to meet the need for short-, medium-, and long-term loans by nonpoor households and small and microenterprises in rural areas.

Informal finance providers continue to play a major role in developing rural credit markets (Lamberte et al., 2006; Adams and Fitchett, 1992). Early

theoreticians of microfinance focused on the “lumpy” cash-flow characteristics of agricultural activity, i.e., money being invested in a crop or an animal that is raised over a protracted period before the final product can be marketed. Therefore, the frequent periodic payments of interest and principal that were a central feature of successful micro-credit programs could not be supported by agricultural activity. This approach, however, ignored the fact that poor households have diversified sources of income and money is fungible.

In sum, the main thread running through the literature reviewed above is that financial market failure adversely affect the economic behaviour of farm households and there need to be corrective measures through government interventions but such interventions should not be distortive. That is, government should make structural reforms that liberalize the financial market and properly sequences the different components of the reform but such interventions should not be excess. In particular, governments need to consolidate efforts to develop effective legal, property rights, regulatory and financial laws that facilitate the development and smooth functioning of rural financial markets. The interventions should be aimed at reducing the adverse effects of the market failures on the performance of economic agents. In this process, issues such as land property rights, saving mobilization and institutional diversity are important to consider.

5. Summary of main results and discussion

This section summarises the motivation, methods used, major findings and policy implications of the four articles comprising this thesis. Since it is a concise summary, readers may need to refer to each article for further understanding. Although the articles aim at answering separate research questions, they are interrelated. Each article is based on the same dataset, and therefore, discusses issues closely related to each other. Article **I**, which tries to understand saving behaviour of farm households is related to Article **II**, which deals with sectoral choice of farm households in their borrowing behaviour. Article **IV** further considers credit and analyzes farm households' demand for credit and its determinants. Article **II** and **IV** are directly related to credit whereas Article **I** serves as the basis for farm households' capital accumulation, to which or beyond which a farm household may demand additional resources through credit. Article **III** considers an outcome of imperfect credit market – the credit constraint – and investigates its effect on farm households' technical efficiency. The summary results of each article are presented separately below.

5.1 Article I: Farm households' saving behaviour

This article was motivated by the observation that Sub-Saharan Africa's slow economic growth correlates with low capital accumulation, which averaged 15% for about 30 years since 1970, compared to 23% for Southeast Asia and 35% for newly industrializing economies of Asian countries (Aryeety and Udry, 2000). In Ethiopia, the macro level saving rates in the past six decades showed declining trend, averaging 5.4% of GDP (Girma, 2004). Categorized by the political regimes, the average saving rates were 14% during 1960-1974 (Imperial Regime), 7% during 1974-1991 (Military Regime) and 3.6% during 1992-2003 (EPRDF Regime). However, these macro level observations might not mirror the situation at the microeconomic level. Hence, this article aimed at understanding saving behaviour at farm household level by analysing the type and extent of savings and identifying its determinants.

Using an agricultural household model (Taylor and Adelman, 2003; Singh et al., 1986; De Janvry et al., 1991) as a conceptual guide, farm household data were analyzed using descriptive statistics and censored regression (tobit) econometric model. Descriptive results show that 62% of the sample farm households had savings in physical and financial assets, of whom 57% had financial savings. However, 89% of farm households saved informally, i.e., outside of formal institutions. The main reasons for such a saving behaviour, as reported by the sample farm households, are perceived too small volume of savings to save at banks (52%), precautionary need for cash (17%) and low real return on bank deposits (8%). In an imperfect credit market, farm households are more likely to face borrowing constraints and this would lead to saving behaviour affected by feelings of uncertainty and hence a precautionary motive to save for countering the uncertainty (Leland, 1968). The econometric model aims to estimate the conditional mean saving and its determinants. Estimation results indicate that a typical farm

household had a conditional mean saving of about 37% of its farm income per annum. It also identified potential factors related to farm households' ability, willingness and opportunities to save. Accordingly, it was found that farm households' saving was significantly and positively affected by farm size, farm and non-farm incomes, farm experience, access to irrigation, investment motive and negatively by the schooling of farm household heads.

Financial intermediation requires resource mobilization efforts to create comprehensive financial services with adequate outreach to the majority of people and for the sustainability of the financial institutions (Gonzalez-Vega, 2003). The fact that large proportion of farm households who were able to save held their savings informally could be explained more by problems of incentives and opportunities to save in this way than by farmers' ability to save, since a considerable proportion of farm households (about 62%) were in fact able to save. This calls for policies to improve the existing incentive structure and opportunities to channel the savings into deposits at formal institutions. Results suggest that financial institutions with easy access, low transaction costs, higher real returns on savings and convenient withdrawal of savings may provide incentives for those who informally hold financial assets to save them formally. This is desirable because mobilizing informal savings into formal institutions would expand the loanable capital base of lending institutions and improves resource allocation in the economy at large. This result is in line with the arguments in the literature that saving mobilization is one important factor in rural financial market development (Lamberte et al., 2006; Amel et al., 2004; Gonzalez-Vega, 2003; Roberts and Hannig, 1998; Deaton, 1992; Bencivenga and Smith, 1991; Braverman and Guash, 1986; Begashaw, 1978).

5.2 Article II: Credit sectoral choice of farm households

Rural credit market segmentation into different sectors has long been recognized in the literature on credit markets in developing countries (Adams, 1995; Braverman and Guash, 1986; Gonzalez-Vega, 2003; Guirking, 2005; Hoff and Stiglitz, 1990). However, little is known as to how farm households make borrowing choices under such segmentation and what factors influence their choices. Recently, official reports indicate that the formal credit sector in Ethiopia holds more than legally warranted reserves (NBE, 1996; IMF, 2006). Yet, many other studies show that farm households face credit constraints (Emana et al., 2005; Gobezie, 2005; Croppenstedt et al., 2003; Kassa, 2003; Gobezie, 2002; Mekonnen, 2002; Woldehana and Oskam, 2001; Freeman et al., 1998). It is thus imperative to understand the reason why this is the case. One way to understand this is to analyse farm household borrowing behaviour, especially their sectoral choice. Motivated by this observed feature in the credit market, this article aims at analysing credit sectoral choice of farm households among formal, semiformal and informal credit sectors and identifying factors affecting their choice. Based on the same dataset as in Article I, Article II uses multinomial logit model, which is founded on the economic model of random utility maximisation (Luce, 1959; Manski and Lerman, 1977; McFadden, 2001), to estimate sectoral choice probabilities and their determinants.

Descriptive results indicate that more than half of the sample farm households (55%) borrowed from formal, semiformal or informal credit sectors, and of these borrowers, the largest proportion (about 50%) borrowed from the informal sector, followed by that from the formal sector (about 28%). The informal sector had the highest lending rate of interest (which was about 38.54% per annum on average but ranges up to 150%) and the formal sector had the least (11.12%). The fact that most farm households borrowed from the informal sector, although this sector charges more interest rate than other sectors, suggests that factors other than the interest rate, *e.g.* loan-processing time, type of loan, credit information and loan size had more weight in determining farm households' borrowing behaviour from a particular sector. For example, it took about nine weeks to obtain a loan from the formal credit sector since application but one week in the semiformal sector and five weeks in the informal sectors. Timeliness of the loans is thus an important factor, especially for farm households since they are engaged in farming activities where input uses need to match the natural process in agricultural production.

Econometric results show that conditional choice probabilities were estimated at 0.3167, 0.1667, and 0.5167 for formal, semiformal and informal credit sectors, respectively. Thus, as evident in the observed data, the econometric estimation also confirms the dominance of the informal sector even though this sector exhibits the highest interest rates. The evidence that the majority of sample farm households use informal finance supports the World Bank report that over 80% of the world population rely on informal financial arrangements (WorldBank, 2001) and the continued role of informal finance providers (Lamberte et al., 2006). Furthermore, several household and loan characteristics significantly affected farm households' sectoral choice. The formal sector was positively affected by gender (*i.e.*, higher probability for male than for female), household labour, farm size, credit information and extension visit, and negatively by nonfarm income, dependency ratio and interest rate. The semiformal sector was positively affected by gender, household labour, credit information, repayment flexibility and cash/kind type of credit, and negatively by age, farm income, household saving, loan processing time, interest rate and lender-borrower distance. The informal sector was positively affected by age, religion, education, extension visit, repayment flexibility and cash/kind type of credit, and negatively by gender, nonfarm income, household saving, credit information, loan processing time and interest rate. The results suggest that sectoral choices are complex phenomena involving considerations of several factors and lending institutions need to take into account these complexities when devising financial products and instruments.

It was concluded that the informal credit sector is still the dominant sector in the Ethiopian rural financial system despite the reform's hoped-for expansion of formal credit to the rural areas. More importantly, factors other than the interest rate significantly affected farm households' sectoral choice. Thus, lending policies and instruments of formal and semiformal financial sectors need to be more compatible with farm households' borrowing characteristics.

5.3 Article III: Influence of credit constraints on technical efficiency

Farm households are heterogeneous in resource endowments and so are their technology choice and risk aversion behaviours. Technology adoption and risk behaviour of farm households are likely to affect production efficiency. However, previous studies gave little emphasis to the effect of credit constraints in production efficiency. Using the same dataset previously mentioned, this study first tested the difference in credit constraint status of the farm households and then estimated and compared technical efficiency of credit-constrained and -unconstrained farm households. Furthermore, it identified additional inefficiency factors, which could affect technical efficiency of farm households.

Descriptive results indicate that not only were the majority of farm households in the study areas credit constrained, but also farm households differed significantly in their credit-constraint status. Econometric estimates showed that credit constraint affected technical efficiency of farm households and credit-constrained farm households had mean technical efficiency that was less than that of the credit-unconstrained farm households by about 12%. This result is closely related to previous studies by Blancard et al. (2006) and Latruffe (2004). In addition, analysis of factors contributing to technical inefficiency revealed that education, land fragmentation and loan size, among others, had significant effects. The fact that lower technical efficiency of the credit-constrained farm households was reflected in their inability to procure the necessary productive inputs relates to previous studies in Ethiopia *e.g.* by Croppenstedt et al. (2003), where it was reported that credit constraint limited adoption of improved technologies. The positive correlation between loan size and technical efficiency is in line with the literature which argues that indebted farm households face repayment obligations, which encourages them increase efforts and limit waste of factors of production (Latruffe, 2004), but differs in the sense that the loan size needs to be adequate to enable adoption of more productive technologies.

Given the largest proportion of the credit-constrained farm households, the 12% technical efficiency gap implies considerable loss in output in the study areas. Assuming that such gap is not unique to the study areas, at the aggregate, this would be costly for a country that often faces food insecurity problem. Moreover, the average technical efficiencies of both the credit-constrained and unconstrained groups were low. Thus, technical efficiency of the farm households in general and more of the credit-constrained farm households in particular need to be improved. This requires consolidation of credit, education and land policies that can improve the existing situation.

5.4 Article IV: Farm households' demand for credit

In Ethiopia, private financial sector re-entered the credit market following the financial sector reform of the 1990s, which overhauled the financial system previously nationalized under the Military Regime. Assuming that the reform would improve credit supply conditions to the farm households, Article IV aimed at estimating farm households' demand for credit and identifying factors affecting

their demand. The primary source of data for this article was the same dataset used in the other articles. Moreover, published and unpublished secondary sources were reviewed to understand the credit supply in Ethiopia in general, and in the study areas in particular. Both descriptive statistics and censored regression were used for data analysis.

Secondary sources indicate that the share of private banks in the formal credit market has increased from less than 10% in 1999/2000 to about 30% in 2005/2006 as a result of the 1990s economic reform program (NBE, 2007) but with little expansion to the rural areas. Formal credit sector provided loans to farm households for only productive purpose irrespective of the farm households' demand for consumption credit. Credit rationing was a prevalent phenomenon in credit supply of the formal credit sector to farm households in the study areas. Although farm households had credit demand for consumption purposes, as expected, this could not be obtained from the formal sector. However, farm households reported obtaining loans for such purposes from semiformal or informal sources at significantly higher interest rates. This again confirmed the widely observed role of informal finance in developing countries (Lamberte et al., 2006; Adams and Fitchett, 1992). The fact that the farm households borrowed from the informal sources at higher interest rates suggests that there is an extensive margin for the formal sector to expand credit supply to the farm households by possibly increasing the lending interest rate by way of a competition with the non-formal sector.

Econometric estimation revealed that demand for credit of a typical farm household was about 2.3% of its farm income. This corresponds with seasonal liquidity constraint a farm household faces to finance its costs of production inputs, medical care and children's education. Several factors significantly affected credit demand of farm households. Among others, investment in children's education and medical care positively affected farm household demand for credit. Given that such costs are not currently public financed, each household faces them privately, and this is likely to be affected negatively by their liquidity constraints. Since the health and education of members of a farm household directly or indirectly affect their productive capacity, it is evident that credit supply irrespective to farm households' credit demand for education and health maintenance fails to account for complementarity of production and consumption at farm household level. Therefore, formal credit sector's financial products and instruments need to address consumption credit demand compatible with the farm households ability and willing to repay the debt. Otherwise, public policy needs to lower costs related to education and health care for the farm households, as they affect their productive capacities.

6. Conclusions and policy implications

As evident in Article I, about 62% of the farm households had savings in financial and physical assets but almost all farm households (about 90%) had savings held informally. This was explained more by problems of incentives and opportunities to save than by their ability to save. It suggests that financial institutions with easy access, low transaction costs, higher real returns on savings and convenient withdrawal of savings may provide incentives for those who hold financial savings informally to channel their savings into the formal institutions. Mobilizing informal savings into formal institutions can build the institutions' loanable capital base and improve resource allocation in the economy.

For both saving and credit, the informal credit sector remained dominant in the credit sector of Ethiopia in general and of the study area in particular. This is contrary to the reform's hoped-for expansion of formal credit to rural areas. Evidence also shows that factors other than the interest rate, i.e., loan-processing time, type of loan, credit information and loan size, significantly affect farm households' sectoral choice. This suggests that lending policies and instruments of the formal and semiformal financial sectors need to be compatible with borrowing behaviour of the farm households.

On the supply side of the credit market, the majority of farm households are credit constrained. However, evidence shows that farm households differ significantly in their credit constraint status. Article III shows that credit constraint affected technical efficiency of farm households and there was a gap of 12% in technical efficiency between credit-constrained and -unconstrained farm households. Given the largest proportion of credit-constrained farm households, the observed technical efficiency gap is a considerable loss in output. Since the average technical efficiency scores of both groups are low, the technical efficiencies of all farmers need to be improved. Moreover, the efficiency gap between the credit-constrained and credit-unconstrained farm households needs to be narrowed. For this, credit, land and education policies need to be reconsidered.

Much empirical evidence suggests that underdeveloped rural financial market in developing countries hinder economic growth and development. One of the reasons for low level of rural financial market development in these countries is the presumption that farmers are too poor to save and that they produce little marketable surplus. In Article I, it was found that the farm households, who are generally smallholder farmers, were able to save both in physical and financial assets, no matter how small the assets, which disproves the prior presumption. More importantly, the policy-relevant evidence is the fact that the farm households held their savings informally mainly due to problems of incentives and opportunities. This evidence suggests that, if rural financial markets are developed in such a way that savers' costs are reduced and returns improved to yield sufficient net benefits, then it is possible to tap these undermobilized resources for a better resource re-allocation in the economy. This, in turn, can increase the capital base of the formal lending institutions and enable them to expand financial services to rural areas. If formal financial institutions expand to the rural areas, this is likely to create

competition in the financial market, lowering costs of saving and borrowing by reaching out to even the lowest income brackets of the rural communities. In this way, even the poor can save and contribute to resource mobilization, and the financial institutions would deepen in their effectiveness and efficiency of financial services to become sustainable.

As the results in Article II and IV show, the farm households borrow from the informal credit sector at significantly higher interest rates, particularly for consumption purposes. The formal financial institutions ration loans to rural borrowers because they lack the conventional collateral. These facts suggest two implications for rural financial market development. Firstly, the fact that the farm households borrow at higher interest rates offers a possibility for the formal sector to expand financial services by raising its interest rates competitively with the informal credit sector since there is effective demand for credit by the farm households. Through such expansion, the formal sector would locate branches appropriately for service provision, reach out to many rural borrowers and increase the total loan volume. With increased loan volume, the unit cost of lending would reduce, making the formal sector more profitable. Secondly, the formal sector needs to relax the restriction of lending only for productive purpose as far as the borrowers are creditworthy. This also means that more comprehensive assessment of the creditworthiness of farm households and rural entrepreneurs, including those credit purposes affecting labour productivity (such as education and health) are needed.

As indicated earlier, theory offers three possible approaches to the relationship between credit and technical efficiency, based on the “free cash-flow” approach, agency theory and credit evaluation approach. The evidence in Article III of this study suggests that if loans are extended to farmers to the extent that sufficiently tackles credit constraints of borrowers, this would positively affect their technical efficiency. In turn, this would allow production of more outputs to generate marketable surplus that would increase repayment capacities of borrowers. Increase in repayment capacity is likely to motivate lenders to extend credit to the farm households. This evidence is in line with the first and third approaches described above.

In relation to land property rights, one of the reasons for the inability of farm households to borrow from the formal sector and for the formal sector’s reluctance in participating in rural credit supply is farm households’ lack of acceptable collateral guaranteeing the loans. However, evidence in many other developing countries and in almost all developed countries shows that a farmland is an important asset, which determines farm households’ borrowing capacity. In Ethiopia, farm households currently have only usufruct rights, not ownership rights. With this limited property rights, it is not possible to use it as a collateral for obtaining credit. Therefore, it calls for consideration of the existing land property rights laws that would allow farm households to be able to use land for collateral purpose to obtain credit.

7. Contributions of the thesis

The contribution of this thesis to the category of literature it addresses is mainly empirical. That is, although the theoretical frameworks used in all the articles are in essence not new to the literature, studies showing their applications in developing countries in general and to the smallholder farm households of Ethiopia are generally new. Hence, by taking the different theoretical concepts used in the articles to empirical tests, this study has tried to fill the empirical void at least for Ethiopia.

Article **I** considers a farm household model, where production and consumption decisions are inseparable due to imperfection in the credit market and derived conditions for possible farm households' saving behaviour, by disaggregating their savings into physical and financial assets. It further investigated potential factors affecting saving behaviours of farm households under imperfect rural financial market conditions and found that although the farm households had some ability to save, they face problems of incentives and opportunities to channel their savings through formal financial institutions. The fact that most farm households were able to save not only falsifies the widely held notion that "the poor are too poor to save", but also supports the idea that if appropriate incentive mechanisms are put in place, these savings can be mobilized for better resource allocation.

As much as saving decisions are behavioural in nature, so are credit sectoral choices of borrowers. The behavioural nature is even highly pronounced under imperfect market conditions, where access and participation in credit market are not plain grounds for most of the farm households. Whereas previous literature considers credit market participation of borrowers from different dimensions, empirical evidence is limited in analysing credit sectoral choice of borrowers as affected by behavioural factors. Article **II**, therefore, contributes to this gap by showing several factors, especially behavioural ones, which affect farm households' choice of a particular credit sector under imperfect credit market conditions.

The presence of a credit constraint faced by farm households is not new to the literature, both theoretically and empirically. However, its influence on technical efficiency of especially farm households in developing countries is not widely investigated. Moreover, previous studies of production efficiency measurement addressed the problem of credit constraint as a dummy variable, which captures only whether or not a farm household has access to credit or has taken a loan. Clearly, this way of addressing the credit problem does not capture the issue of whether or not the farm household would remain credit constrained after participating in the credit market. Therefore, by using direct elicitation approach to capture credit constraint of farm households, Article **III** contributes to the body of literature by showing the effect of credit constraint on technical efficiency of credit farm households in the context of developing countries.

Article **IV** contributes to the literature on credit demand by bringing insights in which farm households' demand for production and consumption credit are interdependent. That is, farm households' demand for credit for the purpose of covering expenditure on children's education and health, which are often

considered 'consumption' activities also affect farm production through labour supply effects. It shows that credit supply that targets only 'production' loans fails to address the interdependence between production and consumption activities at farm household level.

In general, the study shows how an imperfect financial market affects farm household behaviour in terms of saving, credit demand, credit sectoral choice, and technical efficiency. Finally, attention is drawn to an excerpt from Muhammad Yunus' 2006 Nobel Peace Prize lecture. He stated: "... *we create what we want. If we firmly believe that poverty is unacceptable to us, and that it should not belong to a civilized society, we would have built appropriate institutions and policies to create a poverty-free world.*" This is related to the previous quotation from Schultz's 1979 Nobel Prize lecture quoted earlier. It is a fact that one in five of the world's population lives in abject poverty with a per capita income of less than a dollar a day (WorldBank, 2006). At least two-third of these people live in rural areas and in the poorest countries where the share is as high as 90% for some countries (*e.g.* 40% for Ethiopia). For all these people, what happens to the rural economy is vitally important. Yunus suggests design and development of appropriate institutions, which are aimed at eradicating poverty. Schultz argues that we need to understand the economics of being poor, which can serve as a component of the design framework of the institutions to be built. In my view, Schultz points to the fact that much needs to be understood to fight poverty and Yunus offers the institutional design towards the solution. I think that by studying the microeconomic behaviour of farm households in poor countries, we are able to understand what has kept the poor poor. In this connection, this thesis argues that one such problem is the imperfection in rural financial market, which adversely affects farm households' saving, borrowing and production efficiency. Therefore, to understand the strengths, weaknesses and opportunities of the existing market and non-market institutions and to devise new better ones, much remains to be investigated.

8. Suggestions for further research

A natural extension of a cross-sectional research is to give it a time dimension in order to assess the nature of the variables over time. This will allow us to understand seasonal variations in a year, variation between years and changes in trends due to environmental factors in the variables measured. Accordingly, saving behaviour of farm households is likely to change over time due to changes in the demographic and socioeconomic circumstances of the farm households and in the environments, which may affect farm households' abilities, incentives and opportunities to save. Credit demand, sectoral choice and technical efficiency are also dynamic in nature. Therefore, we will have better understanding if such studies are followed up by bringing in the time dimension into their measurements and estimations. The current study did not use longitudinal and/or panel data, due to time and budget constraints to collect such type of data. Therefore, further research efforts are required to generate a comprehensive panel dataset and use panel data econometrics to study further the fixed and random effects in the estimations.

Another area of consideration emanates from the fact that Ethiopia is diverse in terms of agroecological, socioeconomic, cultural and religious features. Due to this heterogeneity, there cannot be a specific policy recommendation that can fit all areas and circumstances. Since diverse environments are not expected to fit to a single policy recommendation, a feasible direction is to try to devise relevant policies in tune with the diversity. In this connection, a study limited to a certain area might not be relevant for other areas. Therefore, another possible extension of this study is to try to replicate it in other socioeconomic and agroecological settings of the country to further understand and explain variations and similarities among different locations. This will enrich the results obtained in this study and can improve policy recommendations.

Finally, due to data shortage the supply side of the financial market, particularly the semiformal and informal financial sector, was not adequately studied in this thesis. Therefore, further research is necessary to understand in detail the nature of supply conditions and existing transactions.

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Special tribute (yaadannoo addaa): *Bu'aan hojii kanaa gadda du'a haadhaa-abbaa kiyyaa (bara 1992) fi ilma kiyyaa Fu'aad (umrii 10tti bara 2001) irraa ka'e booda waan argame. Gaddi kunis hojii kana waliin haa yaadatamuu. Isaaniif araara Rabbii ni kadha. Waan hundaaf Rabbi galatni haa gayu.*

Finally, I thank the Almighty God.

Hussien Hamda Komicha,
Uppsala, September 2007.