Aalto University
School of Economics

Institutional Differences in Provision of Credit to Women in Developing Countries - Evidence from Uganda

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ABSTRACT
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INSTITUTIONAL DIFFERENCES IN PROVISION OF CREDIT TO WOMEN IN DEVELOPING COUNTRIES – EVIDENCE FROM UGANDA

The importance of access to credit in terms of development is well recognized, as is the overrepresentation of women in the poorest segments of the third world societies. The purpose of this thesis is to study the institutional differences in provision of credit to women in developing countries.

The financial sector in developing countries can be divided into formal, semiformal and informal financial institutions. For a number of reasons culminated in information asymmetries, women are assumed to be more excluded from formal financial services than men. On the other hand, they are also considered an important force driving the economic and social development in their countries. This is why many semiformal, mainly microfinance institutions (MFI), have decided to focus on female clients - alongside reasons related to MFI efficiency. Furthermore, while targeted by semi-formal institutions, it is also believed women have a higher tendency to participate in communal forms of informal finance. Based on these notions, it could be thus assumed that there are significant institutional differences in women's access to credit in developing countries.

However, recent studies show the situation in a different light. Not all agree poor women are more excluded from financial services than men, and many have questioned the developmental as well as efficiency based arguments of semi-formal institutions' gender agenda. In fact, the researchers today already talk of a "second generation" of microfinance institutions, who regard focusing on female clients as both inefficient and ineffective. Meanwhile, many formal financial institutions have become more aware of the unbanked population, and informal finance has been suggested as a viable alternative to traditional provision of financial services. The institutional differences begin to blur.

In this thesis I try to answer the question to what extent there are differences in the supply of credit to women by formal, semiformal and informal financial institutions, and why these differences may exist. I base my research on a literature review of the fundamental theories of credit market functioning and recent research in the field. In addition, I will perform an empirical analysis of a case country, Uganda.

While the literature review suggests financial institutions in developing countries differ in their provision of credit to women, the results of the empirical study conducted for this thesis indicated no significant difference in female access to formal or informal finance. They did however show a pro-female bias in the semiformal financial institutions' provision of credit, and also provided evidence for institutional differences in credit provision unrelated to the gender variable. The findings could be thus interpreted as a confirmation of gender agenda of the MFI as well as the often-cited challenges in measuring access to financial services. Many consider defining financial access per se as problematic. Nevertheless, this should be not seen as to undermine the importance of the field of female financial access in terms of social and economic development.

Key words: financial institutions, information asymmetries in credit markets, female access to finance

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1. Introduction

1.1 Background and motivation

In the past years, the discussion around developmental finance has heated up in an intense way. Lack of inclusive financial systems is widely considered a key element underlying persistent income inequality, instability, and slower growth (The World Bank, 2008). On the other hand, the role of developing countries in the global economic scene has attracted increasing attention and media coverage following the turmoil of the financial crisis in 2008. As the Western countries struggle to regain their balance, the world turns its heads to the emerging and developing economies. In fact, in the past five years, the developing countries have accounted for over 70% of global economic growth. Yet much of the potential in these countries remains unexploited, as a significant part of their population is left without financial access. (CGAP, 2009)

An important dimension of financial access is the access to credit. Although financial services include more than just credit, provision of credit has dominated the related debate and research for decades. Today the discussion has extended to cover fields such as savings and insurance, but the importance of credit ought not to be underestimated. Without inclusive financial systems, poor individuals will have to rely on their own resources for investments in education and entrepreneurial activities. According to the World Bank review on financial access in 2008, the developing countries have only a quarter of the credit per person compared to the developed countries. This not only prevents the increase in individual wellbeing, but also hinders aggregate economic growth.

While access to finance is seen as crucial to development, the financial access of women is seen as especially important. The reasons behind this stem from the overrepresentation of women in the poorest segments of the society, their alleged exclusion from traditional sources of financing, and finally, their contribution to the overall social and economic development as compared to men. While more credit constrained than men, the empowerment of women has been shown to yield greater economic and social impacts (eg. Khandker, 2005; The World Bank 2008). It is thus natural, that their role has been highlighted in the discussion concerning developmental finance.

The financial sector in developing countries can be roughly divided into formal, semi-formal and informal financial institutions, which differ both in their ability and willingness to provide credit to the poor, as well as in their provision of credit to women in particular. The reasons behind this go back to the theory of rationing in credit markets by Stiglitz and Weiss (1981), and to the traditional role women play in third world countries. Due to difficulties culminated in information asymmetries

and the lack of collateral, the formal financial sector, consisting mainly of traditional banks, has been largely unwilling or unable to provide credit services to the majority of the population in developing countries. Further, because of their subordinate economic and social status, women are often assumed to be more credit constrained than men (eg. Armendáriz and Morduch, 2010; UNIFEM, 2010).

In the presence of credit rationing in formal financial markets, the poor will turn to informal sources for funding. Although proposed as an alternative to formal financial systems (Allen, Qian and Qian, 2005 and 2008), informal financial institutions are referred to only as a second-best solution. In fact, recent studies show they vary widely in effectiveness as well as in their outreach of female clients (Ayyagari, Demirgüç-Kunt, Maksimovic, 2007). As an effective solution to the functioning of credit markets in the developing countries, microfinance institutions (MFI) promise to provide credit to the poor by using techniques involving joint liability group lending and dynamic incentives (Armendáriz and Morduch, 2010). While the success-story of microfinance institutions has been questioned lately, it is widely acknowledged that they have managed to create a semi-formal financial sector, solving many of the problems faced by formal and informal financial institutions. Moreover, the microfinance movement promises to reduce gender inequality and empower poor women around the world (eg. Karlan and Zinman, 2010, Bhattacharya et al, 2008, and Khandker, 2005). In fact, for many, the focus on women constitutes the core of microfinance. This is also related to the exceptionally high repayment rates of female clients. The rationale behind MFI targeting of women can be thus roughly divided into social and developmental, as well as profitability related goals.

Although the distinction and the differences in the provision of credit to women by different financial institutions might seem rather clear-cut at first sight, recent research shows the situation in a different light. The importance of female financial access remains acknowledged, but it is noted that measuring both financial access, and its impacts, are extremely complicated (The World Bank, 2008). This has cast significant doubt on the microfinance institution gender bias. In fact, the researchers today already talk of a "second generation" of microfinance institutions, who regard focusing on female clients as both inefficient and ineffective (Karlan and Zinman, 2009). Meanwhile the traditional banking sector has begun to identify the potential in the unbanked population, and women in particular. The objectives, means and final implementation of different financial institutions are thus diversified, and the institutional boundaries in female access to finance blurred.

1.2 Research question and methodology

The purpose of this thesis is to study the institutional differences in provision of credit to women in developing countries. The importance of access to credit in terms of development is well recognized, as is the overrepresentation of women in the poorest segments of developing societies. However, as stated before, the current research has questioned the rationale behind the semi-formal institution female focus: not all agree the poor women are more excluded from financial services than men and not every microfinance institution will deliberately target women. In this thesis I will try to answer the question *to what extent there are differences in the supply of credit to women by formal, semiformal and informal financial institutions* and *why these differences may exist*.

I will base my research on a literature review of the fundamental theories of credit market functioning and on the recent research in the field. In addition, I will perform an analysis on empirical evidence from a case country, Uganda.

1.3 Structure of the thesis

The first part of the thesis is based on a literature review of the theories and current research around the subject. I will begin setting the study in context, discussing the importance of financial access, functioning of credit markets, and the role of informal economic activity and women in developing countries. I will then proceed to consider the different financial institutions, introducing the formal, semiformal and informal financial institutions and the mechanisms behind their functioning. Finally, I will provide a more detailed analysis of the institutions' provision of credit to women in particular, in chapter four.

The second part of the thesis consists of an empirical analysis on women's access to credit markets in Uganda. The data for the study was provided by FinScope Uganda, and was collected in collaboration with the National Bureau of Statistics Uganda during the year 2009. In chapter five, I will give a short introduction to the economic and social conditions in Uganda, its financial markets, and the status of women. I will also give a short description of the data and some details about the collection. I will then describe the dependent, explanatory and control variables, and introduce the multinomial logit model used in the study. In chapter seven, I will present and analyze the results of the empirical research, and finally, in chapter eight, I will draw conclusions on the whole study, offering room for general discussion and further remarks.

1.4 Central definitions

Formal financial institutions. In her book "Access for All: Building Inclusive Financial Systems" Brigit Helms (2006) describes formal financial institutions as institutions, which are both regulated and supervised by a central bank or equivalent regulatory body. They offer a wide range of financial services and control a branch network, which can extend across the country and internationally. In addition to commercial banks, these include state banks, agricultural development banks, savings banks, rural banks and also some non-bank financial institutions. In the case of Uganda, the formal financial sector includes commercial banks, credit institutions and microfinance deposit-taking institutions, which are all regulated and supervised by the Bank of Uganda (Heikkilä et al., 2009).

Semiformal financial institutions. Semiformal financial institutions fall in the middle-ground of formal and informal institutions in terms of organizational structure and governance as well as oversight and supervision by the government. Regulated, but not supervised, they include for example member-owned organizations, non-governmental organizations (NGOs), and nonbank financial institutions. (Helms, 2006) The semiformal financial institutions in Uganda consist of NGOs, savings and credit cooperatives (SACCOs) and credit-only microfinance institutions (MFI), which are allowed to make loans, but not to collect deposits for intermediation. These institutions are licensed and registered under an Act of Parliament, but are not supervised by the Bank of Uganda. (Heikkilä et al., 2009)

Informal financial institutions. Helms (2006) defines the informal financial sector as the mirror image of formal institutions – informal institutions are thus not registered nor supervised by any regulatory body. Definitions of informal financial institutions vary, but at large, they include all financial transactions taking place in the economy beyond regulation, such as those made by moneylenders, pawnbrokers, savings collectors, money-guards and input supply shops, among others. Based on the number of participants and nature of the transaction, informal financial institutions can be roughly divided into individual transactions, such as moneylenders, and communal forms, referring to informal groups (Roodman, 2010). Some of the most well-known and widely spread communal informal financial institutions include rotating savings and credit associations (ROSCAs) as well as accumulating savings and credit associations (ASCAs), which also form most of the informal financial institutions in Uganda. Other examples of informal institutions in Uganda include savings clubs and burial societies. (Heikkilä et al., 2009) In this study, I will limit the notion of informal financial institutions to their communal forms, that is, voluntary, regularly meeting groups of members, who engage in financial activities.

1.6 Main findings

Based on the literature review, it was assumed women were more excluded from formal provision of credit than men, while semiformal financial institutions explicitly targeted them. Women were also assumed to have a higher tendency to form informal groups for financial purposes.

The empirical findings of this thesis supported the hypothesis that microfinance institutions do in fact favor women in their provision of credit. Being a female increased the probability of currently holding a loan from a semi-formal institution 3.6-fold compared to the initially calculated baseline probability. However, the empirical analysis did not show a significant difference in female borrower's access to formal sources of credit in Uganda. While contrarian to the theories of female exclusion from formal credit markets, it is recognized that the subject remains much debated in current literature. When it comes to the informal credit markets, the difference due to gender was also found insignificant. Reasons to this may be traced to the complexity of modeling access to credit in developing countries and the low rates of institutional borrowing in Uganda per se. The empirical analysis also provided some evidence for institutional differences in lending unrelated to the gender variable.

2. Role of financial access and women in developing countries

2.1 Financial access in developing countries

The modern development theory sees financial development, growth and inequality as closely intervened. Financial access is said to enhance growth, reduce poverty, and decrease inequality. (The World Bank, 2008) The reasoning behind this is based on some fundamental economic theories. Meanwhile, measuring financial access remains a challenge.

By the neo-classical growth model, capital increases the returns to labor (Solow, 1956), and access to capital is thus argued to enhance growth. However, it is not immediately obvious that broader financial services would reduce inequality. In fact, one could argue that the more successful a micro-entrepreneur in a poor country becomes, the wider the income gap between him and his neighbor becomes. Kuznets (1955) for example states that rapid economic growth requires wealth concentration, basing his argument on the fact that the rich people's marginal propensity to save is higher than the poor's. He thus argues there is a trade-off between justice and growth, which only disappears as the benefits of growth have spread throughout the economy. This would mean the expansion of financial access would at first increase income inequality, not decrease it.

Yet evidence from developing countries is highly contradictory to this hypothesis: high levels of inequality are related to hindered growth, while low levels of inequality have accelerated economic development. At the same time, empirical evidence suggests there is a significant positive relationship between financial depth and growth. (The World Bank, 2008) One of the key mechanisms is based on the fact that expanding the scope of financial systems eases the financial constraints related to firms. Beck et al. (2007) find that increased financial depth is in fact the most beneficial to the ones with the lowest initial wealth, and is thus proven to reduce income inequalities instead of creating them.

It is commonly acknowledged that there exists a wide gap between the level of financial depth in developed and developing countries. This conclusion is based on several indicators. According to World Bank and Consultative Group to Assist the Poor (CGAP) estimates in 2009, developing countries have only a quarter of the loans per person compared to the developed countries, and a significantly narrower outreach in terms of physical presence. The outreach is especially limited in rural areas due to the combination of poor levels of infrastructure and low population density. In fact, bringing banking services to the rural population is identified as one of the biggest challenges in the quest for broader financial inclusion. (CGAP, 2009)

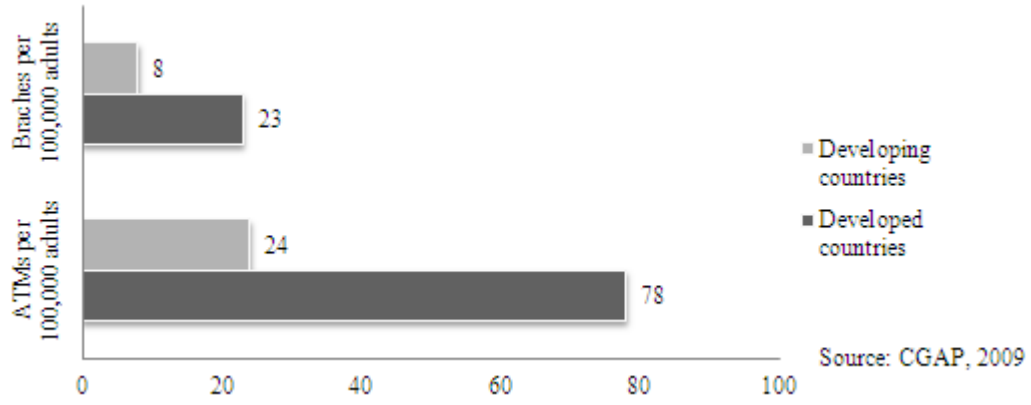

Figure 1 Financial institution outreach

In addition to the physical outreach and number of loans, the number of deposit accounts and value of loans can be used to measure financial access. These are shown to differ according to the country specific level of development. The World Bank and CGAP (2009) estimates indicate that there are as many bank deposit accounts as there are people in the world. However, the accounts are highly concentrated in the developed countries, while developing countries hold only a third of deposits per person in comparison: an average adult in the developed world has 1.77 bank deposit accounts, while the number of bank deposits per adult in the developing world is only 0.52. Furthermore, in

the developing countries the value of bank deposits represents a greater percentage share of the GDP, while the value of an average deposit per person is only a third of the developed world average, indicating both lower national income and fewer deposits. (CGAP, 2009)

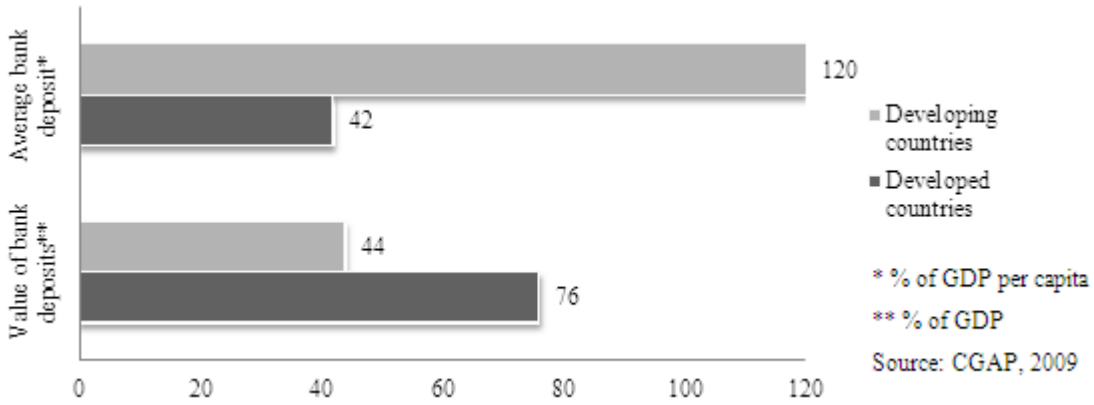

Figure 2 Value of bank deposits

While relatively good indicators exist, one should note that measuring financial access is not as straightforward as it may seem. This is due a general lack of data on the use of financial services as well as to the overall complexity of the matter (The World Bank, 2008; CGAP, 2009). For example, data on the number and value of loans was only available in a third of the 139 countries participating in the World Bank and CGAP survey on Financial Access (CGAP, 2009). On the other hand, distinguishing between voluntary and involuntary exclusion is complicated and many times impossible. For some customers given financial products might not be attractive due to ethical or religious reasons, and the non-usage is then not related to limited financial access. (The World Bank, 2008) In the case of women this argument takes a new level of complexity, as it is hard to differentiate between financial exclusion related to personal and imposed motives.

In this study the difficulties related to measuring financial access are taken into account by limiting the empirical sample to individuals, who have expressed demand for credit through current institutional or non-institutional borrowing as it may be. However, even this is unlikely to entirely account for involuntary exclusion from financial services, which is acknowledged as a general weakness of the theoretical models behind measuring female financial access. In the next section, I will discuss the theory behind credit market functioning developing countries in more detail.

2.2 Information asymmetries and credit market functioning

In order to set a theoretical framework for the study, I will now look at the classic model of credit markets functioning by Nobel Prize winners Stiglitz and Weiss (1981). What Stiglitz and Weiss

(1981) present in their seminal paper "Credit Rationing in Markets with Imperfect Information" is that problems caused by information asymmetries may lead to situations in which the demand for credit exceeds the supply. The following section covers the fundamentals of the model by Stiglitz and Weiss (1981) and relates them to contributions by subsequent authors. A mathematical elaboration of the theoretical framework is provided in Appendices 1a and 1b. It is hereby notified, that in order to enhance coherence and continuity, all mathematical examples to be demonstrated in the Appendices are derived from those by Armendáriz and Morduch (2010). Further, in all examples, limited liability is assumed, and only the borrower's inherent risk, not risks common to all, is considered.

Asymmetric information was discussed already by George Akerloff in his seminal paper "The Market for Lemons" in 1970. Perloff (2009) defines asymmetric information as a "situation in which one party to a transaction knows a material fact that the other party does not". Varian (1999) notes that asymmetric information may cause significant problems regarding the efficient functioning of any market, but that the problems are accentuated in credit markets, in which the presence of information asymmetries between borrowers and lenders can significantly alter the optimal financial contract.

Banks making loans are interested in the interest rate they receive on a loan, as well as the riskiness of the loan. What Stiglitz and Weiss (1981) argue is that the interest a bank charges can itself alter the riskiness of the pool of loans. This may happen either through attracting high-risk borrowers or by affecting the actions and incentives of the borrower. The problems caused by information asymmetries can be thus divided into two distinct phenomena: *adverse selection* and *moral hazard*. Further on, moral hazard can be defined for *ex-ante* and *ex-post situations.*

2.2.1 Adverse selection

Adverse selection refers to a situation in which one side of the market lacks information about the other party. It is also known as the "hidden information" problem. (Varian, 1999)

In credit markets adverse selection causes a situation in which the lending institution lacks information to separate risky and safe borrowers, and is thus forced to charge an average interest rate from both types (Bhattacharya et al., 2008). The high interest rate drives away safe borrowers, decreases the demand, and forces the bank to charge an even higher interest rate in order to cover costs. A high interest rate is in turn associated with a more risky pool of borrowers, who are willing

to take bigger risks to gain higher return, but are also more likely to fail to repay their debt, therefore decreasing the bank's expected return.

In practice this means the bank will have to reject loans to borrowers, who are observationally identical to those who receive loans. This results in denied access, and credit rationing in equilibrium. (Stiglitz and Weiss, 1981) For a mathematical example of adverse selection, please see Appendix 1a.

2.2.2 Ex-ante and ex-post moral hazard

While adverse selection can be described as the "hidden information" problem, Varian (1999) defines moral hazard as a "hidden action" problem. By general definition, moral hazard refers to opportunism characterized by an informed person taking advantage of a less-informed person through unobserved action (Perloff, 2009). In credit markets moral hazard occurs when the lender is unable to observe the effort made and action taken by the borrower, or alternatively, the realization of the project returns (Armendáriz and Morduch, 2010). Thus, moral hazard can be defined for *ex-ante* and *ex-post* situations respectively.

Ex-ante moral hazard relates to the idea that the lender cannot observe the borrowers actions after the loan has been granted, but before the returns have been realized. It is thus equivalent to the probability of a good realization of returns (Armendariz and Morduch, 2010). The probability could be consequently seen as the effort the borrower extends to make sure the project succeed.

Ex-post moral hazard on the other hand, refers to the possibility of the borrower to abscond with the money after the returns have been realized. It is also known as the enforcement problem (Armendáriz and Morduch, 2010). In addition to taking away with the money, the borrowers – protected by limited liability – may have the incentive to pretend their returns were lower, i.e. strategically default (Bhattacharya et al, 2008). For a mathematical elaboration on the impacts of ex-ante and ex-post moral hazard, please see Appendix 1b.

2.2.3 Credit markets in developing countries

At this point, we can note why the impact of information asymmetries is accentuated in developing countries. Normally, a bank would compensate for the inherent risks related to the borrower caused by adverse selection and moral hazard by requesting a collateral to be seized upon default. In developing countries a significant part of the population is poor and by definition lacks assets valuable enough to act as collateral. The problems are further enhanced by issues such as backward infrastructure, costliness of screening loan applicants and monitoring borrowers, difficulties in

writing and enforcing contracts due to imperfections in the judicial system, and low levels of literacy (Besley, 1995).

De Soto (2000) argues that through for example the improvement of the judicial system and property rights, the situation of credit provision to the poor could be alleviated. Given that an asset valuable enough for collateral existed, in many cases social or legal reasons prevent the lending institution from seizing it in case of default. The bank might for example run into large-scale community opposition upon seizing the house of a poor family unable to pay back their loan. This is why limited liability is assumed when modeling credit services to the poor – that is, it is assumed that the poor cannot pay back more than their current income (Armendáriz and Morduch, 2010).

2.3 Informal economic activity and role of women in developing countries

In order to be able to understand the institutional differences in provision of credit to women in the third world, one must set the research question into a wider context. Limited financial access is closely related to informal economic activity, which has an important role in many developing countries. Interestingly, women play a significant part in this sector, especially in sub-Saharan Africa.

Constrained access to formal financial services is particularly related to informal economic activity, the importance of which ought not to be underestimated in developing economies. Blackden and Sudharshan (2003) estimate the share of the informal sector in non-agricultural GDP is 41% in sub-Saharan Africa (SSA), 29% in Latin America and 41% Asia. Yet the informal sector has been largely overlooked, neglected and even suppressed. Despite the neglect, it has grown significantly and contributed to the overall growth of national products in developing economies, including many SSA countries. (Blackden and Sudharshan, 2003) It is then reasonable to ask, what could be the impact of this sector, given that it had the capital to realize its potential. Excluding South Africa, the share of informal employment in non-agricultural employment in SSA is 78%, and including agricultural production, up to 83%. Self-employment on the other hand, represents 70% of all informal employment and 53% of non-agricultural production (ILO, 2002). This means a relatively high percentage of entrepreneurship and significant potential for microfinance institutions.

Furthermore, women represent a major part in the informal workforce. In sub-Saharan Africa the economic role of women is widely recognized. In 2000, the World Bank realized a major survey under the title “Can Africa Claim the 21st Century?”. The main argument was that in Africa there lies an enormous potential of hidden growth reserves, which are culminated in women. A

distinguishing characteristic of African economies compared to the rest of the developing world is that women and men both play substantial economic roles – in fact, much of African economic activity is in the hands of its women, even though the workforce by gender shows considerable sectoral variation. Elson and Evers (1997) call this "gender intensity of production". Building on the Elson and Evers (1997) methodology Blackden and Sudharshan (2003) calculate that in SSA, men contribute to approximately two thirds, and women to one third of economic activity, but they also note that their calculations are likely to underestimate the contribution of women, due to their high involvement in invisible economic activity not captured by the System of National Accounts (SNA). In fact, women make up for approximately 60% of the informal labor force in SSA, and it is estimated that 66% of female activities in developing countries are not captured by the SNA, compared with only 24% of male activities. Moreover, 84% of non-agricultural female workers are informally employed, compared to 63% of men. (ILO, 2002; Blackden and Sudharshan, 2003) All this can be said to make women an important part of the hidden growth reserve in Africa, highlighting their need for financial access.

Finally, when discussing the role of women, it must be pointed out that while women play significant economic roles in many developing countries, according to UNIFEM (2010) they also bear a "disproportionate burden of the world's poverty". In many third world countries women face more poverty and hunger because of their systematic discrimination in education, health care, employment and control of assets. According to some estimates, women represent up to 70% of the world's poor (UNIFEM, 2010). They are often paid less than men for their work and face persistent discrimination when they apply for credit for business or self-employment. Women are also concentrated in insecure, unsafe and low-wage professions. Eight out of ten women workers are considered to be in vulnerable employment in sub-Saharan Africa and South Asia. (UNIFEM, 2010) Due to the impacts of the recent economic crisis, their situation is even worse. The International Labor Organization (ILO, 2009) estimates that the financial crisis in 2008 led to up to 22 million women to lose their jobs in 2009. The need to improve the female status in developing countries can be considered urgent.

3. Financial institutions in developing countries

3.1 Formal financial institutions

By definition, formal financial institutions consist mainly of traditional banks acting under the supervision and regulation of a central bank or an equivalent regulatory agency. They often control

a network of branches and offer a wide range of financial services. In third world countries however, they tend to suffer from technological backwardness and unstable oligopolistic competitive situations. (Bhattacharya et al., 1997) In fact, when it comes to the developing countries, the formal financial sector is often characteristically undeveloped and only serves a fraction of the population.

As discussed in the context of credit market functioning in section 2.2, the problems faced by the formal financial institutions are to a great extent due to the information asymmetries in credit markets and poor people's lack of collateral. However, the deficiencies in the formal sector's outreach involve more. In their survey of 209 banks from 62 developing countries Beck, Demirgüç-Kunt and Martinez (2008) find various barriers to outreach, including minimum account and loan balances, loan fees, and required documents. They also discover strong associations between barriers to outreach and measures of restrictions on bank activities, bank disclosure practices and media freedom, as well as the development of physical infrastructure. Furthermore, they find that government-owned banks tend to impose more barriers on financial services, while the barriers are lower in the presence of international competition and in the case of larger banks.

The undeveloped financial markets in developing countries have a tendency to attract foreign entrants, as the uncompetitive formal banking sector and more limited regulation are often seen as incentives for foreign financial institutions to enter the market. (Bhattacharya et al., 1997) While international competition can be seen as to lower barriers to outreach (Beck et al., 2008), there also exist several potential risks related to it, some perhaps more founded than others. One of the most feared outcomes is that allowing entrance of foreign banks to the developing financial markets may reduce the customer base of local banks, as the clientele may perceive the large, foreign financial institutions as more reliable than smaller, domestic counterparts. This infant industry argument for protecting developing domestic financial markets is used by for example Stiglitz (1993, cited in Bhattacharya, 1994): "there is sufficient learning-by-doing… in an industry as complex as the financial sector", and has been adopted by politicians in many developing countries. Other common fears include the fear of capital flight and unhealthy competition (Bhattacharya, 1994).

As it is for today, the potential gains from global financial integration seem to have won ground over the fears, and the tide is towards the integration of developing economies into the world financial system. Schmukler (2004) points out however, that in order for successful integration to take place, the economic fundamentals need to be and remain strong. In many third world countries, this is not the case, and the undeveloped character of the formal financial sector may have serious

consequences in terms of overall economic development. Knight (1998) argues that an imperfectly competitive banking system may respond to adverse shocks in ways that worsen their impact, and that in the era of financial globalization this could induce negative macroeconomic feedback. Thus, in order to benefit from the growth potential in developing and transition economies, the problems related to financial system soundness must first be addressed (Knight, 1998). This relates to the view of financial access as a perquisite for development, and also gives the developed economies a stake at the design of inclusive financial systems in the third world.

3.2 Semiformal financial institutions

By the general definition, semiformal financial institutions are registered and thus subject to the regulations concerning financial institutions, while they still remain largely unsupervised by the main financial regulator (Helms, 2006). At the core of semiformal finance, microfinance institutions claim to effectively solve the problems related to information asymmetries in credit markets relying on the innovations of group lending and dynamic incentives.

The microfinance movement has its roots further than most would imagine. The Irish Loan Fund system in the 1700's is widely known as one of the first formal microfinance institutions, but savings clubs and credit groups operating by various names around the world have provided financial services for centuries (Helms, 2006). In the 1800's, various types of larger and more formal savings and credit institutions were born in Europe. The emerging institutions were known as People's Banks, Credit Unions, and Savings and Credit Co-operatives, and were primarily organized among the poorest segments of urban and rural societies. Adaptations of these models began to appear in the Latin America in the 1900's. Microcredit institutions, referring to experimental programs allowing groups of poor women to invest in micro-businesses, were born in the 1970's. Early pioneers included the Nobel Prize winning Grameen Bank in Bangladesh, ACCION International from Latin America, and the Self-Employed Women's Association Bank in India. The movement spread fast, and in the early 1990's the term "microcredit" was substituted by microfinance so as to also account for savings and other financial services.

As for today, the borders between microfinance institutions and larger financial systems are starting to blur, as commercial banks are entering the field, and an increasing emphasis is placed upon inclusive financial systems around the world. (Helms, 2006) Bringing banking services to rural clients has been identified as one of the biggest challenges in the quest for broader financial inclusion, and many believe semiformal institutions can be considered especially successful in this aspect. In some developing countries, the microfinance institutions have developed into dominant,

regulated finance providers, which hold more accounts than banks, and serve a broader range of customers in a wider geographic area. (CGAP, 2009) In the following sections I will discuss the mechanisms behind the provision of microcredit in more detail, concentrating on the functioning of group lending and dynamic incentives.

3.2.1 Group lending

Group lending is believed to be one of the most significant innovations in developmental economics (Guttman, 2006). Armedáriz and Morduch (2010) define group lending as "arrangements by individuals without collateral who get together and form groups with the aim of obtaining loans from a lender." Todaro (2000) remarks that the idea behind group lending schemes is in fact very simple: the group allocates the funds to its members, who are responsible of repaying to the group, while the group itself guarantees the loan to the outside lender. By joining together a group of small borrowers can reduce the costs of lending and gain access to credit capital.

In a detailed study, Ghatak and Guinnane (1999) describe the basic functioning of perhaps the most famous example of a group lending institution, the Nobel Peace Prize winning Grameen Bank of Bangladesh:

> "The Grameen Bank borrowers organize themselves into groups of five people. Due to social norms, men and women are in different groups, and all members must be from the same village. After the group is formed, they receive training from a Bank employee, and begin weekly meetings. In these meetings, the members are required to make small savings deposits. Several weeks after later, the first two members receive a small loan. If these initial borrowers make their required weekly payments and if the group binds to the rules of Grameen Bank, two next members receive loans, and finally the last one. If one of the group members defaults, the group is responsible of paying back the loan. If the loan is not paid back, all members of the group are ineligible for Grameen Bank credit in the future. In addition, the loan sizes will increase progressively over the years only given that the group fulfills its duties."

There are several factors, which make this model successful and thus widely replicated around the world. The weekly meetings offer convenience to the villagers as the bank comes to them, and reduce the transaction costs of the bank by dealing with multiple transactions at once. The self-selection of the groups helps to overcome the problem of adverse selection, and the social pressure, public payments, and peer monitoring due to the joint liability contract, mitigate moral hazard. The

fact that all members come from the same village emphasizes this. Dynamic incentives – created by the non-refinancing threat and loss of future, increasing credit – have also a major impact on the success of the model. Some say they may be even enough on their own (Guttman, 2008).

While successful, group lending only represents one form of microfinance today. Also, as the field is constantly evolving, various schemes exist within group lending itself. Even the Grameen Classic System has been modified, as Mr. Yunus himself saw the original model as "inflexible and consisting of a set of standardized rules where no departure from these rules was allowed" (Yunus, 2002). Further examples of group lending schemes used around the world include the "solidarity group" approach of Bolivia's Banco Sol and the "village bank" approach used by 70 countries in Africa, Latin America and Asia. As their name suggests, these approaches may involve entire villages. (Armendáriz and Morduch, 2010) While the groups differ in many ways, the basic mechanisms remain the same. Following, I will examine these mechanisms behind the mitigation of information asymmetries through group lending in more detail. Mathematical examples can be found in Appendices 2a – 2c.

The mitigation of adverse selection by group lending happens through a process called assortative matching. The mechanism was first demonstrated by Ghatak (1999, 2000) and van Tassel (1999), who claim that group lending can solve the hidden information problem by taking advantage of the information the villagers have about each other, benefitting from the tight-knit communities in which the poor often live. When allowed to form their own groups, the poor will sort themselves into "risky" and "safe" borrowers, thus overcoming the adverse selection problem (Ghatak, 1999, 2000; van Tassel, 1999). According to Ghatak (1999), the borrowers' self-selection of groups leads to differential expected costs of borrowing depending on the borrower's type. In brief, safe borrowers will be willing to pay more than risky borrowers to have safe borrowers as their fellow group members (Guttman, 2008). In this way they reduce the probability of having to pay for a defaulting group member. While all borrowers face the exact same interest rates and contracts, safe borrowers will pay lower effective interest rates, since their expected costs, including repaying for defaulting group members, are lower (Battacharya et al. 2008). For a mathematical demonstration of assortative matching, please see Appendix 2a.

Despite the undeniable value of the assortative matching model, the latest research also points out some limitations. Firstly, Guttman (2008) claims positive assortative matching does not necessarily hold in the presence of dynamic incentives, underlining the importance of the refinancing threat. If the group defaults, each member loses the opportunity to borrow in the future. Shortly to be

discussed, the refinancing threat plays an important role in the functioning of many semiformal lending schemes. Further, Banerjee et al (1994) point out that the assortative matching model does not account for risk aversion: if a borrower would be risk averse, he would not participate in a joint liability contract implying unlimited liability of the other group member's debts. This would undermine the basic assumptions of assortative matching.

Lastly, contrarian to the previous research, Armendáriz and Gollier (2000) claim that assortative matching is not required at all in order for group lending to work. Although it no longer achieves the optimum result, group lending is found to improve efficiency even in the absence of borrower's information about each other, that is, in the absence of assortative matching. Armendáriz and Gollier (2000) base their assumption on the collateral effect, i.e. the fact that when the upper tail of the revenue distribution for risky borrowers is higher than the upper tail of the revenue distribution for safe borrowers, group lending reduces the extent to which risky borrowers can take advantage - via the equilibrium interest rate - of the safe borrowers' participation to the credit market. While an interesting argument, Cassar (2007) points out that the model by Armendáriz and Gollier (2000) is highly sensitive to assumptions about borrower returns.

When it comes to the mitigation of moral hazard, it must be first noted that the problem in a group lending situation differs largely from that of an individual lending event. In short, in a group lending situation the individuals engage in common risk sharing, under conditions in which their privately taken actions affect the probability distribution of the outcome for the entire group (Abbink et al, 2006). As demonstrated in chapter 2.2, the problems caused by moral hazard to credit provision in developing countries are related to the lack of collateral. The mitigation of this problem is based on the joint liability and strong social ties the villagers have. Cassar et al (2007) find that when jointly liable, the social ties generate trust that each member will contribute, and thus induce an incentive for all group members to repay. Thus, in the absence of physical assets, the social pressure and threat of social sanctions in effect act as collateral, making default more costly to the borrower (Battacharya et al., 2008).

The success of the group lending scheme is largely dependent on peer monitoring. In his pioneering work, Stiglitz (1990) demonstrates that through peer monitoring the bank can transfer the inherent risk related to the borrower to the cosigner of the contract. He also shows that the transfer of risk induces an increase in the borrowers' welfare. For mathematical examples of the mitigation of both ex-ante and ex-post moral hazard through peer monitoring, please see Appendix 2b.

An interesting point related to peer monitoring is the nature of social sanctions. In Stiglitz's model (1990), the social sanctions, which enforce the individual to maximize the group benefit, are costless. Given the threat of social sanctions, no members will shirk, and thus the sanctions need not to be executed, which justifies the assumption of their cost being zero. On the other hand, the threat of social sanctions adds to the incentive of taking on a safe investment in the first place. Through these mechanisms both ex-ante and ex-post moral hazards can be mitigated.

In an alternative model, Wydick (2001) includes the sanctions in the form of group expulsion as a credible threat. In his model social sanctions are an endogenous variable that constitutes a part of the equilibrium strategy for the borrower. Given a sufficiently low level of peer monitoring, the group might exclude a member even though risky behavior did not take place. However, in a high-information environment, this would be unlikely to be the case.

Armendáriz (1999) points out that the resulting benefits of peer monitoring should be always weighed against the monitoring costs. For a correct evaluation, the benefits must be viewed as dependent on the correlation of risks within the group. When positively correlated, the risks enhance the incentive to monitor. This is often the case especially in rural areas, where investment returns across agriculture tend to be similar. Akin Armendáriz's (1999) claims, Banerjee et al (1994) find that peer monitoring in rural areas is in fact more efficient than in urban circumstances. This is also due to the costs of monitoring being higher in the city, where people tend to disappear their way during the day and contacts between group members may be less frequent. In addition, projects for which loans are made in urban areas are often not as publicly visible as for example agricultural investments. Finally, consistent with Armendáriz (1999) and Banerjee et al (1994), Gangopadhyay et al (2005) criticize the necessity of the assumption that borrowers live close to one another and that they have more information about each other than the lender. In many circumstances this is not the case, and factors such as the positive correlation of risks become more important.

To conclude, while the details remain widely discussed, there seems to exist consensus about the basic mechanisms behind mitigation of adverse selection as well as ex-ante and ex-post moral hazard through group lending. However, it should be pointed out that due to circumstantial differences, successful institutions, such as the Grameen Bank, cannot be simply transplanted from one environment to another (Gangopadhyay et al., 2005). Group lending is also not the only alternative.

3.2.2 Dynamic Incentives

As for today, many microfinance institutions also exercise individual lending schemes. Even without joint liability, assortative matching or peer monitoring, semiformal institutions are able to create incentives for borrowers to repay. This is to a large extent reliant on the invention of dynamic incentives, which can be divided into two distinct mechanisms: defaulting borrowers are denied future loans, and on the other hand, the size of the loans may be gradually increased as the borrower demonstrates reliability. (Armendáriz and Morduch, 2010) A mathematical example of the functioning of dynamic incentives is provided in Appendix 2c.

Dynamic incentives themselves are not a new concept. Aleem (1990) finds evidence of moneylenders relying mainly on non-refinancing threats, supported by two devices for debt repayment: close client relationships, and ensuring clients do not borrow from other sources. These make the threat of denying future credit a powerful tool. In the case of semiformal institutions, perhaps the most important precondition for the functioning of dynamic incentives is the credibility of the lending institution. This applies both for the non-refinancing threat and the gradually increased loan sizes. The borrowers must believe that by defaulting they are denied future loans, and that on the other hand, that the institution is in fact able to increase their loan sizes in the future.

This puts high emphasis on maintaining stability. Bond and Rai (2002) for example find that default rates for an Ecuadorian microfinance institution rose significantly when the institution faced speculations about an organizational financial crisis. Also, while desirable in most economic contexts, competition may significantly deteriorate dynamic incentives: multiple sources of loans reduce the power of a single lender to impose non-refinancing threats. In the long run, this will impact their financial ability to increase the size of the loans. (Armendáriz and Morduch, 2010)

While increasingly popular, the role of dynamic incentives is sometimes debated. It is acknowledged that the mechanism relies on the fact that the borrowers are assumed to request external financing also in the future. As Bond and Krishnamurty (2001) point out, this may not always be the case. In countries in which economic planning in terms of long-term investments is not the norm, the fundamentals behind dynamic incentives are often undermined. As in the case of group lending, this emphasizes the importance of circumstantial differences when it comes to the provision of semiformal financial services.

3.3 Informal financial institutions

Informal financial institutions constitute perhaps the oldest form of financial transactions, and are generally considered a mine of lessons for the semiformal financial sector (Schreiner, 2000). Having been around for so long, they can be found on almost every continent, by different names and in different forms. As stated before, the focus of this thesis is on the communal forms of informal finance, in which people join together for mutual support – "to lend to, save with, and insure each other" (Roodman, 2010). Similar to semi-formal groups, typically the members know one another and come from similar situations in life, and most often share geographical proximity. The social communities and thus the mechanisms of informal credit intermediation are then effectively based on mutual trust, interdependence, and peer pressure. To differentiate these self-formed groups from the semiformal group lending, in the informal groups all members and parties of the transaction are clients as well as providers. (Roodman, 2010)

Vast research (e.g. Ardener and Burman, 1995; Bouman 1995 and Graham, 1992) points out to six virtues of informal finance: low transaction costs, supply of savings and insurance in addition to loans, sensitivity to constraints faced by women, confidence in place of physical collateral, socially enforced contracts, and sequences of repeated transactions. As one can see, many of these are lessons semiformal finance draws upon.

However, academics also conclude informal finance falls short of formal and semi-formal systems in various ways (Schreiner, 2000). Chirstensen (1993) summarizes informal finance weaknesses as follows: no deposit insurance, no large or long loans and finally, no legal systems to enforce contracts. With the availability of capital being entirely dependent upon the group itself, it faces certain limitations, while the positive correlation of risks discussed in the context of semiformal financing may have even more serious consequences for informal groups. The simplicity of informal finance thus also results in its biggest weakness, rigidity. Yet its importance in developing economies ought not to go unnoticed.

3.3.1 Rotating Savings and Credit Associations

Perhaps the most universal form of communal informal finance is the Rotating Savings and Credit Association (ROSCA) – known as *tanda* in Mexico, *susu* in Ghana and *chits* in India (Smets, 2000). Bouman (1995) finds an exceptionally high participation rate in these associations around the world. This ranges from 50 to 95 percent of the adult population in the Republic of Congo, Cameroon, Gambia, and villages of Liberia, Ivory Coast, Togo, and Nigeria.

The basic ROSCA model relies on every member of the group contributing a fixed sum into a common pot on a regular basis. This pot is then allotted in part or whole to each participant at a time, until all participants have had their turn. The distribution may take place in many ways such as lottery, auction, seniority, negotiation or consensus. For a participant who receives the pot early in the cycle, the ROSCA resembles a loan – he receives a large payout and then must steadily pay back in. On the other hand, for those, who come last, the ROSCA is a savings account. (Armendáriz and Morduch, 2010; Smets, 2000) In their seminal contribution, Besley, Coate, and Loury (1993) argue that, on average, ROSCAs allow individuals to receive the pot, and hence make the desired purchase or investment, earlier than through individual savings.

Interestingly, there also exists evidence for participation in ROSCAs based on demand for savings and not provision of loans. Anderson and Baland (2002) find that women favor ROSCAs since they help them keep the money out of the house, while Rutherford (1997) notes the most common reason for participating in ROSCAs among slum dwellers in Dhaka was to save. Further evidence is provided by Gugerty (2003), who surveys ROSCA participants in Western Kenya, finding support for saving commitments as a primary motive to join ROSCAs.

Characteristic to informal finance, ROSCAs have one major advantage: simplicity. They are easy to understand; the cycle has a clear beginning and a distinct end. They are transparent in operations, and no shared funds are accumulated under a single person's care, which effectively mitigates fraud. The day the funds are collected, they are also distributed. However, despite its beauty, the simple structure also results in inflexibility. As noted earlier, problems may arise when the financial needs and abilities of the group members are correlated, and this is the case in most ROSCA groups. The majority of ROSCAs are very local institutions, indicating that needs arising from the external environment, such as a bad harvest season, impact all group members simultaneously. Furthermore, while ROSCAs put the money in a community to good use, they do not offer ways to move resources across independent communities.

The rigidity has given rise to new forms of informal financing, including bidding processes for allotment and complicated arrangements, such as burial clubs. Another well-known form of informal finance is the Accumulating Savings and Credit Association (ASCA), which is to a great extent similar to a ROSCA, but instead of distributing the pot immediately, saves it for later on. (Armendáriz and Morduch, 2010) For a mathematical example of the functioning of ROSCAs, please see Appendix 3.

4. Female access to finance in developing countries

4.1 Constrained access to formal financial institutions

There exist several reasons to why it is commonly believed that women are more credit constrained than men in the third world. These reasons can be roughly divided on economic, social and cultural grounds, and are more broadly connected to the general status of women in the developing world; in their societies and in their homes. As by the latter, an important aspect related to female financial access deals with intra-household decision-making processes.

4.1.2 Economic, social and cultural reasons

According to UN estimates women represent up to 70% of the world's poor (UNIFEM, 2010). As touched upon in the context of women's role in developing countries in section 2.3, they lag behind in many key indicators of economic development, and face significantly more social, legal, and economic obstacles (Strauss and Beegle, 1996). UNICEF (2007) estimates women perform 66 % of the world's work and produce 50 % of the food, but earn only 10 % of the income and own just 1 % of the world property. These figures relate to two issues, which form basis of women's economic constraints to credit: female access to formal labor markets, and the question of land rights in developing countries. As we will see, these economic constraints relate the female access to credit directly to the Stiglitz and Weiss (1981) model of information asymmetries in credit markets.

The question of land rights is closely related to women's lack of assets valuable enough to act as collateral. In many developing countries, women have been traditionally denied access to land ownership, often based on religious and cultural reasons. While the situation has somewhat improved, challenges remain. Even in countries, where the national legislation guarantees women's land rights, the good intentions have not translated into reality. One example is Madagascar, where women's right to land is guaranteed in the Constitution and the Civil Code. Yet, although 83 % of employed women work in agriculture, they own just 15 % of small landholdings. (UNIFEM, 2010) The question of land rights and the resulting lack of collateral thus remains a significant factor limiting the female access to credit.

When it comes to work, women are assigned to most of the housework and family responsibilities, and thus lack financial compensation for their contribution. Lack of permanent income is an obvious obstacle for access to credit, but it has also a major impact on the women's position in intra-household bargaining: where women have no income, they have less to say (UNIFEM, 2010). This in turn affects the role women play in the economy as a whole. The situation can be seen as an

interaction between the household and market economy (Elson and Evers, 1997). This will be discussed in more detail in the following section dealing with household decision-making processes, a model relating financial access more directly to the women's status in the society.

The economic issues are accompanied by various social and cultural factors. Illiteracy is especially high among rural women (Rau, 2004) and although globally the gender parity in secondary school enrolment has improved in countries, which have taken reforms to abolish school fees, problems remain. What is particularly noteworthy in the Eastern and Southern Africa is the region's dilemma of demand versus availability, which creates significant challenges when it comes to the quality of education (UNICEF, 2005). Furthermore, while the net enrolment/attendance ratios have improved, the rates for secondary school enrolment in sub-Saharan Africa and South and West Asia remain low (UNIFEM, 2010). The illiteracy of the clientele requires special skills from employees of formal institutions, which they often lack (Rau, 2004).

	Gender Parity Index	Primary Net Enrolment/ Attendance Ratio
Botswana	1,05	81,10
Kenya	1,02	70,20
Lesotho	1,08	84,70
Madagascar	1,01	69,00
Malawi	1,00	81,50
Mauritius	1,02	99,20
Namibia	1,07	78,40
Rwanda	1,03	84,30
Seychelles	1,00	94,80
South Africa	1,02	93,90
Swaziland	1,01	77,00
Tanzania	1,00	54,40
Uganda	1,01	78,90
Zimbabwe	1,01	80,50

Source: UNICEF, 2005 quoted in UNIFEM, 2010

Table 1 Gender parity in primary education

To go further, women's access to financial services may be more limited due to simple physical barriers. For example, women's transportation needs are often more complex than those of men (Barwell, 1996), which given the poor infrastructure and branch outreach, makes their access to financial services more limited. Finally, religious reasons might prohibit female access to finance. For example in Muslim countries, religious restrictions often prevent women from seeking credit, or only allow them to take on credit with the co-signing of their husband, father or son (Rau, 2004).

4.1.2 Household decision-making processes

Household decision-making is a theme, which captures many of the problems related to the financial situation of women in developing countries. One of the key insights of gender analysis has been that the market and household economies co-exist and are interdependent – the potential for supply response and the impact of economic policies are in the end mediated and determined through the interactions of these two economies. (Blackden and Sudharshan, 2003) In order to understand the mechanisms behind intra-household resource allocation, one must begin with the traditional neoclassical approach.

The neoclassical approach views the household as a single unit. Becker (1981) argues that male and female preferences can be aggregated into a single household objective function, in which individual preferences are compiled with fixed weights to determine the household level of welfare. This welfare function is subject to several constraints, such as time use, technology and resources. The final welfare will be maximized by finding the optimal allocations of resources and investments. In the Becker model all household resources are pooled, so while the source of income matters, the intra-household distribution of resources is irrelevant. As it follows, the criticism of the model is mostly related to the absence of household dynamics. Rogers and Scholssman (1990) note that the unified approach by Becker does little to address the interpersonal relations through which the household utility function emerges. Strauss and Beegle (1996) go even further, claiming that Becker model treats decision-making as a mere black box.

In order to pay more attention to the composition of the utility function, the income maximization or investment model builds further on the unitary approach to household decision-making. In this model, the common objective of the household is to dedicate resources to maximize the household income. As men often have a comparative advantage in labor markets, they should devote more of their time to working outside the house, whereas women are should respectively dedicate themselves to unpaid household work. As a more reliable source of future income for their aging parents, this would effectively mean male children were favored over females when it comes to investments such as education, or even nutrition.

This conclusion is supported by vast empirical evidence and has also received significant attention in the recent public discussion: “why do boys go to school more often than girls, and what are the patterns which have led to millions of baby girls missing in China?” (The Economist, 2010) In terms of academic research, Strauss and Beegle (1996) are among the many who conclude that in intra-household resource allocation men are in fact often favored over women. Behrman (1998)

shows that households in rural India become more egalitarian in surplus seasons, while in the lean seasons they tend to allocate more resources to household members with the highest earning potential and the pro-male bias is more severe. Early evidence on similar patterns dates back to 1982, when Rozenweig and Schultz found that survival probabilities of female infants were higher in areas of rural India where women's job opportunities were greater. This relates the model to women's constrained access to the labor markets, and supports the argument that parents are forced to invest in children with highest earning potential. Creating employment possibilities for women should thus constitute a top priority in international developmental agenda.

Related to the women's limited access to formal labor markets and their resulting demand for self-employment, the demand for credit among women is often estimated to be higher than among men. With limited access to paid work, women value self-employment more, and thus request more funds (Emran et al., 2007). On the other hand, as discussed previously, it has been also pointed out that women might assign to credit systems in non-banking institutions for saving purposes. This could be also related to their subordinate position in household decision making processes. Goetz and Gulpta (1996) find that women might commit to microcredit programs not necessarily in order to gain access to credit, but in order to keep the earned money away from their husbands. Interestingly, his is similar to findings of women participating in communal forms of informal finance, namely ROSCAs.

4.2 Semiformal institutions' focus on female borrowers

Women make up for 70% of microfinance institution (MFI) clients, and over 83% of the borrowers in the poorest segments of the MFI clientele (Armendarich and Morduc, 2010). The rationale behind MFI targeting women can be roughly divided into a social and developmental agenda, and on the other hand, microfinance institution efficiency. While widely applied, there also exists criticism of the gender bias in semiformal financial institutions.

4.2.1 Social and developmental reasons

The first arguments relate to poverty reduction and gender specific developmental impacts. As stated before, the overrepresentation of women in the poorest segments in the society relates to both their disadvantaged position in the labor markets, as well as their frequent lack of access to collateral. This can be used as an argument supporting the female role in poverty reduction. Going back to the fundamentals, the Solow-Swan growth model gives diminishing returns to labor and capital separately, but constant returns when the two are combined (Solow, 1956). Even though the model is somewhat simplified for the case and unable to take into account factors such as

entrepreneurship or technological progress as sources of growth, the fundamental idea of higher returns to labor when capital is increased can be used to argue for the importance of provision of credit to women, who make up an important part of the labor force, but are more capital deprived.

Furthermore, the overall developmental impacts of lending to women have been estimated to be larger than those of lending to men (eg. Khandker, 2005; The World Bank 2008). According to Blackden and Sudharshan (2003) gender inequality directly and indirectly significantly limits economic growth in Africa, where women are likely to invest more in household durable goods and the education of their children, while men tend to spend more on personal items, such as alcohol and tobacco. And the phenomenon is not unique to Africa. Khandker (2005) finds that while a 100% increase in volume of borrowing by a woman would lead to a 5% increase in the household nonfood expenditure and a 1% increase in the household food consumption, the equivalent numbers for men were just 2% for nonfood expenditure and a negligible change in food consumption. The evidence also shows falling fertility and illiteracy rates in Bolivia and Bangladesh, both of which are countries where microfinance institutions have taken a strong stance in targeting women (Armendáriz and Morduch, 2010). In Brazil, child health was seen to rise more as a result of additional non-labor income is in hands of women than of men, and when measured with respect to survival probabilities, additional income in the hands of a mother was estimated to have a twenty times bigger impact than in the hands of a father. (Thomas, 1990)

While the abovementioned evidence relates mostly to the household level, women are also believed to have a larger impact on the level of society. Chattopadhyay and Duflo (2004) find that women as policy makers tend to be more biased towards provision of public goods to help families and communities than men. The evidence has also led to a wider, general awareness of the role of women in national development. For example, UNIFEM (2010) claims that without the recognition of women in aid delivery, developmental aid is left relatively more ineffective.

A second line of arguments in the social and developmental agenda is based on the promotion of gender equality. Going back to the bargaining model of intra-household decision-making, it is argued that the situation can be improved by changing the economic status of women in the household. According to the investment theory of household resource allocation, men are favored over women because of their higher earning potential. Although plenty of evidence exists to support this theory, the model says little about the actual bargaining, which makes for the intra-household decision-making processes.

Based on models describing household choices, economists have found household decision-making to rely on inequalities, negotiation and conflict. For example Folbre (1984) views household resource allocation as an outcome of a bargaining process among household members. This would suggest that when adult females have higher earning capabilities, they have more bargaining power and are thus able to allocate more resources to female infants. Related to higher earning potential and power, Browning and Chiappori (1998) present a model in which bargaining power is derived from the women's ability to credibly threaten to leave the household. This can be again related back to the importance of financial access. With increased employment opportunities and income, women are more able to credibly threaten to leave the household and thus possess more bargaining power in the decision-making process. This is argued to change the decision-making patterns to the favor of women, and female children. And finally, through household level impact, improved financial access can be seen as to impact the overall status of women in the society. (Armendáriz and Morduch, 2010)

Looking at the issue from another perspective, Behrman, Pollak and Taubman (1982) represent another model in which the parents intrinsically care about their children, instead of viewing them only as an investment opportunity as is by Becker (1981). In the Behrman, Pollak and Taubman (1982) model of utility maximization, both preferences and market opportunities impact the resource allocations. The model has been used to identify systematic gender differences in human capital allocation, i.e. the pro-male bias suggested by Rosenzweig and Schultz (1982) in rural India. Another similar model is the one presented by Strauss and Beegle (1996), who in addition make an interesting point about not all intra-household decisions being conflicting by nature. For example, high female child mortality rates and the better schooling of boys might be the results of joint decisions of resource allocation by mothers and fathers based on the better working opportunities of men or the more costly raising of women. The last point can be yet again used to emphasize the need for female access to credit. Given the improved opportunities for employment through entrepreneurship and self-employment, the pro-male bias in intra-household resource allocation would be mitigated despite the exact mechanism related to the bargaining process.

4.2.2 Microfinance institution efficiency

Besides the goals related to poverty reduction and gender equality, the focus on female clients is made more attractive to microfinance institutions by the reported repayment rates by women. In here, the women's limited access to credit often works in the lender's advantage. The credit constraints of women relative to men will make them more likely to select themselves into the

microcredit programs with different kinds of strings attached, ranging from weekly meetings to joint responsibility. This enhances dynamic incentives and reduces both ex-ante and ex-post moral hazard. (Armendáriz and Morduch, 2010)

The better female repayment rates have inspired a number of studies. For example, the average loan recovery rate for Grameen bank female borrowers is currently around 97.2% (Grameen Bank, 2010). Meanwhile, research has shown that 15.3% of Grameen Bank male borrowers face difficulties in loan repayments, while only 1.3% female borrowers struggle with paying back their loans (Khandker et al., 1995). However, in this case it should be pointed out that the low ratio of male clients, 3% as reported by Grameen Bank in October 2010, may influence the share of male borrowers with difficulties in a negative way. This happens through a selection bias: men who are considered to be too risky as borrowers by formal financial institutions might be more likely to apply for credit from a semi-formal institution.

Furthermore, in Guatemala, women were found to misuse their funds less often than men (Kevane, 2001), and a similar pattern could be seen in Southern Mexico (Armendáriz and Roome, 2008). These results are also supported by various studies. Using a sample of 1,140,000 contracts from a Maghrebian microfinance institution over ten years, Marrez and Schmit (2009) find that the loss rates are higher for the male population than the female population. They also show that the difference is due to the lower probability of female clients to default, while the repayment rates of the two genders are equal. This can be related back to the Grameen bank observations.

Finally, Emran et al. (2007) find that due to their more limited mobility, women are easier to monitor. Women tend to often work near home or at home, which significantly reduces the costs of monitoring them compared to men. Lower mobility also reduces the incidence of strategic default, as women are more fearful about social sanctions. A related point is the female risk aversion, which argued to lead to smaller capital gains (Roodman and Morduch, 2009). This will be discussed in more detail the next section related to the criticism the gender bias in microfinance has received.

4.2.3 Criticism of the gender bias in microfinance

The profitability of lending to women as well as the bigger impacts in terms of poverty reduction and gender equality have been questioned by a new wave of research. Recent empirical evidence indicates significantly higher returns to investment for male-owned enterprise and points out that the positive repayment effect resulting from a conscious gender bias might be offset by other associated factors, such as the higher costs related to the smaller loans (D'Espallier, Guérin and

Mersland, 2009). Moreover, the latest research poses a question about the true impacts of a gender bias on intra-household relations, pointing out that focusing on women is also related to negative outcomes (Mayoux, 2006). In fact, the researchers today already talk of "second generation" of microfinance (Karlan and Zinman, 2009). For the new generation of microfinance institutions the focus on women is inefficient as well as unprofitable. To avoid problems and enhance efficiency, they prefer mixed groups in lending, basing their position on a variety of arguments.

To begin, Roodman and Morduch (2009) question the causal link in Khandker's (2005) theory of borrowing to women increasing the household welfare more than borrowing to men, pointing out that females tend to yield lower returns on investment than men. De Mel et al. (2009) show similar results for female run microenterprise in Sri Lanka, and moreover, Karlan and Zinman (2009) demonstrate the same phenomenon in the Philippines.

Furthermore, although meaning well, some argue that microcredit may have even negative consequences for women (Mayoux, 2006). It has been shown to increase intra-household conflicts, inequality and even violence against women (UNESCAP, 2007). Threatened by the changes in intra-household dynamics, men might react aggressively to microfinance schemes. The literature review for the Office of Development Effectiveness and Gender Based Violence Evaluation (AusAID, 2008) picks up on this point: "although micro-credit strengthens women's ability to stand up to family violence, in some cases it has increased violence against women and family break-ups". Other possible negative gender impacts relate to the spending of funds after women have been granted them. Goetz and Gupta (1996) find that of 40% of women, who had been given microcredit, lacked control over their loans in the end of the day. If the intra-household decision-making doesn't radically change, the expenditure decisions might also continue to prioritize men and male children. This would reinforce the negative gender bias. Furthermore, the responsibility of women to repay loans may absolve men of responsibility for the household, decreasing the overall level of household welfare. (AusAID, 2008)

Adopting another perspective, Mumtaz (2000) blames the microfinance institutions of taking advantage of the women's lower status in the household. To give loans to women because recovery is easier equals exploiting the structural disadvantage that confines women to their homes. Rather than taking advantage of women's condition, one should look for ways to overcome these obstacles. If women's development is the goal, recovery cannot be prioritized at the cost of continuing the subordination of the "target group". (Mumtaz, 2000)

Finally, Bauchet and Morduch (2010) find a negative correlation between operational self-sufficiency, profitability and percentage of female clients served. Due to the conflicting relationship between commercial transformation of the MFI, and focus on women, the percentage of female clients fallen for certain institutions (Frank, 2008). This is widely referred to as the mission drift, which is one of the most discussed topics in the field of microfinance today. At the present, 85% of non-governmental organizations cater women, while only 66% of MFI target female clients (Cull et al., 2009). Whether the direction is right or wrong, is subject to intense debate, but despite criticism, gender focus seems to hold as the dominant strategy of microfinance institutions. The social and developmental arguments, higher repayment rates, and the increasing interest in women from the donor and investor side, still cause many microfinance institutions to seek "the double bottom line", yielding both financial and social returns.

4.3 Female tendency to communal informal finance

Due to the self-determined character of informal financial institutions, it is somewhat more difficult to determine role of women in informal financial arrangements such as ROSCAS. Unregulated and unsupervised, their size may vary from a handful of individuals to several hundred people, and their members may be all women, all men, or a mixture of both (Baydas et. al,1993). However, due to the reasons of more limited female access to finance discussed in section 4.1, it is often assumed that women have a higher demand for informal forms of finance than men (Armendáriz and Morduch, 2010).

Empirical evidence seems to support this. Anderson and Baland (2002) find an overwhelming 84 percent of the ROSCA participants in the slums of Nairobi to be women. Their detailed evidence thus suggests most ROSCAs are predominantly composed of women, particularly those living in a couple and earning an independent income. This relates to the household decision-making processes discussed earlier, as well as to the demand for ROSCAS in terms of saving purposes. Mayoux and Anand (1995), among others, argue that ROSCAs "play an important role in increasing women's control over resources which they can use to increase assets in the family".

However, the tendency of women to participate in communal forms of informal finance is not only limited to poor women, who have no other financial alternatives or ways of keeping the money out of the reach of their male relatives or husbands. Examining forms of informal financial sector in Egypt, Baydas et al. find a "bazaar of informal financial arrangements" among women, even in the presence and access to formal banking services. This supports the social and cultural rationale

behind female tendency to form informal financial groups as discussed by for example Anderson and Baland (2002).

Somewhat contrarian evidence is provided by findings by researchers such as Thomas (1989), who find that while women may have a higher tendency to form ROSCAs of a relatively small size, men are more likely to participate in high-budget rotating-credit-associations. Nevertheless, the majority of evidence from ROSCAs in sub-Saharan Africa seems to point at the direction of a higher female participation in communal forms of informal finance.

5. Basis for the empirical analysis

5.1 Introduction to Uganda

Uganda is an interesting case country for an empirical study, as it has a relatively diverse financial sector considering its low level of overall development (Heikkilä, Kalmi and Ruuskanen, 2009). Within its almost 241,000 km^2 and a population of 32.3 billion, Unganda embraces various different regions with different levels of economic and social development, political systems, ethnic groups, religions and cultures (CIA Fact Book, 2010).

5.1.1 Economic and political situation

After several decades of civil war and economic mismanagement, Uganda began to rehabilitate its economic infrastructure and restore macroeconomic stability in 1987. Since 1987 the Ugandan economy experienced varying growth rates, with an average GDP growth rate of 7.2% between 1997-2001, 6.8% between 2001-2004, and 8% over the period 2004-2008. (Ingvés and Bio-Tchané, 2003) The estimated average growth rate for the period of 2009-2015 is approximately 6.6% (IMF, 2010). The global economic crisis hurt Uganda's exports, but its growth rate is still relatively strong, thanks to the country's relatively successful dealing with the crisis. For example, the estimated industrial production growth rate was 5.3% in 2009, making Uganda number 24 in country comparison to the world (CIA World Fact Book, 2010). At the current GDP growth rate, the nominal per capita income is projected to increase from USD 506 in 2008-2009 to about USD 850 by 2014-2015. During the same period, the proportion of people living below the poverty line is expected to decline from the level of 31% in 2005-2006 to about 24.5% in 2014-2015 – below the Millenium Development Goal target of 28% (MFU, 2010).

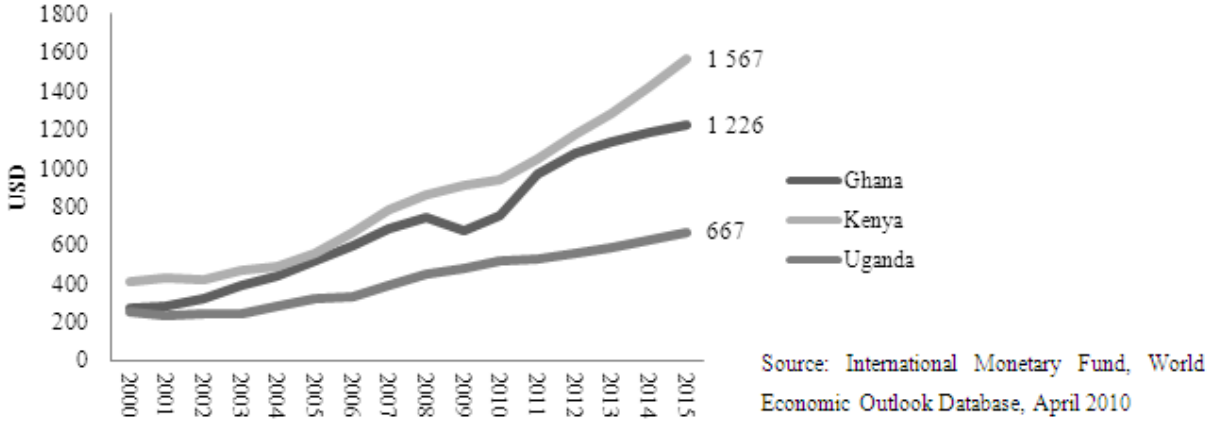

Figure 3 Gross domestic product per capita, current prices

Despite the progress, compared to other economies in Africa and Asia, the size of the economy and the per capita income in Uganda are low. While Uganda's economic performance was at par with that of countries such as Kenya and Ghana even in the early 21st century, these economies have since improved significantly over Uganda's economy. (MFU, 2010) Although Uganda's dealing with the economic crisis could be considered successful, there remains much to be done in order to strengthen and support the fundamentals of economic development in the country.

One of the problems lies in agricultural inefficiency (Benin et al, 2008). The GDP growth has been accompanied with changes in the sectoral composition, reflecting a structural transformation in the economy. Particularly, the share of agriculture has fallen from approximately 34% 2001 to 23% in 2009. However, while the share of agriculture in the GDP has fallen, the share of labor force engaged in agriculture has increased from 75% in 2006 to approximately 82% in 2009 (MFU, 2010; CIA Wrold Factbook, 2010). These trends stem from the low productivity in agriculture, undermining growth potential of the total economy and contributing to issues related to food insecurity (Benin et al, 2008). Still largely dependent on agriculture and characterized by primary production for exports, Uganda is left vulnerable to external shocks, especially to falling commodity prices. (MFU, 2010) This could be seen as to highlight the importance of entrepreneurship in terms of creating non-agricultural employment.

When it comes to the labor situation, 86% of the population in Uganda is self-employed and close to 1.5 million people, that is, nearly 90% of the non-farming population is employed in micro- and small enterprise. (MFU, 2010) This means a significant market potential for microfinance institutions, which are in fact recognized in the governmental economic planning (Ingvés and Bio-Tchané, 2003). The governmental economic recognition could be seen as an important positive

sign, as self-employment has been generally lacking official support in sub-Saharan Africa (Blackden and Sudharshan, 2003).

5.1.2 Financial system in Uganda

The financial system in Uganda can be considered to consist of the formal, semi-formal and informal sectors already discussed in this study. However, even though the financial system can be considered relatively developed (Heikkilä et al., 2009), there remains room for improvement. The Steadman Group's (2009) estimates 42% of the population still relies merely on informal financial sources, and in fact, the indicators of financial depth in Uganda are low both on absolute terms and in comparison to neighboring Kenya, Zambia and Zimbabwe. (MFU, 2010) For example, the bank branch penetration as quoted by the World Bank in 2008 for Uganda was notably low, with 0.53 branches per 100,000 people, compared to 1.38 in Kenya and 3.27 in Zimbabwe (The World Bank, 2008). However, already in 2010 the Steadman Group finds formal financial access for adults to be 21%, while 7% are reported to have access through semiformal institutions. In fact, since 2006, the Ugandan financial sector has developed considerably and at a relatively fast pace.

Most notably, the number of commercial banks has grown from 15 in 2006 to 22 in 2009, while the number of commercial bank branches grew from 301 to 363 in just one year from 2008 to 2009. The outreach has been also improved through the introduction of mobile money services, and there has been a series of mergers and buy-offs of microfinance and deposit institutions, as well as commercial banks. Some micro deposit institutions have been also upgraded to commercial banks. Finally, there has been increased implementation of Village Saving and Loan Associations and Savings and Credit Cooperatives (SACCOs) both by non-governmental organizations and the central government, emphasizing the growing importance of the semiformal financial sector. (Steadman Group, 2010) In fact, the three major government policy documents that drive the national economic agenda (Poverty Eradication and Action Plan, the Program for the Modernization of Agriculture and the Medium-Term Competitiveness Strategy) all include microfinance as an element of development (UMFPED, 2002).

While improving financial access through microfinance is considered one of the pillars contributing to poverty reduction, in their participatory poverty assessment report (2002) the Ugandan Ministry of Financial Planning and Economic Development (UMFPED, 2002) also found out that there exist hardships with available microfinance in Uganda:

> "Women in Nakaloke noted that their poverty is a result of stringent conditions in the available microfinance institutions that prevent them from accessing loans. Women in Nakaloke mentioned that they were aware of micro-finance institutions in Mbale, but these loans were not accessible because of collateral and other attendant processes. The other processes that made loans unpopular included; the time for repayment of loans, the small size of most loans and the fact that investment areas were also not very many in their community. The married women in particular fear accessing loans to start small businesses as their husbands always grab such funds from them."

While semi-formal institutions traditionally overcome the question of collateral through mechanisms of group lending and dynamic incentives, the above quote reflects many other problems generally associated with microfinance. The repayment schedules are often tight, and the loans by definition small. On the other hand, 67% of those holding a loan in Uganda, say they borrow money to meet daily needs (Steadman Group, 2010). While this could be seen as to question the need for large loans, it is still consistent with the problem of few investment opportunities. Finally, the last quote refers to loans ending up at husbands' control despite having been given to women, which is a common finding in many microfinance studies, reflecting the problems related to intra-household resource allocation and gender equality (Mayoux, 2006).

5.1.3 Financial access of women in Uganda

When it comes to differences in usage of financial services by gender, the Steadman Group (2010) finds more men (24%) than women (18%) to use formal financial institutions. On the other hand, they note that a slightly higher proportion of women (8%) than men (7%) use semiformal financial services, and also that more women (43%) than men (41%) use informal financial services. This is consistent with general findings of differences between formal, semiformal and informal institutions provision of financial services to women. However, the group finds no difference in overall borrowing by women and men, even though they do note that use of formal financial institutions for credit is slightly higher among male (5%) than women (4%) and among urban (6%) than rural (4%) borrowers. (Steadman Group, 2010)

Largely thanks to the battle of the women's movements over land rights, Wryod (2008), among others, argues that a new configuration of gender relations is evident in urban Uganda: one that accommodates some aspects of women's rights while retaining previous notions of innate male authority. This could be assumed to have an impact on female financial access, especially assuming that the share of women in possession of collateral would increase. Higher ownership of land could

also result in potential differences in provision of financial services to women in urban and rural areas, as the Steadman Group (2010) reports landownership is generally less common in urban than rural areas. However, one should also remember that borrowing from formal sources per se is more common in urban than rural areas, which leaves the final impact uncertain.

When it comes to the second economic constraint of women, their access to labor markets, it is noted that women in Uganda work from 2 to 10 hours longer days than men, even though their economic compensation is less (Blackden and Sudharshan, 2003). Using data from Ghana and Uganda, Canagarajah et al. (2001) show that women's labor force participation in Uganda increased substantially within a period of 5-6 years in the 1990's. Based on a household level analysis, they point out that non-farm employment is growing, providing many women income and employment. This again places emphasis on female entrepreneurship. Most importantly, Canagarajah et al. (2001) note that the increased female employment has led to decreasing poverty rates and increased wellbeing – supporting the social and developmental agenda of the MFI.

5.2 Data description

The data used for this study was collected as a part of a FinScope survey 2009, addressing questions of demand, access and usage of financial services in Uganda. The study was a follow-up to one conducted in 2006, while similar studies were also carried out in other African countries, namely in Kenya, Tanzania, Rwanda, and Nigeria. An advisory committee was gathered to formulate the questionnaire and oversee project implementation, consisting of representatives from various institutions, including the Bank of Uganda. The fieldwork was conducted by Synovate, and data processing and report writing by the Uganda Bureau of Statistics, Finmark Trust and Uganda Insurances Association. (Steadman Group, 2010)

The study employed face-to-face data collection. A structured questionnaire was used to interview randomly selected respondents of age 16 and above. The field team was trained, and the final version of the questionnaire was translated into seven local languages. The main data collection took place approximately during the two months between November 2009 and January 2010. The major obstacles encountered during collection included the absence of respondents, and refusals to participate. The sample size totaled 3001 respondents, and was distributed between all 56 districts in Uganda, enabling the survey to capture a wide spectrum of demographics and valuable information of the developmental status in different regions. (Steadman Group, 2010)

5.3 Hypotheses setting

As discussed in the previous chapters, as a result of socio-economic reasons, women are considered to be more excluded from the provision of formal credit in developing countries than men. On the other hand, the semiformal banking sector, including NGOs and microfinance institutions, has traditionally explicitly targeted women. Finally, the informal financial sector, defined as communal forms of finance, receives a higher participation by women. Based on these notions, and the analysis of the previous chapters, the following hypotheses were constructed:

Hypothesis 1. It is significantly harder for women to receive credit from formal financial institutions than for men.

Hypothesis 2. It is significantly easier for women to receive credit from semi-formal financial institutions than for men.

Hypothesis 3. It is significantly easier for women to receive credit from informal institutions than for men.

6. Empirical model

6.1 Variable definitions

The dependent variable of the study was identified as the lending institution, and constructed to include all three categories of financial institutions in developing countries. The independent variables used for the study were determined based on the analysis of the previous chapters, and also included control variables for demographic and regional factors.

6.1.1 Dependent variable

Lending institution (formal, semi-formal, informal)

Before constructing the dependent variable, the specific financial institutions identified in the questionnaire were divided into formal, semiformal and informal institutions. The categorization followed the one by the National Bureau of Statistics Uganda, including the definition of informal financial institutions in accordance to the communal forms of informal finance. The following table demonstrates the final division:

(1) Formal financial institutions	(2) Semiformal financial institutions	(3) Informal financial institutions
Commercial banks	SACCOS	VSLA
Credit institutions	NGOs	Savings Clubs
Micro deposit institutions	Other MFI, which are not SACCOS	ROSCAs
		Welfare Funds
		Investment Clubs
		Burial societies
		Others

Table 2 Categorization of the financial institutions

The dependent variable itself is an indicator variable based two questions. First, the respondent must answer positively to the question "which of the following do you currently have from a financial institution, group, organization or place: personal loan, credit card, overdraft, a mortgage or lease, or hire purchase?". Upon a positive answer, the second question follows: "what is the source of the most recent current loan or credit?", dividing the indicator variable further into three categories for loans from (1) formal, (2) semiformal and (3) informal sources. The base category (4) is defined as individuals, who are currently not borrowing from any institution, but have expressed a need for credit by borrowing from non-institutional sources such as friends, relatives or for example shops. Thus we end up with the dependent variable *lending institution*, obtaining values from one to four.

With the abovementioned restrictions, the final sample size totaled 1155 respondents, of whom 3.8% were currently borrowing from a formal financial institution, 1.6% from a semiformal financial institution and 3.7% from an informal financial institution. The observations are mutually exclusive – a person borrowing from a formal institution was not counted as borrowing from semi-formal or informal sources, even though he had expressed so.

6.1.2 Explanatory and control variables

Respondent's gender

The gender dummy *female* is the primary explanatory variable of the study, and takes value one if the respondent is female, zero if male. The sample of 1155 respondents consisted of 56% female and 44% male respondents. This is in accordance with the Steadman Group (2009) estimation, but

somewhat differs from the national estimate for sex ratio in Uganda; 52% female versus 48% male (CIA World Factbook, 2010).

Setting (urban, rural)

The control variable for setting, *urban,* takes value one for respondents living in urban and zero for respondents living in rural households. Its purpose is to control for the vast differences in rural and urban areas in terms of socio-economic development, employment, infrastructure, and thus, access to credit. 57% of the houses were within 5km of formal financial institutions, while 86% were 5km from informal financial institutions.

Region (North, East, West, Central excluding Kampala, Kampala)

The control variable for region is to account for regional differences in provision of credit. These dummy variables take value one when the respondent resides in the corresponding region, and zero otherwise. In the analysis, residents of *East, West, Central region excluding Kampala* and *Kampala* are compared to those living in the *North*. For the purposes of this study, Kampala is viewed as a separate entity from the Central region so as to control for the effects related to urban circumstances. In addition to administrative sectors and overall level of development, the variables help to control for the 11 major ethnic groups in Uganda, which show significant regional variance (CIA World Factbook, 2010).

Respondent's age and age squared

Age and *age squared* are continuous control variables for the respondent's age. The age structure in Uganda is as in most of the developing world, biased to the young. The median age in Uganda is 15 years for the total population, 14.9 years for males and 15.1 for females. The average life expectancy in Uganda as quoted by national sources, is 52.7 years for the total population, 51.7 years for males and 53.8 years for females (CIA World Factbook, 2010) The mean age of the sample respondents, who were all 16 or above, was 34.2 years. The *age* variable is assumed to impact provision of credit positively.

Children

The number of children has various effects on the economic positioning of the household. The impacts include increased expenditure, but also increased household income. In developing countries, even younger children are expected to participate in the income generation. In Uganda, as well as in elsewhere in the developing world, the high average number of children (6.73 per

woman) is also related to the low level of social security and high child mortality rate (6.38%), as children are expected to look after their aging parents (CIA World Factbook, 2010). The average number of children in the sample was considerably lower than the nationally estimated average in Uganda, being only 3.10.

Adults

The number of adult members in a household may vary significantly in developing countries, as the household unit is often extended to include more than the immediate family. This has a major impact on the household earning potential, but also impacts its aggregate expenditures. The average number of adults in a household in the survey was 2.40.

Marital status

The control dummy for marital status takes the value one if the respondent is married, and zero if he is not. The definition of married is extended to cover monogamy, polygamy as well as cohabiting. The non-married include single, separated and widowed respondents. The marital status is likely to have a significant impact especially on women's access to credit, even though this impact may be controversial, as being married might both increase and decrease a woman's access. Of the sample respondents, 60.5% were married.

Status in household (household head)

The dummy variable status in the household takes the value one, if the respondent refers to him- or herself as the *household head*. It shows some correlation with gender (0.47), but was viewed as an essential control variable in terms of intra-household decision-making and its potential impacts on access to credit.

Literacy skills

67% of the total population in Uganda is literate, when literacy is defined as individuals aged over 15 year, who can read and write (CIA World Factbook, 2010). Of the sample population over 16 years old, 70% were considered literate. Literacy skills are likely to correlate strongly with a person's access to credit, both directly in terms of understanding the procedures related to granting a loan and indirectly in terms of higher earning potential. Due to the relatively low level of the education system as a whole in Uganda, literacy was considered separate to education.

Level of education (primary, higher)

The level of education of the respondent is specified by the highest level of education attained, divided into *primary level* and *higher level* education, higher level education being defined as secondary level education and above. The level of education is expected to have a positive impact on the respondent's access to credit. In Uganda, the average school life expectancy is ten years, but regional variations are vast and the level of the overall educational system moderate. Men are likely to study a year longer than women, and the women are generally more often excluded from education than men. (CIA World Factbook, 2010)

Employment (not working, agriculture, wage employment, self-employment)

The control variable for employment is specified as an answer to a question concerning the respondent's main source of income. The answers were divided into employed in the *agriculture*, *wage employment* and *self-employment,* and compared to individuals *not working* at the moment. The *not working* category included dependence on others, as well as pension transfers and rent, as these do not involve active participation in the labor market. Respondents who specified no source of income were dropped out.

Not working	Agriculture	Wage employment	Self-employment
Pension	Sell produce from own farm	Working on other people's farms	Running own business
Dependence on household member	Sell product from own livestock	Working in other people's homes	Trading in agricultural produce from others
Dependence on relatives	Sell own livestock	Working for an individual in private business	Trading in livestock products bought from others
Dependence on friends	Fishing	Employed in the formal sector	Trading in fish bought from others
Rent income			
Dependence on church			

Table 3 Categorization of employment variables

Wealth indicator

The variable *wealth indicator* takes values zero to four depending on the estimated household wealth. Since finding out the exact household wealth in developing countries is hard, a wealth indicator was constructed based on the methodology used by the Uganda Bureau of Statistics (2000). The household welfare was estimated using housing and household characteristics, which were assigned points 1-2, according to the given attributes. One point would assign the respondents in the lower wealth quintile, and two points in the higher wealth quintile. In the end the points were

added up to give a total score, based on which the distribution the respondents was divided into five wealth quintiles, scoring 0-4. The lowest score in the sample was 19 and the highest score 35, while the *wealth indicator* had the mean of 2.14. The following tables demonstrate the characteristics considered when estimating the household welfare:

Housing characteristics	Household characteristics
Type of housing unit	Energy used for lighting & cooking
Type of dwelling unit	Source of drinking water
Type of roof	Means of transport
Type of wall	Ownership of communication equipment
Type of floor	Type of toilet used
	Ownership of clothes, beddings, shoes
	Frequency of eating meat or fish
	Average number of meals
	Usage of sugar and salt
	Frequency of eating breakfast (children below 5yrs)
	Type of breakfast eaten (children below 5yrs)

Table 4 Composition of the wealth indicator

Land ownership

The dummy variable for *land ownership* takes value one, if the respondent has ownership of either *freehold, mailo, leasehold* or *customary land,* and zero, if the respondent has no ownership of land or was unable to specify the type of ownership. The purpose of this control variable is to control for the access to collateral. Contrary to the expectations, the variable showed no major correlation with the explanatory variable gender, even though access to land represents one of the most important gender inequalities in Uganda. (Tripp, 2004)

6.1.3 Summary of variable correlations

Summary tables of the variables and their correlations can be found in Appendices 4 and 5. When it comes to the correlations, the analysis showed no significant correlations of concern, and thus there was no reason to assume multicollinearity. Most notably, Kampala was correlated with the urban variable by 0.56 on 0.1% significance level, as could be expected. Also, higher-level education and literacy were found to be correlated by 0.45 and being a household head and respondent's age by 0.39, both on a 0.1% significance level. In addition, the primary explanatory variable, female was

negatively correlated with being a household head by 0.45, on a 0.1% significance level. The female variable was slightly negatively correlated with both agricultural and wage employment, as well as the wealth indicator and land ownership. Correlation with gender and self-employment was positive, but insignificant. Being a female was also significantly negatively correlated with higher education and literacy.

6.2 Model specification

A multinomial logistic regression was used to estimate the impact of gender on the provision of credit from formal, semiformal and informal institutions. The model suits the purpose well as it allows the extension of logit models to cover polytomous nominal responses. That is, it can be used to predict the probabilities of different possible outcomes of a categorically distributed dependent variable (*lending institution*), given a set of independent variables (respondent's *gender* and control variables). The multinomial logit model was used rather than ordered logit regression, since the dependent variable is not ordinal in nature. The dependent variable y_i, *lending institution*, will take the following values:

Lending institution

1 if the respondent currently has a loan from a *formal financial institution*

2 if the respondent currently has a loan from a *semi-formal financial institution*

3 if the respondent currently has a loan from an *informal financial institution*

4 if the respondent currently has no loan from any financial institution, but has expressed a need for credit by currently borrowing from friends, family members, employer or money lenders, or has current debt outstanding for buying goods or services on credit

Each response for row *i*, $y_i = (y_{i1}, y_{i2}, \dots, y_{ir})^T$, is assumed to have a multinomial distribution with index $n_i = \sum_{j=1}^{T} y_{ij}$ and parameter $\pi = (\pi_{i1}, \pi_{i2}, \dots, \pi_{ir})^T$, in which *n* is the total number of trials for row *i*, and y_{ij} is the number in which *j* occurred, that is when a person currently holds a loan in a formal, semi-formal or informal financial institution. The subindex *r* denotes the number of categories in the dependent variable, that is *r*=4. Taking $j^* = 4$ as the baseline category, the multinomial logit model will take the form:

$$\log\left(\frac{\pi_{ij}}{\pi_{ij^*}}\right) = x_i^T \beta_j, \qquad j \neq j^*$$

in which x_i represents the independent variables, β is the multinomial logit regression coefficient, and $\log(\frac{\pi_{ij}}{\pi_{ij^*}})$ tells the log-odds of the response row taking the value y_{ij} as opposed to y_{ij*}. This is demonstrated by the coefficients β:

$$\beta = [\beta_1, \beta_2, \ldots, \beta_{r-1}] \qquad \text{or} \qquad vec\,(\beta) = \begin{matrix} \beta_1 \\ \beta_2 \\ \vdots \\ \beta_{r-1} \end{matrix}.$$

The k^{th} element of β_j can be interpreted as the increase in log-odds of falling into category j, that is having a loan from a formal, semi-formal or informal financial institution, versus the base-category j^*, that is not having loan at all, resulting from a one-unit increase in the k^{th} covariate, holding the other covariates constant.

As for the baseline category j^*, category (4) was created for this purpose, including individuals, who are currently not borrowing from any financial institution, but have expressed a need for credit in terms of their outstanding debts to neighbors, relatives, shops or equivalent. This restriction on the base category was made in order to isolate the population with demand for credit, and to achieve better correspondence with the theoretical framework. The restriction induces a problem of a limited sample size, but is necessary in order preserve the theoretical relevance of the model. From the multinomial logit model point of view, category (4) makes the most natural category for comparison as, despite the limited sample size it is still the category with the most observations.

To get the impact of gender and the other independent variables on the increase in the probability of the respondent having a loan from a given type of financial institution versus not having loan, but having expressed need for a loan, we need to calculate π_i from β. The back-transformation for the non-baseline categories is:

$$\pi_{ij} = \frac{\exp(x_i^T \beta_j)}{1 + \sum_{k \neq j^*} \exp(x_i^T \beta_k)}.$$

For the base line category the back-transformation is:

$$\pi_{ij} = \frac{1}{1 + \sum_{k \neq j^*} \exp(x_i^T \beta_k)}.$$

The multinomial logit model thus provides answers to the question of the impact of gender on the odds of a respondent having a loan from a given financial institution, compared to the odds of the respondent not having a loan from any institution, but having expressed the need for one through non-institutional borrowing. (Agresti, 2003)

7. Empirical results

Prior to running the final results, the sample was adjusted to be representative of the population, as in the original data there was a bias towards the urban population relative to the actual ratio of urban and rural inhabitants in Uganda. The results of the empirical study were estimated by a method based on baseline probabilities. First baseline probabilities for each category of the dependent variable were calculated keeping all dummy variables at zero and assigning continuous variables to their means. These probabilities were then compared to the probabilities of each category, when one independent variable at a time was changed from zero to one, or in the case of continuous variables, increased by one unit.

It is acknowledged that these baseline probabilities are arbitrary, and that for accurate results one should estimate the marginal changes for each individual case. However, considering the nature and scope of the study, the above described method was considered more appropriate and sufficient. At this point it is noted that the limited sample size and low rates of overall institutional borrowing was likely to affect the results of the empirical analysis. A summary table of the results can be found in Appendix 6.

7.1 Female access to credit

When it comes to the primary independent variable, we find that out of the three categories of the dependent variable under inspection, *gender* was a significant explanatory variable only in the semi-formal category on a 5% significance level. Thus we accept the Hypothesis 2; "it is significantly easier for women to receive credit from semiformal financial institutions than for men". By changing the dummy variable *female* from zero to one, the probability of a person currently holding a loan from a semiformal institution increased 3.6-fold. However, as the baseline probability per se for this category is low, the change in percentage units was not major; from 0.23 percent to 0.83 percent.

In the case of formal financial institutions, increasing the gender dummy variable from zero to one resulted in a 147 percent increase in probability, but the *female* explanatory variable was not significant. Thus we reject the Hypothesis 1 of higher female exclusion from formal credit markets,

and accept the Null Hypothesis of no significant evidence of female exclusion. While somewhat contrarian to the Steadman Group (2010) finding of a slightly higher rate of male borrowing from formal sources, it is noted that prior research has also shown mixed results in terms of empirical evidence of access to formal credit. This may be due to a variety of factors, including the difficulty of defining and measuring financial access. In this case, the formal category of the dependent variable also showed the most significance in other explanatory variables besides gender.

The insignificance of the informal category and acceptance of Null Hypothesis 3, "it is not significantly easier for women to receive credit from informal sources", could be considered somewhat unexpected, as a higher rate of female borrowers from informal groups was assumed. Again, this could be due to various reasons. For one, it may be that the significance was diluted due to similarities between the informal category and the arbitrary baseline category, for example in rural setting. On the other hand, the dependent variable constructed assumed the categories to be mutually exclusive, while the Steadman Group (2010) finds the informal category to overlap with the formal and semi-formal categories by 19 percent. Lastly, as in the case of formal provision of credit, the prior research has also demonstrated varying results, and due to the complexity of the matter, it is unlikely that the model was unable to account for all possible factors influencing the final outcome.

7.2 Control variables

Of the control variables, urban variable for setting seemed to have no significant impact on the probability of holding credit from institutional sources. Interestingly the variable did show significance for formal and semi-formal sources before the sample was adjusted for the population, which decreased the share of the urban population relative to the rural population. The adjustment did not however affect the significance of regional differences. Being a resident of the Eastern region decreased the probability of holding credit from semi-formal and informal sources at 1% significance level, while residing in the Western region decreased the respective formal and semiformal probabilities at 1% significance level. Living in the central region also decreased the probability of holding credit from formal and semiformal sources, while inhabitants of Kampala had a lower probability of holding credit from any of the institutional sources. All comparisons were made with respect to the Northern region, which bears a history of conflict and instability, but has recently been subject to vast humanitarian aid and shown significant improvement in terms of overall development (Virtual Presence Post, 2011). Also, it should be pointed out that as the baseline probabilities were relatively small, the changes in percentage units were not large.

Furthermore, the regional effects in the case of Kampala can be assumed to be to some extent accounted for in the control variable for urban setting.

Age was a significant explanatory variable for formal and informal credit, increasing the probability of having some by 113% and 110% respectively, on 5% and 10% significance levels. The results were estimated by increasing the control variable from the mean 34.52 to 35.52. Age did not, however, have significant impact semi-formal sources of credit. For the semi-formal institutions, their agenda for poverty reduction may explain the insignificance – microcredit may be extended irrespective of age. For informal groups, age could be assumed to represent a proxy for trustworthiness; members sharing a long history may know and trust each other better. Also, the likelihood of having accumulated some wealth and ability to enter an informal group can be assumed to grow with age. This applies also to formal sources.

Interestingly, education was insignificant for all categories of the dependent variable, while literacy was only significant for formal sources of credit, where it increased the probability of holding credit from a formal source over four-fold at 1% significance level. This could have been expected. Those relying merely on informal sources are less likely to be literate, while the insignificance of the literacy variable may be interpreted as a sign of the semi-formal institution poverty reduction agenda. Both age and education can be thus seen as reflecting the institutional differences in provision of credit. Literacy and age were also found to be negatively correlated, indicating lower level of education of the older population.

Being a household head turned out to be insignificant in terms of credit provision, while marriage was only significant for formal financial institutions – being married increased the probability of holding formal credit 2.7-fold at 1% significance level. In this case marriage may be interpreted as a proxy for creditworthiness, as being married may increase the incentives to pay back in time. For women, being married may in addition decrease religious and social constraints. The number of children in the family was insignificant for all institutions, while the number of adults increased the probability of holding credit from each category, reflecting the higher earning potential in these families. The impact of the adult control variable was the biggest for formal sources by 132% and the smallest for informal sources with 119%. Informal and formal sources were significant at 5% level, while semiformal institutions probability was affected at 10% significance level.

The variables related to employment showed the greatest overall significance for provision of credit. This was expected. There was however variation between the institutional categories.

Agriculture was a significant variable for semiformal and informal sources of credit at 1% and 5% significance levels respectively, increasing both probabilities. The insignificance of agricultural employment in the formal category may reflect its association with more urban areas. Wage employment had a significant positive impact on all categories at 5% significance level, and could be interpreted as a proxy for both earning potential and trustworthiness. Self-employment increased the probability for semiformal and informal categories at 1% significance level, but showed a slight increase only at 10% significance level in the formal category. This could be seen as to indicate the importance of entrepreneurship for development at lower levels of income. Finally, increasing the average of the wealth indicator by one increased probabilities of formal and informal sources of credit at 1% significance level, but was insignificant in the case of semiformal financial institutions. This is aligned with the semiformal institution agenda of poverty reduction.

8. Summary and conclusions

The purpose of this study was to examine the institutional differences in provision of credit to women in developing countries. The study was based on a literature review of fundamental theories and current research, as well as on an empirical analysis of a case country, Uganda. The fundamental analysis was based on the theoretical model of rationing in credit markets by Stiglitz and Weiss (1981), which was extended to female access to finance. Based on the literature review, it was concluded that women are likely to be more excluded from formal sources of credit, while they are often targeted by semi-formal institutions, and may have a higher tendency to form informal financial groups. However, it was also noted that the boundaries of institutional differences have begun to blur in various ways.

Recent research questions the social and developmental agenda behind the microfinance institution's female focus, as well as its profitability. Further, formal financial institutions have begun to recognize the potential in the unbanked population, and it is not agreed upon that women are in fact more credit constrained than men. Finally, informal sources of credit have been suggested as an alternative for formal financial systems, and already provide a mine of lessons for the semiformal financial sector and microfinance institutions in particular.

The hypotheses were nevertheless constructed based on the initial findings, indicating higher female access to semi-formal and informal sources of credit, and their exclusion from the formal financial supply. The empirical model relied on a multinomial logit regression, in which the dependent variable, *lending institution* was divided into four categories by individuals borrowing from (1) formal institutions, (2) semiformal institutions, (3) informal institutions and the base category (4) of

those, who did not have a loan from any institution, but had expressed a need for one by non-institutional borrowing. The sample was adjusted to be representative of the population, and the final results were estimated using baseline probabilities.

The analysis showed that the primary explanatory variable, *female*, increased the probability of an individual holding a loan from a semi-formal institution 3.6-fold on a 5% significance level. For the informal and formal categories the *female* variable was insignificant. Reasons for this may include limiting factors related to the sample size, the low overall level of borrowing in Uganda, and restrictions concerning the model definition and estimation of final results. The control variables also showed some significance. Out of these, a number could be seen as to reflect assumed institutional differences in provision of credit on a broader scale.

As a conclusion, it could be stated that the study provides some evidence for institutional differences in provision of credit to women in developing countries. Moreover, it emphasized the impact of various other variables on the availability of credit, and confirmed some of the difficulties related to measuring financial access. These included availability of data, determination of the models and estimation of results, and finally, the complexity of defining financial access per se. This shouldn't however be interpreted as to undermine the importance of the theme. The field leaves vast room for future research, for example in terms of the wider range of variables influencing financial access. Further, the impact of gender on financial access is to be studied on a broader scale, also including other financial services besides credit.

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Appendices

It is hereby noted that in order to enhance coherence and continuity, all mathematical examples demonstrated in Appendices 1 to 3 are derived from those by Armendáriz and Morduch (2010). Further, in all examples, limited liability is assumed and only the borrower's inherent risk, not risks common to all, are considered.

Appendix 1a: Adverse selection, a mathematical example

Assume that all individuals seek to maximize their profit and each individual can borrow and invest 1€ in a one-period project. Further assume the population of potential borrowers is heterogeneous and can be divided into safe and risky borrowers. A safe borrower obtains revenue $\underline{y}$ with certainty. A risky borrower obtains revenue y^* when lucky, but zero in case of default. The probability of risky borrower succeeding is p, where $0<p<1$. Risky borrowers do better when successful, $y^*>\underline{y}$, but when adjusted for risk the expected returns are equal, $py^*=\underline{y}$.

Assume that the lending institution aims at breaking even, covering the gross cost k per unit lent. For every euro lent, the gross cost $k>1$€, since the bank needs to account for the principal as well as additional costs. However, $k<\underline{y}$ and $k<y^*$, indicating that the cost of capital is smaller for even the low-revenue outcomes and the borrowing thus efficient in expectation for both borrowers. In the presence of only safe borrowers, the bank would set the interest rate at k, just breaking even. The revenue for borrowers would be $(\underline{y}-k)$. In the presence of both safe and risky borrowers in the respective proportions q and $1-q$, the bank will charge a higher interest rate R so that the expected return from lending to an unknown borrower is equal to k: $(q + (1-q)p)R = k$. Solving for the new rate R: $R = k / (q+(1-q)p)$. Further, we will denote the difference between R and k by A, and can thus write $R = k + A$, $A = (k(1-q)(1-p)) / (q+(1-q)p)$. Since the bank is unable to differentiate between the two types of borrowers, all borrowers must pay the higher rate R.

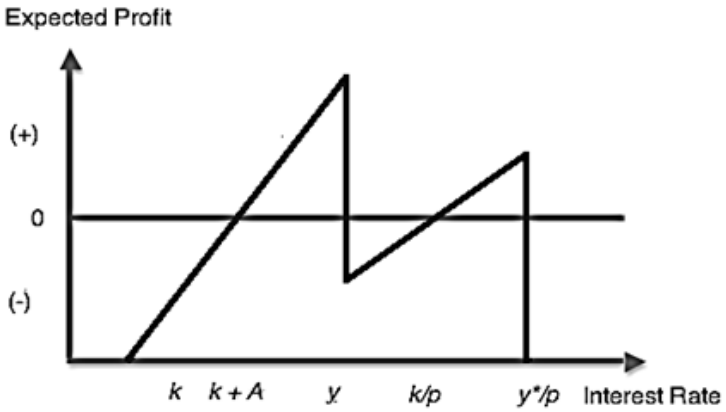

Figure 4: Adverse selection example a)

From the above graph one can see that the lending institution breaks even charging a rate between $k+A$ and $\underline{y}$, after which the safe borrowers exit the market. At k/p the bank will again earn profit, and at y^*/p the risky borrowers will also exit the market.

It should be pointed out that this is a rather simple model only to demonstrate the basic mechanism behind adverse selection in credit markets. In reality the types of clients and the risks vary more. Considering a riskier case, such as lending to the poor, the bank might only break even at point k/p, driving the safe borrowers out of the market altogether. One can clearly see the market imperfection demonstrated by the following graph:

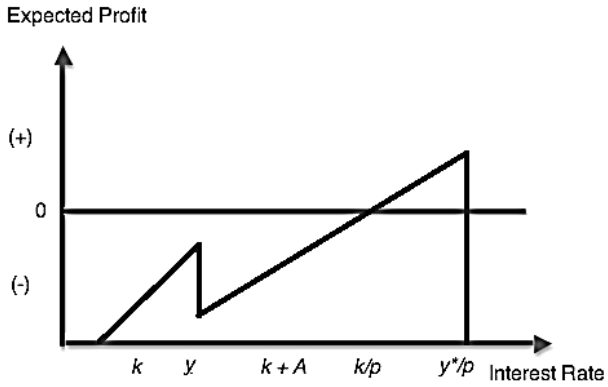

Figure 5: Adverse selection example b)

Appendix 1b: Ex-ante and ex-post moral hazard, mathematical examples

It is assumed that each individual can invest a 1€ loan in a one-period project. The returns from the project are y with certainty, given that the individual extends effort, or py, $p<1$, if the individual does not extend effort. The gross repayment R (principal and interest) is less than the cost of capital for the lending institution k. Borrower's return if he extends efforts is $(y-R)-c$, c denoting the cost of effort. Borrower's return if he doesn't extend effort is $p(y-R)$. Thus the borrower is likely to extend effort only if $(y-R)-c > p(y-R)$. Solving the equation for R one gets $R < y - (c/(1-p))$. That is, if the gross interest rates rises above $y - (c/(1-p))$, the individual has no longer an incentive to extend effort.

Assume that for the bank's cost of funds k it holds that $y-c > k$. That is, even if the borrower extends efforts, the net return is positive. In an ex-ante efficient situation this would happen. However, with limited liability, the bank has no way to force the borrower to bear the cost c. Further, assume that $(y-c)/(1-p) < k < y-c$. In order to break even, the bank must now charge $R > (y-$

c)/(1-p). This is greater than the threshold rate seen previously, and thus the borrower would shirk. The result in the situation is that no transaction will take place.

At this point it is useful to consider a situation with unlimited liability and the presence of collateral. Let *w, w<k,* denote the collateral, which the bank would seize in case of default. The probability of default is *(1-p).* The borrower's incentive constraint is now *(y-R) > p(y-R) + (1-p)(-w).* Rearranging, $R < y + w - c / (1-p)$. This allows a higher interest rate than without collateral. In the case of $k < w$, the bank could set an interest rate that always allows borrowing.

This demonstrates that the problem of ex-ante moral hazard in credit markets in fact culminates in the lack of collateral.

The ex-post moral hazard can be derived from the same mathematical example (Armendáriz and Morduch, 2010). Assume now that the 1€ project will be always successful, yielding revenue *y* with certainty. Assume also that the borrower has private wealth to be used as collateral *w*, and that the gross interest rate to the lender, *R*, is fixed so that the lender breaks even. The probability of the lender confiscating the collateral in case of default is denoted by *s*. If the ex-post payoff to the borrower is *y+w-R*, if he chooses to strategically default, his payoff becomes *(1-s)(y+w)+sy*. The first term refers to the case in which the default is not verified (borrower can run away with his net returns and collateral). The second term captures what happens if the borrower is caught (he loses his collateral, but is left with his net returns). Now the borrower will only choose to pay if *y+w-R > (1-s)(y+w)+sy*. His incentive constraint now becomes $R < sw$. Thus, a borrower without a collateral cannot access financing, since *s*0=0*.

The absence of collateral is thus proven critical in both ex-ante and ex-post moral hazard situations.

Appendix 2a: Assortative matching, a mathematical example

Let us consider an individual with a one-period project requiring a 1€ investment. The fraction of the population that is safe is $q<1$ and the fraction of the population that is risky is $(1-q)$. A euro invested by a safe borrower yields $\underline{y}$ with certainty. A risky borrower obtains $y^*>\underline{y}$ if successful, and zero otherwise. The probability of success is $p<1$. Assume that both have identical expected returns $py^*=\underline{y}$.

In equilibrium, there will be assortative matching, since the borrowers know each other's types, and the safe borrowers will not cross-subsidize for the risky borrowers. With probability of q the bank faces a (safe, safe) pair of borrowers and is repaid with certainty, and with probability $(1-q)$ a (risky, risky) pair. Assume that $y^* > 2R$, so that when lucky, a risky borrower can always repay for his peer, but if both are unlucky $(1-p)(1-p)$, the bank will not be paid. Let the probability of the bank being repaid be denoted by g.

To calculate the equilibrium gross interest rate, we know that the chance that in a random couple both or at least one will repay is $g = 1 – (1-p)^2$. The expected payment of the bank is thus $(q+(1-q)g)R$, indicating that q percent of the population will always repay R, but $(1-q)$ of the population will pay R only g percent of times. In order for the bank to break even, the cost of capital must equal the expected return, $k = (q+(1-q)g)R$. Solving for R, we get $R = k / (q+(1-q)g)$.

The new rate is thus smaller than the rate in the absence of group lending. This is due to the risk being transferred from the bank to the risky borrowers themselves through assortative matching. Thus, it could be said that the bank in fact price discriminates, without knowing the types of borrowers itself.

Appendix 2b: Peer monitoring, mathematical examples

Assume a borrower who pays back his loan and yields a return $\underline{y}$ with certainty. Further assume another borrower, who will not pay back, and yields y^* with probability p and zero otherwise. When it comes to ex-ante moral hazard, the borrower has to decide whether to put effort into a project or not. Let R denote the gross interest rate and c the cost of effort. Thus the expected return for the borrower if he extends effort is $(y-R)-c$. Members in a group are assumed to act so as to maximize group benefit, and anyone who deviates, suffers from social sanctions.

In section 4.1.2 it was seen that the borrower will choose to extend efforts only if $(y-R)-c>p(y-R)$. This implied an interest rate of $R < y- (c/(q-p))$. Any interest rate higher than this would give the

borrower and incentive to not extend efforts. For a two-person group the total return is *(2y-2R)-2c.* On the other hand, if both decide to shirk, they will be able to pay the joint obligation *(2y-2R)* only *p^2* percent of the time. If one shirks, but one is lucky, the lucky one will have to pay for the other one as well, leaving no surplus. Thus the incentive constraint is *(2y-2R)-2c > p^2(2y-2R).* Solving for *R,* this gives *R < y –c / (1-p^2).*

Since *p<1,* it follows that *p^2<1* and that *(1-p^2)>(1-p).* This means that the interest rate charged under joint liability group lending is strictly larger than the one to be achieved without it. In this way it serves as a collateral.

In order to demonstrate the mitigation of ex-post moral hazard, we now consider the situation when the returns have been realized. We further assume, that in the absence of peer monitoring, the borrower will abscond with the money.

Let the cost of monitoring be *k*, at which cost a borrower can observe his peer's actual revenue with probability *q*. Let the social sanction to be imposed in case of intended strategic default be denoted as *d*. Thus, given the gross interest rate *R*, the borrower will choose to repay if *y-R>y-q(d+R).* Solving for *R* gives *R < (q/(1-q))d.*

In the absence of peer monitoring, there was no chance of observing a peer's actual revenue, *q=0*. Now, in equilibrium *q>0*. This is due to the incentive caused by joint liability. As long as *k < gy*, monitoring will take place since the borrower doesn't want to assume responsibility for his peer's repayment.

Appendix 2c: Dynamic incentives, a mathematical example

To demonstrate the impact of the non-refinancing threat, we being by assuming two periods of production, and a required investment of 1€, which we assume to be financed by a loan from a bank. At the end of each period, the borrower can create a gross return $y > 1€$, before repayment of the debt with interest. At this stage, the borrower may choose to strategically default. In order to avoid this, the bank can make the second period lending contingent on the repayment of the first period loan.

We will first look at the case, when the borrower chooses to default. His expected payoff will then be $y + dvy$, where d is the borrower's discount factor and v is his probability of obtaining refinancing despite having defaulted, $v < 1$. On the other hand, if the borrower decided to repay, his

payoff would be $y - R + dy$, where R is the principal and interest payable to the bank. In this case, $v = 1$, as the bank will refinance the second period investment with certainty.

With a finite number of periods, the borrower will not have an incentive to repay in the end of the second period. So considering that he chooses to repay in period 1, his expected payoff in period 2 is dy, and vdy, in the case he decides to default. From this we can see that the borrower will choose to repay in period 1 only if $y + vdy \leq y - R + dy$. This incentive compatibility constraint determines the largest gross interest rate, R, the bank can elicit from the borrowers without inducing default, equal to $dy(1 - v)$. This is maximized when the probability of refinancing for those who default is zero, $v = 0$, leaving $R = dy$.

Another form of dynamic incentives relates to gradually increasing the size of the loan. To see this, we can go back to the previous example, now assuming the bank increases the loan between periods 1 and 2 by a factor a. Assuming constant returns to scale, this increases the opportunity cost of defaulting by the same factor. By defaulting, the borrower now loses $ady > dy$. This means the bank can now achieve a maximum interest rate $R' = ady > R = dy$, as the incentive compatibility constraint is relaxed.

Appendix 3: Functioning of ROSCAs, a mathematical example

The following, is a stripped-down version of a model for ROSCAs by Besley, Coate and Loury (1993). They look at a group of *n* individuals, who wish to acquire a durable and indivisible good at cost *B*. In the ROSCA, each individual regularly contributes an equal amount to a pot, which is distributed the members in a predetermined order. All individuals are assumed additive preferences over durable and non-durable consumption, defined as: *v(c)* without the durable, and *v(c)* + θ with the durable good, further assuming that the utility *v(c)* is linear *v(c)* = *c*, given that $c > \underline{c}$, where *c* is the level of consumption, and $\underline{c}$ is the subsistence level of consumption. We then suppose all individuals earn *y* in each period of time, and live for *T* periods in total.

If the individual did not join a ROSCA, he would be solving *Max*$(T - t)(y + \theta) + tc$, subject to $c>\underline{c}$ and the budget constraint $t(y-c)>B$, given that *t* represented the date of acquisition of durable *B*. The optimal solution for a non-ROSCA member would be to consume only the minimum in each period, that is $c = \underline{c}$ and save the rest, until he is able to acquire the durable good. The utility can be represented as

$$U_A = (T - t)(y + \theta) + tc = \left(T - \frac{B}{y-c}\right)(y + \theta) + \frac{B}{y-c}c$$

We now consider the situation, had the individual joined a ROSCA. We assume his order of receiving the pot is *i*, $1 < i < n$. Before the order is determined, all members have equal probability of ending up with rank *i*. We deduct that if the individual receives the pot at $(i/n)t$, his lifetime utility will be

$$u_i = \left(\frac{i}{n}\right)tc + \left[t - \left(\frac{i}{n}\right)t\right](c - \theta) + (T - t)(y + \theta)$$

The corresponding ex-ante utility for an individual, who doesn't know his number yet is $U_R = \frac{1}{n}\sum_{i=1}^{n} u_i$ or

$$U_R = \left(\frac{n+1}{2n}\right)tc + \left(1 - \frac{n+1}{2n}\right)t(c + \theta) + (T - t)(y + \theta)$$

We still assume that all members will minimize their consumption in order to speed up the process of purchasing the durable. As we know that *t* can be defined as $t(y-c) = B$, the maximized lifetime utility of a ROSCA member becomes

$$U_R = \frac{B}{y-c}c + \left(1 - \frac{n+1}{2n}\right)\frac{B}{y-c}\theta + (T - \frac{B}{y-c})(y + \theta)$$

All individuals minimize consumption of non-durable goods in order to be able to collect money for the purchasing of the durable good. Comparing this to the utility of an individual not joining the ROSCA, we can see that $U_R > U_A$. Even if it assumed that the individual's saving pattern was not affected by ROSCA membership, participating in a ROSCA will give all individuals the chance to obtain the pot early on.

Appendix 4

Variable definitions

This table defines the dependent and independent variables of the multinomial logit model used for the study of institutional differences in credit provision in Uganda.

	N	Mean	Std. Err.	Min	Max
Lending institution	1115	3.57	0.04	1	4
Female	1115	0.56	0.02	0	1
Urban	1115	0.25	0.02	0	1
Region North	1115	0.05	0.00	0	1
Region East	1115	0.31	0.02	0	1
Region West	1115	0.32	0.02	0	1
Region Central excl. Kampala	1115	0.28	0.02	0	1
Kampala	1115	0.04	0.01	0	1
Age	1115	34.24	0.57	16	105
Age squared	1115	1363.83	47.48	256	11025
Household head	1115	0.44	0.02	0	1
Married	1115	0.67	0.02	0	1
Children	1115	3.10	0.11	0	12
Adults	1115	3.16	0.09	1	14
Education, primary	1115	0.54	0.02	0	1
Education, higher	1115	0.35	0.02	0	1
Literate	1115	0.70	0.02	0	1
Agriculture	1115	0.50	0.02	0	1
Wage	1115	0.17	0.02	0	1
Selfemp	1115	0.20	0.02	0	1
Not working	1115	0.11	0.01	0	1
Household wealth	1115	2.27	0.03	0	4
Land ownership	1115	0.84	0.02	0	1

Appendix 5

Variable Correlations

	Female	Urban	Region North	Region East	Region West	Central, excl. Kampala	Kampala	Age	Age^2	Household head	Married	Children	Adults	Education, primary	Education, higher	Literate	Not working	Agriculture	Wage employment	Self-employment	Wealth indicator	Land ownership
Female	1.000																					
Urban	0.020	1.000																				
	(0.269)																					
Region North	-0.029	-0.053	1.000																			
	(0.109)	(0.004)***																				
Region East	0.016	-0.133	-0.285	1.000																		
	(0.379)	(0.000)***	(0.000)***																			
Region West	0.002	-0.119	-0.289	-0.316	1.000																	
	(0.934)	(0.000)***	(0.000)***	(0.000)***																		
Central, excl. Kampala	-0.005	-0.109	-0.261	-0.285	-0.289	1.000																
	(0.802)	(0.000)***	(0.000)***	(0.000)***	(0.000)***																	
Kampala	0.020	0.562	-0.176	-0.192	-0.195	-0.176	1.000															
	(0.270)	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***																
Age	-0.021	-0.151	0.023	0.011	0.018	0.024	-0.102	1.000														
	(0.249)	(0.000)***	(0.203)	(0.563)	(0.324)	(0.190)	(0.000)***															
Age^2	-0.016	-0.150	0.021	0.016	0.024	0.016	-0.104	0.976	1.000													
	(0.372)	(0.000)***	(0.242)	(0.388)	(0.187)	(0.382)	(0.000)***	(0.000)***														
Household head	-0.457	-0.011	-0.023	-0.051	-0.020	0.070	0.037	0.389	0.330	1.000												
	(0.000)***	(0.550)	(0.217)	(0.005)***	(0.275)	(0.000)***	(0.045)**	(0.000)***	(0.000)***													
Married	-0.011	-0.103	0.038	0.058	0.056	-0.080	-0.104	0.061	0.005	-0.101	1.000											
	(0.566)	(0.000)***	(0.037)**	(0.001)***	(0.002)**	(0.000)***	(0.000)***	(0.001)***	(0.778)	(0.000)***												
Children	0.075	-0.231	0.078	0.140	0.009	-0.078	-0.205	0.002	-0.033	-0.191	0.222	1.000										
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.639)	(0.000)***	(0.000)***	(0.912)	(0.075)*	(0.000)***	(0.000)***											
Adults	-0.015	-0.045	0.062	0.031	0.084	-0.129	-0.071	-0.080	-0.050	-0.395	0.049	0.263	1.000									
	(0.409)	(0.013)**	(0.001)***	(0.095)*	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.007)***	(0.000)***	(0.007)***	(0.000)***										
Education, primary	0.002	-0.214	0.007	0.048	0.033	0.035	-0.167	-0.012	-0.023	-0.009	0.113	0.081	-0.037	1.000								
	(0.896)	(0.000)***	(0.720)	(0.008)***	(0.070)*	(0.059)*	(0.000)***	(0.524)	(0.206)	(0.609)	(0.000)***	(0.000)***	(0.045)**									
Education, higher	-0.104	0.334	-0.117	-0.036	-0.074	0.034	0.262	-0.224	-0.213	-0.029	-0.110	-0.121	0.090	-0.717	1.000							
	(0.000) ***	(0.000)***	(0.000)***	(0.047)**	(0.000)***	(0.062)*	(0.000)***	(0.000)***	(0.000)***	(0.108)	(0.000)***	(0.000)***	(0.000)***	(0.000)***								
Literate	-0.136	0.204	-0.175	-0.115	0.042	0.133	0.155	-0.257	-0.249	-0.027	-0.030	-0.066	0.079	-0.027	0.453	1.000						
	(0.000) ***	(0.000)***	(0.000)***	(0.000)***	(0.021)**	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.147)	(0.099)*	(0.000)***	(0.000)***	(0.135)	(0.000)***							
Not working	0.164	0.183	-0.026	-0.001	-0.093	0.003	0.161	-0.078	-0.017	-0.221	-0.112	-0.049	0.104	-0.093	0.141	0.049	1.000					
	(0.000) ***	(0.000) ***	(0.151)	(0.963)	(0.000)***	(0.868)	(0.000)***	(0.000)***	(0.360)	(0.000)***	(0.000)***	(0.007)***	(0.000)***	(0.000)***	(0.000)***	(0.007)***						
Agriculture	-0.037	-0.414	0.011	-0.007	0.199	0.014	-0.300	0.169	0.148	0.040	0.136	0.157	0.044	0.188	-0.261	-0.117	-0.380	1.000				
	(0.041)	(0.000) ***	(0.556)	(0.713)	(0.000)***	(0.436)	(0.000)***	(0.000)***	(0.000)***	(0.030)**	(0.000)***	(0.000)***	(0.015)**	(0.000)***	(0.000)***	(0.000)***	(0.000)***					
Wage employment	-0.126	0.179	-0.025	0.027	-0.042	-0.041	0.108	-0.090	-0.100	0.079	-0.056	-0.117	-0.084	-0.109	0.163	0.076	-0.200	-0.428	1.000			
	(0.000) ***	(0.000) ***	(0.168)	(0.147)	(0.023)	(0.026)**	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.002)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***				
Self employment	0.016	0.176	0.030	-0.017	-0.124	0.019	0.132	-0.048	-0.070	0.082	-0.017	-0.033	-0.068	-0.045	0.045	0.034	-0.215	-0.461	-0.242	1.000		
	(0.376)	(0.000) ***	(0.102)	(0.366)	(0.000)***	(0.302)	(0.000)***	(0.008)***	(0.000)***	(0.000)***	(0.359)	(0.075)*	(0.000)***	(0.013)**	(0.013)**	(0.060)*	(0.000)***	(0.000)***	(0.000)***			
Wealth indicator	-0.030	0.202	-0.196	-0.008	0.013	0.059	0.172	-0.152	-0.157	-0.087	0.066	-0.030	0.119	-0.096	0.308	0.299	0.092	-0.089	-0.004	0.033	1.000	
	(0.097)	(0.000) ***	(0.000)***	(0.675)	(0.464)	(0.001)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.098)*	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.827)	(0.073)*		
Land ownership	-0.044	-0.394	0.171	-0.011	0.133	-0.059	-0.316	0.148	0.146	-0.027	0.106	0.207	0.122	0.122	-0.198	-0.122	-0.107	0.299	-0.132	-0.154	-0.076	1.000
	(0.015)	(0.000) ***	(0.000)***	(0.531)	(0.000)***	(0.001)***	(0.000)***	(0.000)***	(0.000)***	(0.143)	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	

This table represents the independent variable correlation coefficients. The standard errors are represented in parenthesis and the significance levels as follows: (*) at 10%, (**) at 5% and (***) at 1% significance level.

Appendix 6

Results of the multinomial logit regression

This table presents the results of the multinomial logit regression for the estimation of the impact of gender on provision of credit from (1) formal, (2) semi-formal and (3) informal financial institutions in Uganda. Dependent variables (1), (2) and (3) take value $y_i = 1$, when the respondent currently holds a loan from each given institution. The base category (4) is defined as the individuals, who have expressed a need for credit by non-institutional borrowing, but do not currently have a loan from any institution. Standard errors are indicated in the parenthesis, and the significance levels are as follows: (*) = 10% significance level, (**)=5% significance level and (**)=1% significance level. The baseline probabilities for each category is calculated keeping all dummy variables at zero and continuous variables at their sample means. (N = 1115)

	1	2	3
Female	0.5529	1.3190	0.4220
	(0.3767)	(0.5539)**	(0.3745)
Urban	0.2101	0.8509	-0.2272
	(0.3966)	(0.5929)	(0.4363)
Region East	-0.6390	-1.7724	-1.8915
	(0.5641)	(0.5572)***	(0.4578)***
Region West	-1.5218	-2.7550	-0.6530
	(0.5612)***	(0.6318)***	(0.3995)
Region Central excluding Kampala	-1.6479	-2.8478	-3.5631
	(0.5907)***	(0.6888)***	(0.7509)***
Kampala	-2.4908	-3.2931	-2.5108
	(0.7322)***	(0.8861)***	(1.0523)**
Age	0.1288	0.0243	0.1003
	(0.0590)**	(0.0764)	(0.0521)*
Age squared	-0.0011	-0.0001	-0.0009
	(0.0006)*	(0.0009)	(0.0006)
Head of household	0.9899	-0.2979	0.0226
	(0.4356)	(0.5399)	(0.4299)
Married	1.0615	0.7359	0.1200
	(0.3713)***	(0.4796)	(0.3563)
Children	-0.1054	0.0085	-0.0131
	(0.0781)	(0.0736)	(0.0677)
Adults	0.2869	0.2351	0.1904
	(0.1148)**	(0.1299)*	(0.0933)**
Education, primary	-0.8499	0.7257	-0.4137
	(0.7012)	(0.8785)	(0.4342)
Education, higher	-0.3387	0.7247	-0.7738
	(0.7560)	(0.9992)	(0.5452)
Literate	1.5023	0.4329	-0.0192
	(0.3903)***	(0.5567)	(0.3486)
Agriculture	0.1409	2.4799	2.4552
	(0.5996)	(0.8248)***	(0.9951)**
Wage	1.1915	2.3550	2.6020
	(0.5675)**	(0.9384)**	(1.0483)**
Selfemployment	1.1336	3.0162	2.6816
	(0.5982)*	(0.8771)***	(1.0354)***
Household wealth	0.6887	0.2639	0.7900
	(0.1973)***	(0.3380)	(0.2399)***
Land ownership	-0.6312	-0.0778	0.1905
	(0.4175)	(0.5342)	(0.4779)
Baseline probability	0.0205	0.0023	0.0317