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Ethnic Heterogeneity, Economic Inequality, and External Leadership in Group-based Finance: Evidence from Uganda

Final Thesis in Agricultural Economics (M.Sc.)

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Summary

Access to financial services allows investment and consumption smoothing. It is of major importance for firm growth and economic development. Because of information asymmetries, credit is often rationed. High operating costs and high enforcement costs increase the access barriers to formal finance, especially in developing countries. In this situation, the poor are largely excluded from formal financial services. As a response, a number of collective self-help approaches emerged which manage to overcome some of the problems in formal finance markets, for example by economizing on information and enforcements costs. Scholarly consensus on how these groups are forming and functioning has not yet been reached. In the literature on collective action for natural resource management and for market access, there is an ongoing debate on the variables which may affect prospects for successful collective action. Three of the most disputed community-level variables in this regard are ethnic heterogeneity, economic inequality, and external leadership. Up to now, there is only limited evidence on the effects of these variables on collectively organized financial services. Drawing on the existing literature, I argue that there are negative effects of ethnic heterogeneity and economic inequality and positive effects of external leadership on group-based finance. By using a number of econometric techniques, I examine these effects on loan access, loan demand, and group participation. The results indicate that heterogeneity and inequality have no simple effect on loan access and demand. However, they have a negative effect on group participation. I point out that the reason for this may be found in the deeper social networks, maintained by co-ethnics. I argue that economic inequality may make group-functioning difficult, because it is likely to translate into heterogeneous preferences. This may not be compatible with some properties of group-based finance. With respect to leadership, I find that a recent government-run program has a slightly significant positive effect on demand of microfinance loans. I can also show that the number of organizations and programs with a credit focus, increase the probability of participation in credit-related farmer groups. Organizations and programs with a different focus, decrease this probability. The reason for this may be that non-credit-focus organizations provide good substitutes to credit. From these findings I derive some preliminary policy recommendations and implications for further research.

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Abbreviations and Acronyms

ASCRA Accumulating Savings and Credit Association

CBO Community-Based Organization

CPR Common Pool Resource

ELF Ethno-Linguistic Fractionalization

GDP Gross Domestic Product

IFPRI International Food Policy Research Institute

ML Maximum Likelihood

NAADS National Agricultural Advisory Services

NGO Non-Governmental Organization

OLS Ordinary Least Squares

ROI Return on Investment

ROSCA Rotating Savings and Credit Association

UBoS Uganda Bureau of Statistics

UNHS Uganda National Household Survey

VIF Variance Inflation Factor

1 Introduction

1.1 Background

Access to financial services, particularly to efficient credit and saving schemes, is of major importance for firm growth and economic development (Rajan and Zingales, 1998; Beck *et al.*, 2000; Claessens, 2006; Ayyagari *et al.*, 2008). Savings and credit allow people to undertake investments in physical and human capital, *e.g.* pay for farm inputs, health expenses, or school fees. Therein, access to financial services is interlinked with other services. Seiber and Robinson (2007), for example, show that developing the microfinance sector has a positive impact on access to quality health services from private clinics in Uganda.

Financial market development may have a pro-poor effect, as it tends to raise lower incomes over-proportionally (Beck, Demirgüç-Kunt and Levine, 2007). Moreover, with increasing bank competition formal finance tends to explore remote and niche markets and increasingly lends to the poor *via* microfinance organizations (Cull *et al.*, 2009).

However, weak public infrastructures and little monetary incentives for the private sector lead to a situation where service delivery often fails to adequately reach the poorest fractions of a country's population. Even though it would foster economic development, in many developing countries universal access to financial services is not a key concern of policy makers, probably because it is difficult to achieve (Claessens, 2006). Making these services work for the poor is one of the major challenges for economic development (World Bank, 2003).

Beside its role in investment, access to savings and credit is of crucial importance in consumption smoothing. This point is particularly relevant for agricultural economies, where farmers in rain-fed agriculture, usually face high income risks due to unstable weather conditions, often accompanied by frequent droughts and floods, volatile world markets, plant pathogens, and unstable political environments. In the absence of functioning credit and savings markets, risk-induced income shocks may have a number of adverse effects on household members, especially children (Morduch, 1995, p.106). They may, for example, induce a reduction of school attendance rates of boys and girls from agrarian households, as shown by Jacoby and Skoufias (1997) for South Indian villages. Maccini and Yang (2009) show that these effects are not only relevant during the actual time when the shock occurs, but that negative effects persist over long periods. By using data from Indonesia, they show that rainfall levels in the time of birth affect health,

education, and wealth of female Indonesians, even in their adult life. Similar evidence is available for Africa (Dercon, 2008).

In most agrarian economies only a few stable off-farm income sources exist for farmers to smooth their income and often they yield only very low returns. Moreover, they are still attached to a positive non-zero covariance with agricultural incomes, as also off-farm activities tend to be negatively affected by below-average agricultural incomes, especially in the case of a complete crop failure within a given region (Dercon, 1996). As a consequence, mere income smoothing with non-farm activities is barely an option to overcome the aforementioned problems.

Giving farmers the opportunity to smooth their consumption by efficient savings and credit markets allows them to reduce income diversification. Thereby, it can facilitate a shift from a highly-diversified production portfolio with low-risk production techniques to a less diversified portfolio, resulting in higher risks (which are then smoothed by savings or credit) and higher returns (Dercon, 1996). As a result from higher incomes and a higher degree of specialization, farmers may ultimately move out of poverty.

1.2 Problem Statement

A look on the *status quo* of the formal financial sector around the world reveals that especially in developing countries there are strong barriers to bank deposit and loan services. In a worldwide study on banking services Beck *et al.* (2008) summarize some of the strong financial and bureaucratic barriers to bank access. From a sample of more than 200 banks from 62 countries (representative for a major share of the respective country's formal financial market share) they find that it takes more than a per capita GDP to open a bank account in Cameroon, more than 20 days to process a consumer loan application and more than four different official documents to open a bank account in Pakistan, more than $50 for an international transfer of $250 in the Dominican Republic, and more than a quarter of a per capita GDP to maintain a bank account in Sierra Leone.

Within the group of developing countries, financial depth is particularly low in Sub-Saharan Africa (Gulde *et al.*, 2006; Honohan and Beck, 2007) and credit constraints are seen as a major reason for the region's shortfall in economic development and long-run growth (King and Levine, 1993a, 1993b; Collier and Gunning, 1999). This is especially the case in East Africa, where rates of private credit to GDP are among the lowest of the world (Beck, Demirgüç-Kunt and Peria, 2007; African Development Bank, 2009). Due to the presence of high risks, many economies in Sub-Saharan Africa do not manage

to attract foreign investments. The situation is worsened by the fact that around 40% of the domestic capital is fleeing African countries—more than in any other region of the developing world (Collier *et al.*, 2001). This has severe negative effects on private investments in the respective economies. In case of Uganda's cotton industry, for example, it is commonly reported that a lack of credit is constraining extended production (Baffes, 2009).

In developing countries, especially the poor have limited access to formal finance. As a matter of fact, average annual bank account maintenance fees of a quarter of a per capita GDP—as it is the case in Uganda—create a situation where the poor are widely excluded. When turning from deposit services to loan services, the picture for a country like Uganda does not differ much. The minimum possible consumer loan starts at more than 200% of a per capita GDP, the bank will charge fees (not interest) of 2.68% of a per capita GDP (Beck *et al.*, 2008, p.408), and it is very likely that applicants require very good collateral for securing these loans.

Information asymmetries may explain a good deal of failing financial markets. In their seminal paper, Stiglitz and Weiss (1981) show that information asymmetries can lead to a situation where credit is rationed and financial markets do not necessarily reach an interest-rate-adjusted equilibrium. Armendaríz and Morduch (2005) present a simple example on the consequences of these information asymmetries. Let me present a simple adaptation of their example and for simplicity assume, that there are only two types of borrowers in the market: half of them are borrowers of type A with a zero-risk project and an expected return on investment (ROI) of 7% and half of them are of type B with a risky investment opportunity and an expected ROI of 14 %—a 0.5 probability of a 28% return and a 0.5 probability of a zero return. Let us also assume that in the latter case this would mean full default and zero repayment to the bank. Suppose that after lending from the central bank and fully covering their operating cost the bank in a competitive financial market will provide loans at an interest rate of 5% for zero-risk projects. In a situation where the risk-neutral bank has information only on the whole population (*e.g.* from past experience), but cannot individually distinguish the risky from the safe borrower, it will charge interest r to all borrowers so that r times the default probability equals their cost of providing the loan (here 5%) which in my example would result in r=6.66%. In this situation, all projects are still profitable and save borrowers will cross-subsidize risky ones. But if I only slightly change the numbers in my example the situation changes and the subsequent increase in interest will scare save borrowers out of the market. If the return of the save borrower was below 6.66%, there was a larger amount of risky borrowers in the market,

or the risky project would be even more risky (*e.g.* p=0.25 for a 56% return and p=0.75 for a zero return, resulting in an expected ROI of 14%, but the bank faces a higher risk of default and would now charge 13.33%), then the bank would have only risky borrowers left in the market and now would have to charge an even higher interest rate, because cross-subsidization of the save borrowers will not occur any more. Ultimately, this could even lead to a situation where the bank will provide no loans at all.

To overcome this problem, the bank will try to access information on an individual's project riskiness and will try to secure the loan by collateral. In a situation where information or enforcement costs (*e.g.* the costs of actually obtaining provided collateral) have a high fixed cost element, relatively smaller loans face higher per-loan transaction costs. This has implications for rural and poor areas where enforcement and information are more costly, proper collateral is often not existent, and sizes of demanded loans are small. This is the reason why all around the world "[...] a wealth of behavioral and institutional responses often emerge to fill in the holes left by market failures" (Morduch, 1995, p.103). In credit markets these responses are manifold and include credit unions and cooperatives, Rotating Savings and Credit Associations (ROSCAs) and related groups, or—with a lot of recent attention, caused by the overwhelming success of the Bangladeshi Grameen Bank—microfinance groups. They largely differ in their customers—who range from poor to non-poor, rural to urban, male to female—, their contractual arrangements, requirements and offered services (Morduch, 1999). However, most of these collective organizations find innovative ways in overcoming some of the aforementioned difficulties that arise in credit markets.

For example, credit groups may manage to lower information costs—as local knowledge is typically easy and cheap to access within the community (Bonus, 1986)—, or work with peer-pressure and social collateral to ensure low default rates (Stiglitz, 1990; Besley and Coate, 1995). As they are often the only source of financial service provision for the developing countries' poor and therewith create a lot of pro-poor benefits it is important to understand how these groups function. In this thesis I will analyze the effect of a number of variables on access to credit, credit demand, and participation regarding microfinance and other group-based financial services.

1.3 Research Objectives

A large body of theoretical and empirical literature exists on the prerequisites of successful collective action. Mancur Olson (1965) argues, that public goods are usually produced

below the social optimum. In his view, everybody will take into account only the marginal benefit *vs*. the marginal cost, caused by his or her *individual* participation in joint production. A similar argument is brought up by Hardin (1968) with respect to common pool resources. He believes that people are locked in a "tragedy of the commons", a social dilemma situation, where everybody only accounts for his own costs and benefits and subsequently will over-use the common pool resource. His view is questioned by a number of scholars who find strong empirical evidence against this assumption (Ostrom, 1990; Baland and Platteau, 1996). They show that under certain conditions collective management of common pool resources can reach levels near the social optimum and social dilemmas can be solved collectively. More importantly, collective management can be the superior mode of governance, compared to privatization or state control. While this is now consensus among scholars, the effect of group size and heterogeneity on the prospects of successful collective action is still highly contested (Varughese and Ostrom, 2001; Poteete and Ostrom, 2004).[1]

There is agreement on the fact that for successful collective action, a catalyst to provide leadership is necessary (Ostrom, 1990; Baland and Platteau, 1996). However, there is an ongoing discussion on the various actors who provide this leadership (Bennett *et al.*, 1996; Molinas, 1998; Thorp *et al.*, 2005). It may, for example, be the state, NGOs, community members, or religious organizations.

Recently, the approaches from studying collective action in public good provision and common pool resource management have been extended to study the formation of self-help groups, *e.g.* farmer groups in collective marketing or finance (Markelova *et al.*, 2009). The similarity mainly refers to the social dilemmas and organizational difficulties these groups are facing, *e.g.* free-riding, or enforcing cooperative behavior with effective monitoring and sanctioning. A number of scholars pay interest in studying the effect of various forms of inequality and heterogeneity on group participation. For both, developed (Alesina and La Ferrara, 2000; Leigh, 2006; Gustavsson and Jordahl, 2008) and developing (La Ferrara, 2002a, 2002b; Katungi *et al.*, 2007) countries, the effect of local level heterogeneity in language and ethnicity or economic inequality in income and assets has been studied with evidence pointing in the direction of a negative effect. However, this discussion is still ongoing and there is only limited evidence regarding credit groups (Karlan, 2005, 2007).

[1]See also the book *Inequality, Cooperation, and Environmental Sustainability*, edited by Jean-Marie Baland, Samuel Bowles, and Pranab Bardhan (2006), for a detailed discussion of the effect of inequality on collective action in natural resource management.

The aim of this thesis is to contribute to this discussion on heterogeneity, inequality, and the role of leadership. I will examine the effect of these variables on group-based finance. The empirical analysis is carried out with data from Uganda. Uganda is an appropriate country to study these effects, because it is one of the ethnically most fractionalized countries (Easterly and Levine, 1997), and high quality household level data, including data on loans, are available. Moreover, the available data allow a comparative study between the newer microfinance groups and the "traditional" local credit groups, *e.g.* ROSCAS.

1.4 Research Questions

In my attempt to address these research objectives my analysis will be guided by the following research questions:

1. Which factors determine Ugandan farmers' *access* to credit, namely their borrowing capacity? Particularly, I will ask whether these determinants differ by source and which role the community and community-level inequality, heterogeneity, and availability of leadership play. Do they inhibit or facilitate a household's borrowing capacity from group-based credit sources?

2. Which factors determine Ugandan farmers' *demand* for credit? And again: what is the role of inequality, heterogeneity, and leadership?

3. Which factors are critical in determining *participation* in credit-related farmer groups? Is external leadership necessary to catalyze group formation? If yes, which form matters most and why?

To answer these questions I will derive a number of hypotheses from the relevant literature. I will then test them by applying regression analysis to two datasets.

1.5 Contribution and Originality

By answering these questions, this thesis will contribute to the understanding of group-based financial services in Uganda and therewith may generate policy-relevant knowledge, for example by evaluating the impact of the National Agricultural Advisory Services Program on credit group formation. None of the recent empirical studies on finance in Uganda have touched the question of heterogeneity, inequality, and leadership with regard to group-based finance. Moreover, so far only one author (Kasirye, 2007) has used

the most recent household survey (UNHS, 2006) to conduct empirical work on finance in Uganda. As the financial sector in Uganda is rapidly changing, using up-to-date data is a crucial issue. Because the survey data do not include information on participation in farmer groups, this question can only be tackled by utilizing additional data. By drawing on a dataset gathered by the International Food Policy Research Institute (IFPRI), I will be able to empirically investigate participation in farmer groups.

The thesis will also add new empirical evidence to the ongoing debate on the role of heterogeneity in collective action, as only a very few quantitative studies exist for farmer groups in rural areas of developing countries (Molinas, 1998; La Ferrara, 2002a). Moreover, the role of external leadership in group formation will be targeted, again a highly contested area with limited empirical evidence (Molinas, 1998; Thorp *et al.*, 2005).

By analyzing group participation, the thesis will indirectly contribute to the understanding of social capital formation among Ugandan farmers, as group participation is a major indicator of social capital (Putnam *et al.*, 1993) and only a very few studies on social capital formation in rural Uganda exist (Katungi *et al.* 2007, 2008). Moreover, the quantitative results from this study will be used for an in-depth qualitative analysis within the research project *Making Rural Services Work for the Poor*, jointly coordinated by IFPRI and Humboldt University Berlin.

1.6 Organization of Work

The rest of this thesis is organized as follows. The next chapter reviews the existing literature on inequality, heterogeneity, and leadership and how these variables affect collective action outcomes. At the end of the chapter, I summarize the literature and derive a number of hypotheses from previous works, which I then will test in the empirical part of this thesis. Chapter 3 briefly introduces the reader into the country background of Uganda, with special reference to the agricultural and financial sector. Chapters 4 and 5 are dedicated to explaining the empirical strategy and the used data sources. The following section presents and discusses the results from the empirical analysis. Chapter 7 is dedicated to the general discussion, testing of the formulated hypotheses, and discussing limitations. The last chapter concludes and closes with some preliminary policy recommendations and implications for further research.

2 Literature Review

As mentioned in the introduction, all around the world people form groups in a variety of forms to overcome financial market imperfections. To make these groups work, a number of prerequisites must be fulfilled. In this chapter, I will review the existing literature on the impact of community heterogeneity and leadership and their effect on collective action outcomes. I will start with a brief introduction into the literature on collective action, with special reference to heterogeneity and a few notes on leadership. I will then continue with sub-chapters in which I will focus on the two dimensions that typically receive the highest attention in empirical work: ethnic heterogeneity and economic inequality,[2] followed by a chapter on leadership. The subsequent chapter will summarize and derive hypotheses for the empirical part of the work.

2.1 Heterogeneity in the Collective Action Literature and Some First Notes on Leadership

A collective action situation exists "[...] when a number of individuals have a common or collective interest—when they share a single purpose or objective—[and when] individual, unorganized action [...] will either not be able to advance that common interest at all, or will not be able to advance that interest adequately" (Olson, 1965, p.7). In his influential book *The logic of collective action* (1965), Mancur Olson shows that rational individuals engage in collective action for public good provision only if the additional *individual* benefit created through their *individual* participation outweighs the *individual* costs of participation and that this will typically lead to under-provision of the public good, unless the group manages to provide selective incentives, *i.e.* benefits (*private* goods) for the cooperator, or punishment for non-cooperators. Olson argues that due to increasing coordination costs and increasing difficulties to detect free-riders, group size is limited. If the marginal productivity of public good production is decreasing—and this will be the case at a certain level of output—prospects for group growth are limited, as the individual benefits from participating are decreasing with group size and it will become ever harder to attract new members—worsened by the fact that members with high benefits are likely to have joined the group in the first place. Hence, the gap between benefits and costs might

[2] Other dimensions could be for example education (partly touched by La Ferrara 2002a), occupation (Nagarajan *et al.*, 1999), inequality in land holdings (Bardhan and Dayton-Johnson, 2007), or gender (Agarwal, 2007).

grow for any new member to join.

Olson (1965) also touches the question of heterogeneous interests. In his view, heterogeneous interests in the population will make the provision of public goods more likely, because individuals with a sufficiently large interest in provision may become active first and make substantial contributions on an individual base. Moreover, when a certain threshold level of production—a critical mass (Oliver *et al.*, 1985), *e.g.* a high fixed cost element—, exists, it is more likely that it can be reached if one person or a small sub-group have a high interest in individually producing the public good (Olson, 1965).

The view that individuals will only account for their individual costs and benefits is shared by Hardin (1968). He is highly skeptical of any sustainable collective agreements and in his influential article on governance of common pool resources (CPRs) proclaims a "tragedy of the commons". He argues that for open access natural resources, over-extraction and subsequent degradation cannot be avoided by the users themselves. By drawing on the example of an open access pasture, he depicts an unsolvable dilemma situation in which everybody will keep too much livestock to graze on the land, as the benefits are enjoyed individually, while a large share of the cost is borne socially. In his opinion, this will ultimately lead to the destruction of the natural resource, particularly under increasing population pressure. By drawing on Hegel, he sees the only way out of this dilemma in the "freedom of recognizing the necessity". For him this either means privatizing the CPR or achieving mutual agreement on a *leviathan*, *i.e.* the state or any other *external* power, that is then legitimated to maximize social welfare by designing and enforcing optimal access rules.

The view of an unsolvable social dilemma was highly questioned by Elinor Ostrom (1990). In her book *Governing the Commons* she analyzes successes and failures of collectively governed and collectively organized CPRs. She identifies principles that are common to successful cases of community-managed CPRs. Further, she specifies key conditions under which prospects for collective action increase. One of the main principles is that distinct boundaries have to exist for the collectively-governed CPR, *i.e.* it has to be clear who is and who is not to allowed to utilize the CPR in which particular way. The governing institutions have to be locally adjusted, *i.e.* CPR-specific and community-specific, so that both the attributes of the CPR and the attributes of the user community are reflected in the rules. Successful collective action will be easier to achieve if users actively participate in crafting these institutions and if their compliance is monitored.[3] Moreover,

[3]The process of crafting these rules can be crucial for determining compliance. Bardhan and Dayton-Johnson (2007) show for South Indian farmers that compliance is substantially reduced if users believe that

in case of non-compliance there have to be sanctions that are graduated by the degree of rule-violation. Communities that collectively govern a CPR benefit from communication mechanisms (like regular meetings *etc.*) as this eases conflict solving. Ostrom concludes that if these conditions are met, collectively-organized CPRs may be organizationally superior to state-governance or privatization of the respective resource and a "tragedy of the commons" may be prevented. With respect to community attributes, Ostrom (1990, p.188) names five key variables that impact collective action outcomes: the "total number of decision makers", "the number of participants minimally necessary to achieve the collective benefit", "the discount rate in use", "similarities of interest", and "the presence of participants with substantial leadership or other assets". Here, Ostrom already highlights the importance of *individual* leadership. In her later work she also touches the question of heterogeneity. Cárdenas and Ostrom (2006), for example, draw on game theory and experimental economics to analyze strategic behavior. They develop a framework for structuring the analysis of human interaction. In this framework they group the information and questions that players ask themselves into four layers, namely the "static game layer", the "dynamic game layer", the "group context layer", and the "identity layer".

The first layer refers to a static analysis of the rules of the game, merely the net payoffs of the game, when played once without any additional information. The second layer introduces reputation, reciprocity, learning, and the probability of a next round. In other words, players have the future and the past in their minds. In the third layer the group context comes into play. Players consider group attributes as relevant. Shared norms, heterogeneity and inequality, group identity, and the type of setting (cooperative *vs.* competitive) play a role here. Players will ask themselves, who they are playing with and which norms and attributes others share. The fourth layer refers to the identity of players. It contains wealth, other-regarding preferences, values (especially with regard to forms of governance), and various socio-economic attributes.

Regarding the effect of heterogeneity, inequality, and leadership, especially layer three and four are relevant. If players do not share norms with their counterparts, they fall into completely different groups due to heterogeneity, cannot build upon any common group identity, or are trapped in a very competitive setting, cooperative behavior is unlikely to happen. Layer four contains a number of variables that may be important for leadership. If the other players, for example, are members in civic organizations or have a high level of education, they may use these networks and assets to take a leader position and therewith

rules have been designed only by the local elites. They observe an even higher decrease in compliance if villagers perceive these rules as imposed on them by government officials.

may foster collective action. If a player A believes that a counterpart B has preferences that attach a high value to player A's welfare, he will assume that B is more likely to behave cooperatively and will adjust his own strategic behavior to this knowledge. However, this does *not* mean that Ostrom has any simple relationship between these variables and outcomes in mind. For her, institutions *and* heterogeneity determine outcomes *together*. Ostrom and Poteete (2004), for example, argue that there is no simple *per se* relationship, even though often assumed in empirical research. Heterogeneity is something a group can cope with, and institutions can be designed to overcome potential problems arising from it (Poteete and Ostrom, 2004).

Following Habyarimana *et al.* (2009, p.7), the way *how* behavior in social interaction can be pushed towards non-cooperation due to heterogeneity can be summarized. There are different mechanisms through which this can happen, namely preferences, technology, and strategy selection. People that belong to the same economic class, ethnicity, caste *etc*. may be more likely to take each other's welfare into account, they might be more likely to care for the same outcomes of collective action, or they might prefer interacting with somebody alike over interaction with a more distant partner. The technological side includes that more efficient interaction might be possible, and that homogeneous partners have a higher ability (or at least a belief in it) of revealing each other's characteristics. They may be engaged in more frequent interaction and in experimental economics it has been shown that in *repeated* prisoner dilemma games with free communication cooperation can be sustained over long periods (Sally, 1995). Moreover, proximity will make it easier for players to track each other down. With respect to strategy selection homogeneous partners are more likely to know how to punish each other, and they are more likely to actually make use of punishment. Additionally, group solidarity between members of the same ethnicity or the same economic class may play a role (Hechter *et al*., 1982; Hechter, 1987).

But how can be defined whether a community is heterogeneous or not? Agrawal and Gibson (1999, p.634) stress the fact that communities are not *per se* homogeneous or heterogeneous, as the concept of homogeneity necessarily has to be a relative one. They write:

> Typically, observers assume communities to be groups of similarly endowed (in terms of assets and incomes), relatively homogeneous households who possess common characteristics in relation to ethnicity, religion, caste, or language. [...] Such homogeneity is assumed to further cooperative solutions,

> reduce hierarchical and contractual interactions, and promote better resource management. [...] Even if members of a group are similar in several respects, however, it is not clear at what point the label 'homogeneous' can be applied, nor is it clear that these shared characteristics are critical to conservation. Because all human groups are stratified to some extent or the other, it becomes important to analyze the degree of homogeneity and those dimensions of it that are important to resource conservation. Few studies, however, wrestle with the difficulty of operationalizing what social homogeneity might be.

This quote raises several important issues for my work. First, there are multiple dimensions in which heterogeneity and inequality can occur. Members of a community may have different economic endowments in terms of income and assets. They may belong to different ethnicities, speak different languages, or practice religions which are different from their neighbors. Second, it is typically assumed that homogeneous communities have a higher potential for cooperative solutions, have a lower level of hierarchical and contractual relations (which might be replaced by trust), and the likeliness of successful community-based natural resource management increases. The third important point is that operationalizing the multiple dimensions of heterogeneity is a difficult task, even though at least in quantitative empirical analysis this problem has been adequately addressed (see for example Alesina and La Ferrara, 2005). In the next section I will turn to the two dimensions of heterogeneity that are the most relevant in empirical work and whose effects have been studied widely: ethnic heterogeneity and economic inequality.

2.2 Ethnic Heterogeneity and its Measurement

One dimension of heterogeneity that received particular attention with regard to Africa is ethnicity. In their influential paper, Easterly and Levine (1997, p.1213) argue that a substantial part of the continent's shortfall in economic development can be explained with the high degree of ethnic fractionalization: "Political instability, rent-creating economic policies, and poor public goods may reflect a more fundamental country characteristic: ethnic divisions." Moreover, they show that their measure of fractionalization significantly contributes to the explanation of economic growth in the long-run. With their article a large debate on ethnic cleavages and their impact on economical and political variables begun.[4] It became then standard to include a measure of ethnic fractionalization into

[4]Of course, ethnicity has been subject to other economic research, too. There are a number of works on ethnic *networks*. Fafchamps (2000) or Biggs *et al.* (2002), for example, show that belonging to a certain

cross-country regressions, *e.g.* on GDP growth, as well as studying the effect of ethnic heterogeneity on group functioning.[5] With respect to groups, linguistic fractionalization may be of major importance simply due to the fact that cooperation needs communication. Easterly and Levine (1997) find that developing countries usually have a higher level of ethnic fractionalization, especially in Africa. Among the fifteen most fractionalized countries, there is only one non-African country (India). If one is interested in obtaining the degree of ethno-linguistic fractionalization (ELF)[6] over k possible groups for a given country, region, district, or village d, one can use the following adaptation of the Herfindahl-Hirschman-Index:

$$ELF_d = 1 - \sum_{i=1}^{k} s_{di}^2 \tag{1}$$

where s_{di} is the share of group i in district d.[7] The index has a simple interpretation. It reflects the possibility that two randomly drawn individuals from d belong to the same (ethnic) group. ELF becomes 0 if everybody is in the same group and 1 if each person forms his own group.[8] Even though widely applied, this measure received a lot of criticism. The fractionalization index may take the same value for quite different group constellations. If a country consists of two equally sized groups, or of a group that consists of two thirds and two more groups that each account for a sixth of the population share, in both cases the ELF will be 0.5 ($0.5^2 + 0.5^2 = 0.5$ and $0.66^2 + 2 * 0.166^2 = 0.5$), even though both situations are quite different. While in the first case no group is really dominating and there may be continuous tensions between the two groups, in the latter case the large group may easily dominate the two smaller groups (*e.g.* in terms of political votes). Another point that is often criticized refers to the commonly used data in cross-country studies, that are taken from the *Atlas Narodov Mira*, an ethnographic atlas, published in the Soviet Union in 1964. The data are rather outdated, a problem that usually does not

ethnic group has an impact on access to supplier credit. These studies are different, however, from the attempt undertaken here, *i.e.* examine the effect of ethnic *heterogeneity* on *collective action* and group formation.

[5] See Alesina and La Ferrara (2005) for an excellent literature review on that topic, including a discussion on different measures and an overview on empirical cross-country and local-level studies.

[6] Of course this measure can also be used to calculate fractionalization over any other meaningful categorical variable.

[7] See Alesina *et al.* (2003) for a detailed discussion on issues of group definition, alternative measures, and calculations of indices over various dimensions for a large number of countries.

[8] Theoretically, ELF can only become 1, if each share is 0, which is impossible in a finite population, even if everybody represents a single group. Thus, for any empirical work the index may get close to 1, but can never actually reach this number.

occur in intra-country studies with up-to-date census data available. Other problems occur with group definition and the concept of ethnicity, *e.g.* Rwandan Hutu and Tutsi are collapsed into one group in the Soviet data, even though both groups were involved in violent conflict along ethnic lines, leading to the genocide on the Rwandan Tutsi.[9] On the other hand, ethnic groups that share norms of reciprocity and that are frequently involved in cooperation are often defined as distinct ethnic groups in the data.[10] Moreover, the standard ELF measure cannot account for varying distances between groups, that in fact can hardly be measured anyway. While Sri Lanka and Switzerland have roughly the same degree of ethnic fractionalization, the cleavage between the groups is obviously quite deep in one case and does not really play a role in the other one. Ethno-linguistic groups get along pretty well in Switzerland, while Sri Lankan Tamils and Singhalese have been involved in violent conflict for many years. In general, if there are three different groups A, B, and C, then by calculating the standard ELF one implicitly assumes that the relationships A-B, A-C, and B-C are marked by an *equal* distance.

In an attempt to overcome these imperfections at least partly, Desmet *et al.* (2009) try to improve upon the classical ELF index by using a hierarchical way of linguistic classification. For a large number of countries, they compute the measure on fifteen levels of linguistic proximity, where on the highest aggregation level ELF is calculated only for the most distant language groups, and on the lowest level even ethno-linguistic groups that are very close to each other are treated as distinct. They find that it is the highest aggregated measure that performs best in explaining the economic and political variables used by Easterly and Levine (1997). While the measure is relatively stable over all levels for many western countries—*e.g.* hardly any change for Norway or Denmark—, for other countries these measures vary largely over levels. Zambia, for instance, has an ELF index of only 0.01 on the highest level and 0.86 on the lowest level of aggregation, indicating that most people belong to the same major language group, but many different sub-groups on a much lower level exist.

It is frequently argued that ethnic fractionalization, *e.g.* *via* patronage, may lead to poor

[9]This case also highlights the social construction involved in group definitions, as these two "ethnic groups" were mainly defined as such by the Belgian colonial power. There is no such thing as an *objective* definition of ethnic groups, and—at least in my opinion—it is always a matter of argument how to define groups and why they differ.

[10]Gaspart and Platteau (2007) show, how the concept can be misleading. In a study on Senegalese fishermen they find strong and partly violent conflicts between local fishermen in villages located South of Dakar and migrant fishermen from a Northern part of Senegal. However, in fact these conflicts go back to the different fishing techniques used by both groups, as migrant fishermen that settle in the community and adapt to the local technique do *not* show loyalty with the position of their Northern co-ethnics.

policies and therewith has a negative effect on economical and political variables. As not all groups are equally involved in a country's political landscape, Posner (2004) suggests an adaptation of the ELF formula to compute a measure for *politically relevant* groups, only. However, even this measure suffers from not being able to account for the size of the distance between groups. Posner (2005) examines voting behavior in Zambia and found that people rationally switch between different identities to maximize their welfare through political coalition building based on either "tribal" or "linguistic" identities, depending on the political institutions. In his view ethnic identity is not a fixed category with a fixed effect, but something that can either be emphasized or hidden and he shows that Zambians actually do so by rationally choosing a utility maximizing identity.

A white Muslim woman may be limited in changing her skin color, her religion, or her sex, but she will rationally choose one or many of these identities to form political coalitions. In his book *Identity and Violence* (2006) Amartya Sen highlights this point. He stresses the multi-dimensional character of identity and warns against a reduction of a person's manifold identities to only one dimension. Particularly, he challenges Samuel Huntington's idea of the clash of civilizations and insists on a multi-faceted identity concept that is not solely dominated by religion. However, he differs from Posner, as he does not identify identity choice with rational decision making and does not take notice of the institutional structures which may create an incentive for people to prefer a certain dimension over another.

Promising new research from experimental economics may help to overcome some of the conceptional weaknesses associated with empirical work on the effect of ethnic fractionalization on collective action outcomes. Habyarimana *et al.* (2007, 2009) conduct public good games with Ugandans from an ethnically diverse slum area in Kampala who belong to different ethnicities. They find that groups are not equally distant and co-ethnics are more likely to cooperate. With their research design they are able to distinguish between all possible constellations of inter-ethnic interaction. Thus, they rely much less on any simplifying assumptions. Moreover, Habyarimana *et al.* (2007) shed some light on the mechanisms through which ethnic heterogeneity affects cooperation. They do not only detect *whether* there is an effect, but they discover *how* it works. They show that due to the fact that co-ethnics are closely linked in social networks, they are more credible in threatening social sanctioning, and subsequently achieve higher levels of cooperation, a fact that may be highly relevant also for microfinance groups, as repayment in group-based lending

may increase with social cohesion (Zeller, 1998; Karlan, 2005).[11]

In another experimental work, Fershtman and Gneezy (2001) show that in trust games among Israeli Jews there is discrimination towards Sephardic male players only, and that there is no significant difference between females of all origins. They find that the interaction between two dimensions of diversity (here gender and ethnicity) may determine outcomes. In this case, ethnic diversity does not have an effect over all groups. There is systematic mistrust only *vis-à-vis* one sub-group. Moreover, Fershtman and Gneezy (2001) show that discrimination of Sephardic male players is not due to a "taste for discrimination"—*i.e.* discrimination is part of the preferences of the "racist player" and a direct utility is attached to discrimination—, but because of an ethnic stereotype. Players expect Sephardic males to play differently and they are therefore adjusting their strategy when playing with Sephardic males.

In the only empirical work on rural Uganda that touches the question of ethnic fractionalization and its effect on social capital, Katungi *et al.* (2007) show that village-level ethnic fractionalization has a positive effect on membership in social organizations and a negative effect on membership in agricultural organizations. They conclude that, "[e]thnic heterogeneity is positively associated with participation in organizations because the population is likely to stratify into homogeneous groups" (p.185). However, this conclusion is rather weakly justified, as it does not explain the positive effect. There is no plausible reason why a homogeneous population would not also stratify into more groups if this was a more efficient solution. However, it could still be the case that co-ethnics in diverse communities have stronger ties than they would have in homogeneous communities and that size matters. Consider, for example, two villages of 500 people, one highly homogeneous with everybody belonging to the same group, and one highly diverse with 50 groups and 10 people from each group. Under the condition that group identity and size jointly matter, in the latter case social punishment may be a more serious threat and easier to achieve. Given the small sample size and the calculation of only five ELF indices from five villages of Katungi *et al.* (2007), with only 20 respondents per village, it is doubtful if the ELF indices are not only good proxies for some other influential village characteristic that is the real cause behind the relationship. In their analysis they find no statistically significant impact of ethnic fractionalization on participation in saving and credit groups.

As mentioned above, Poteete and Ostrom (2004) argue that (ethnic) heterogeneity has no *per se* effect, but that institutions to cope with this heterogeneity matter. Partly, this

[11] Contrary to this, Wydick (1999) shows that peer-monitoring is crucial, while social ties do *not* have a significant effect on repayment rates in Guatemalan microfinance groups.

is empirically backed by La Ferrara (2002b) who finds that ethnically diverse income generating self-help groups in Nairobi are marked by fixed-payment schemes (everybody gets the same amount of money) and little heterogeneity in occupation (everybody fulfills the same tasks). She suggests that the reason for that may be found in the fact that group consensus on these issues is harder to achieve. In other words, to avoid a situation where differences in payments or occupation go along with ethnic differences—which may cause serious inner-group conflicts along ethnic lines and subsequently threaten group cohesion and group functioning—, group members choose to rule this possibility out by agreeing on "equalizing" institutions. The fact that homogeneous groups do not have to cope with these problems may give them an advantage as they are more free in designing their institutions. Moreover, La Ferrara (2002b) finds that punishing free-riders works better in ethnically homogeneous groups, a point that may be crucial for sustained group functioning and that has also been detected by Habyarimana *et al.* (2007). In an unique attempt—combining methods from experimental economics and survey data analysis—, Karlan (2005) shows that people with strong social networks—*i.e.* coming from the same cultural background, living in the same neighborhood, or attending the same church—, transfer significantly higher amounts of money in trust games and also reach higher savings and lower credit default rates in Peruvian microfinance groups. This has important implications for the validity of experimental evidence in "real life" situations, as Karlan is able to show that cooperative behavior in experiments can reveal social capital in the "real world". In a later work on microfinance groups, he is backing his prior observations with further evidence on the positive effect of deep social networks on loan repayment (Karlan, 2007).

In this chapter we have seen that there is a lot of empirical evidence on the negative effect of ethnic heterogeneity on group performance. A common explanation for this is found in the deeper social networks of co-ethnics, indicating that it is not the different "culture" that directly impacts group outcomes, but that social relationships are formed along ethnic lines. Through this ethnic diversity may translate into a higher likelihood of achieving successful collective action. Ethnic heterogeneity does not make collective action impossible. Groups can design institutions to overcome potential problems and still be successful. However, it is reasonable to assume that these coping mechanisms can only be achieved at some cost. Thus, it seems reasonable to assume a limiting effect on group formation.

2.3 Economic Inequality

As seen in the previous chapter, there is some evidence on the impact of ethnic heterogeneity on collective action. However, there is less agreement on the impact of economic inequality, may it be in income or assets.

Baland and Platteau (1996) argue that cultural differences and differences in interest are indeed important, but they neglect the importance of inequality in endowments. In their view, inequality may translate into heterogeneity in interests and then will only determine outcomes *through* this. In that sense heterogeneous interest and heterogeneous endowments are tantamount in determining collective action outcomes. In the opinion of Baland and Platteau (1996, p.305), it "is only in exceptional circumstances when transfers are needed to compensate potential losers that heterogeneity in endowments may inhibit collective action due to difficulties in effecting those payments".

In a later publication, Baland and Platteau (1999) show that if the community cannot find a binding agreement for optimal exploitation of a common pool resource, economic inequality may lead to a socially desirable outcome. By drawing on an example of fishermen, they show that the more unequal the distribution of boats (in their example caused by an unequal distribution of credit access) the closer resource extraction gets to the social optimum. For the richest fisherman it is not paying to over-use and to exceed a certain point of fish extraction. As the major user he is also bearing the largest share of the costs of over-exploitation and any additional boat is subject to decreasing marginal productivity. With a more equal distribution of credit the individual share of the costs is relatively smaller compared to the social costs of over-using. Due to decreasing marginal productivity, additional boats of fishermen, running only few boats, still reach higher returns than those of fishermen that already have boats out catching fish. Surprisingly, incomes of the poorest fishermen—who in the example are running only one boat—are highest in case of a very unequal distribution, where everybody but one fisherman can run only one boat due to credit constraints. If a collective agreement is at work two countervailing forces with respect to inequality have to be considered, one *facilitating* collective action and one *inhibiting* collective action:

> [W]ealthier users, because they usually have more incentives to 'cooperate', tend to contribute more to collective action. On the other hand, when inequality is large, 'small' users internalize such a tiny share of the benefits that they are not prompted to participate in the collective effort. Increasing inequality thus enhances the incentive of the big users to voluntarily contribute and

> simultaneously encourages the small users to free ride on the former's contributions. Consequently, the net impact of inequality on collective action will hinge upon the respective strengths of these two opposite effects (Baland and Platteau, 1999, p.777).

As stressed by Olson (1965), the first argument also holds true in public good production. The more heterogeneous the interest in producing the good in the population, the more likely it will be that one individual (or a small sub-group) produce the good on an individual base. However, for group-based finance this is *not* the case, as group-based financial services are not a public good on which others could free-ride. Moreover, wealthier community members may find it much easier to make use of alternatives to group-based finance and to opt for exit, *i.e.* they will turn to commercial banks.

When a certain threshold level of production, a critical mass, is reached through individual contributions, fostered by a high degree of heterogeneity in interest, collective action from this point on may be much easier to achieve, especially with an accelerating production function, leading to increasing economies of scale, once the threshold is reached (Oliver *et al.*, 1985). Again, these effects may be countervailed, if heterogeneity in interests goes along with heterogeneity in endowments and people in a heterogeneous population are unwilling to contribute because they are showing solidarity with their class (Hechter, 1987).

By detailed look to savings and credit groups one could find more than the aforementioned arguments for a negative effect of economic inequality on the probability of group formation. First, access to financial services differs by income and assets. Income enables repayment and assets can be used as collateral to secure loans (see for example Okurut *et al.* (2005) for evidence on Uganda). In a relatively unequal population, there may be less matching partners for a credit group, as some may already be served by formal finance. Moreover, given a very simple rotating pot arrangement (see for example Besley *et al.*, 1993) in a ROSCA, it will be difficult to reach agreement on the amount of the regular contribution. The rich may want to contribute more and in this case the poor would opt out of the group as they could not afford the regular contributions. On the other hand the rich may not want to participate in a group with a small pot, as the benefit from saving and receiving the pot does not outweigh their potentially higher opportunity costs of participating in regular group meetings. Even if a relatively heterogeneous group could agree on a regular contribution somewhere between the optimum amount for the richest and the optimum amount for the poorest members, in times of crises, the poor are more likely

to default, then they would be with lower agreed-upon contributions. As a consequence, group coherence may be at risk. The same applies to microfinance groups. When social collateral and peer-pressure are utilized—*e.g.* a member receives a loan only after his or her predecessor repaid a substantial part of his or her loan in the first place—members who are interested in small loans may not want to be held responsible and provide collateral for much larger loans of others.

In a study on self-help groups in Nairobi, La Ferrara (2002b) shows that the more unequal earnings are distributed among group members, the less likely it is they can obtain credit from their group. She finds that this effect is even stronger in groups that recently experienced financial losses. She assumes that in a situation of scarce capital and high inequality it is particularly difficult to reach agreement on who will get the loan. While poor members will always refer to their poverty and neediness, rich members will refer to their better creditworthiness. Eventually, this may prevent group consensus on loan disbursement.

The assumption that economic inequality has an effect on self-help group participation is also supported by additional work of La Ferrara (2002a). She develops a theoretical model, showing that the direction of this effect can depend critically on the degree of inequality and the group's institutions, in her case the access rule. In general, inequality in assets reduces participation, but has quite different effects depending on the type of access rule. When group access is unrestricted (everybody can freely join), inequality lowers participation, while in restricted-access groups (majority of existing members decides on new members) it actually increases participation.

For collective action in natural resource management similar evidence is available. Gaspart and Platteau (2007), for instance, show that Senegalese fishermen manage to adapt to problems arising from various forms of heterogeneity (*e.g.* in physical capital or skills) by crafting effective rules to cope with difficulties. However, they also show how difficult this process is and that it can only be achieved at a substantial cost.

The current discussion on the emergence of the "new generation cooperative" (see for example Cook and Iliopoulos, 1999) provides another illustration of difficulties with inequality in collective action. In the presence of high inequalities in investments or a high degree of heterogeneity in interests, the traditional cooperative property of "one member, one vote" may not work anymore. When the "Influence Costs Problem" (Cook, 1995) becomes prevalent, cooperatives may either shift to more flexible voting rules—which is a key feature of the "new generation cooperative"—or transform into an investor-owned firm.

2.4 External Leadership and Group Formation

As mentioned above, one of the necessary preconditions for successful collective common pool resource management is the presence of internal or external leadership (Ostrom, 1990; Baland and Platteau, 1996). Thorp *et al.* (2005) discuss the differences between internal and external leadership based on the proposition that "group formation often needs a catalyst, and the nature of the catalyst is crucial" (p.912). There is empirical evidence on the positive effect of external leadership for both natural resource management groups and farmer groups.

Nkonya *et al.* (2008), for example, show that the number of government programs and NGOs with a focus on environment and agriculture, that are active in the community, lead to a significant increase in awareness and compliance in community-organized natural resource management, namely tree protection and tree planting. They also find that the presence of NGOs and government programs positively affects community enactment of bylaws in natural resource management.

Markelova *et al.* (2009) argue that farmer groups involved in collective marketing need a minimal amount of help (information, technical assistance, formality in interactions *etc.*) to meet necessary standards to explore new markets. Usually, this help can only be provided by external actors such as NGOs. Empirical evidence for their argument is provided by Kaganzi *et al.* (2009), who show that Ugandan farmers from a remote rural area were only successful in organizing collective marketing of potatoes to the capital Kampala by utilizing "bridging social capital", namely involvement of the NGO *Africare* and national agricultural research institutes that assisted in providing disease-free seed potatoes. Herewith, farmers were enabled to meet urban quality standards and achieve stability in harvested amounts—a precondition for serving urban primary markets (here the "Nados Restaurant" in Kampala).

Also Thorp *et al.* (2005) discuss the importance of external assistance. They show that it is usually necessary and fruitful, but they also pay attention to the fact that external assistance may lead to a situation in which locals become dependent on this assistance, or where the external actor's poor knowledge of the local conditions leads to failures. External actors may behave in their self-interest and may tend to maximize their own profits rather than serving their target group.

Bennett *et al.* (1996) show that assistance through capacity building (management skills, accounting) in credit group formation can lead to enduring group success if ownership is kept with the local population and formation of their own village bank or credit

group is supported, instead of trying to link villagers with existing banks. In India, for example, it is a common model that loans from government banks are disbursed *via* NGOs. Roy and Chowdhury (2009) develop a theoretical model for this popular practice. While the local group cannot access funds of remote government or commercial banks, banks cannot access local knowledge, and thus cannot distinguish safe from risky borrowers. In this situation, NGOs as "motivated agents" are important mediators. For them it is possible to access funds from government banks and at the same time they are capable of obtaining local knowledge from the community (at some cost). The importance of NGOs in microfinance is not limited to India. Also in Uganda they often create the link between borrowers and lenders. One third of the Ugandan NGOs are active in credit provision (Barr *et al.*, 2005). By encouraging community participation, Ugandan NGOs achieve an increase in satisfaction with NGOs in the population (Barr and Fafchamps, 2006). Even though median sizes of supplied loans are small, and there are only three NGOs with a primary focus on loan services, NGOs may help with providing the aforementioned indirect assistance by linking local groups to remote commercial and state banks or building knowledge. However, Barr *et al.* (2005) also report a case, where an organization *registered* as a NGO is in fact a fanatic religious sect. In other cases the NGO is rather maximizing donor money than doing any good for communities.[12]

Leadership cannot only be provided by individuals, who are rich in assets, and external NGOs, but also by other community-based organizations and existing networks. In an article on ROSCAs and ASCRAs[13] Bouman (1995) shows that community-based organizations (CBOs) in Africa substantially contribute to risk reduction, play a vital role in social life, and often provide financial services:

> Africa is particularly noted for its proliferation of mutual aid groups with a finance component. Labor groups, church organizations, burial societies, professional associations, and age-groups organized around a certain sport, dancing, singing or community development activity, or loyalty to a political party: all may involve financial functions (Bouman, 1995, p.372).

He points out, that up to 95% of the rural populations of Liberia, Ivory Coast, Togo, Nigeria, and Cameroon are members in such groups.

[12]"The issues of governance and monitoring strike a particularly painful chord in Uganda where in the late 1990s the Movement for the Restoration of the Ten Commandments of God, a registered NGO, is thought to have killed more than 700 of its followers. Other, less dramatic, accounts speak of crooks and swindlers attracted to the sector by the prospect of securing grant money" (Barr *et al.*, 2005, p.658).

[13]Bouman uses the term ASCRA for Accumulating Savings and Credit Associations. While ROSCAs rotate a pot and funds are not stored, in an ASCRA the funds are stored.

This is also the case for the Eastern part of the continent. Ben Jones (2009) shows for Uganda that the country is extra-ordinarily rich in CBOs and has a vivid civil society that is often underestimated by scholars, as they tend to study regions with a lot of active (western) NGOs, donor organizations, and state intervention within the community, because they need to draw on the existing infrastructure, are guided by their "western contacts", or are primarily interested in policy assessment. In the village Oledia, where Jones conducts his case study, virtually every villager is a member of the local burial society. Burials are a frequently attended event, *e.g.* it is common that an individual attends about 15 burials per year. Apart from the insurance function in case of a dead family member, also other social groups form around these societies, some of which have a strong financial component. The strength and quantitative importance of these societal groups is also demonstrated by the fact that in some areas of Uganda they manage to raise more funds than official government tax collectors (Jones, 2009, p.138).

In a study on Tanzania and Ethiopia, Dercon *et al.* (2006) evaluate the potential of broadening the functions of these group-based funeral insurance organizations with regard to financial service provision or an extended social insurance. Aside from the intrinsically valuable functions these groups fulfill, they discuss the option of "scaling up" and find that there are indeed cases where NGOs successfully cooperate with these societies for a broader scope of community development, *e.g.* in the area of health education, water, sanitation, and microfinance. Beside burial societies also religious groups play a vital role in many communities, as shown by Jones (2009) for Uganda. Given the fact that most of the religious and burial organizations have already been active for a long time—a time before NGOs or modern states existed—and the fact that these organizations are also present in areas where the state is virtually absent, it is reasonable to assume that these organizations exist independently from any external assistance themselves and are formed from the within the community.

Apart from NGOs, CBOs, and religious groups, cooperatives may serve as catalysts for group-based credit. Cooperative members form a network which may be used to either form an external credit group or to extend the cooperative's services to credit provision. Flygare (2006) shows that the latter is indeed the case. The Ugandan Nabuka Dairy cooperative was a dairy product marketing cooperative in the first place. However, soon the cooperative extended its service portfolio and today also runs a popular credit scheme. Another example is the Jinja Teachers Savings and Credit Cooperative. Even though it carries the finance element in its name, it was originally founded to "enhance social, economical and professional advancement of all teachers working in the Jinja dis-

trict in Uganda" (Mrema, 2008, p.163) and then extended its activities to the provision of financial services. More than half of a sample of 116 Ugandan farmers who are members in cooperatives name credit access as the most important direct benefit from their membership (Mugisha *et al.*, 2005, cited in Mrema 2008, p.165). Moreover, roughly half of the women and 40% of the men report an increase in skills through training as the major secondary benefit they receive from participating in these groups (*ibid.*).

Another major player in external assistance is the state. However, especially with respect to financial service provision, states often failed in designing sound policies for financial sector development. In many developing countries high nominal interest rates made policy makers believe that loan provision was a highly monopolized business which has led to the creation of development banks which have often been highly inefficient. In many cases, they did not pay attention to the fact that real interest rates are much lower (due to high levels of inflation), and that these rates in fact reflect high operating costs, high information costs, and high risks, while monopoly rents of the "evil usurer" may be much smaller than expected (Armendaríz and Morduch, 2005; Bonus, 1986). Under these conditions, merely subsidizing credit at below-market rates—in some reported cases even below inflation rates—creates inefficiencies and may ultimately even lead to a crowding out of competitive money lenders. Moreover, artificially lowered interest rates lead to more credit rationing and it is frequently reported that under these conditions loans are rather disbursed *via* patronage to the local élites, than to those with the best investment projects or the poor and needy (Armendaríz and Morduch, 2005).

Beside that, government programs do not manage to lower default rates and in some cases these rates even increase (Armendaríz and Morduch, 2005, p.9). This assumption is backed by empirical evidence from Abaru *et al.* (2004) who show that default rates remain high even when credit is subsidized at below-market rates for an Ugandan government-run credit scheme.

New attempts of state initiative point in the direction of supporting farmer group formation, rather than directly disbursing loans. In Uganda, for example, the National Agricultural Advisory Services (NAADS) program seeks to assist farmers in many ways, *e.g.* by encouraging farmer group formation and providing necessary assistance (Ugandan Ministry of Agriculture, Animal Industries, and Fisheries, 2000). Hence, communities covered under the NAADS program may be more likely to find the necessary external assistance to collectively form a farmer group, may it be in marketing, soil protection, or credit. Benin *et al.* (2007, p.21) show that the percentage of planted crops from farmers living in communities covered under the program is significantly different from those

who are not, indicating that the program actually reaches the community with spreading knowledge and providing access to better seeds and varieties. The program has an effect on farmers' production portfolio decisions. They also show that the presence of the program led to differences in soil, water and agroforestry management practices. Most important, they find that in NAADS sub-counties the awareness of collective marketing is significantly higher than in non-NAADS sub-counties.

We have seen from this chapter that external leadership is an important ingredient for successful collective action. In the course of this thesis external leadership is understood as the provision of external assistance for catalyzing group formation. In my case, the providing organizations are NGOs, CBOs, religious organizations, cooperatives, or representatives of government programs.

2.5 Summary and Hypotheses

In the previous chapters, I reviewed some of the theoretical and empirical work on heterogeneity, inequality—particularly ethnic heterogeneity and economic inequality—and leadership in the collective action literature. We have seen that ethnic heterogeneity is likely to have a negative impact on collective action outcomes, as cooperation between co-ethnics is more likely to happen. Economic inequality has an ambiguous effect, as it may translate into unequal interests. It can have have a positive effect—*e.g.* because a critical mass is easier to achieve, or there is a larger incentive for the ones with a high interest to compensate those whose interest is small for their compliance—and a negative effect—*e.g.* the benefits for the poor are too small and they will free-ride. With respect to group-based financial services, however, it could be expected that the negative effects prevail. It has also been shown, that there are negative effects that can *directly* result from economic inequality. These may include a strong feeling for class solidarity or difficulties in reaching consensus in inner-group discussions. With regard to leadership, I have shown that it is of general importance and may take multiple forms. The forms differ in their offered "services" and in the way they approach and influence a to-be-formed group. Generally, I would expect a positive effect on group formation, with differences in forms. In the light of the literature review, the following hypotheses are tested:

H1: Ethnic heterogeneity has a negative effect on household level credit access and credit demand for group-based finance. It will also have a negative effect on group participation.

H2: Economic inequality has a negative effect on household level credit access and credit demand from these credit sources.

H3: Heterogeneity and inequality have no statistically significant effect on access and demand in formal finance (commercial banks).

H4: External leadership in the community is necessary for facilitating access to group-based finance. Availability of leadership will also facilitate credit demand.

H5: The relevant form of leadership differs with respect to different groups. While NGOs and government programs are very important for microfinance groups, local groups rely on external assistance through religious organizations. Additionally, a "democratic culture" may have a positive effect on functioning of the group and subsequent credit access and demand.

H6: Group participation increases with the availability of external leadership.

3 Country Background Uganda

Uganda is a landlocked country in East Africa. It shares borders with the Democratic Republic Congo, Sudan, Kenya, Tanzania, and Rwanda. Uganda has a total area of about 241,038 km² of which roughly one sixth is covered with water. The country is mostly plateau with a few mountains, and about 21.57% of the land is arable. About 8.92% of the land is covered with permanent crops. Usually, soils are fertile, but environmental problems like erosion do widely exist. Uganda's climate is tropical and generally rainy with two dry seasons—from December to February and from June to August. The population size is about 32 million with an annual growth rate of 2.69% in 2009. More than 80% of the population live in rural areas and the urban population is concentrated in the capital Kampala with about 1.2 million inhabitants (Central Intelligence Agency, 2009). Uganda is a multi-ethnic country. According to the measures of Easterly and Levine (1997) it is the second most ethnically fractionalized country in the world. The UNHS 2000, for example, differentiates between more than 40 ethnic groups. Otiso (2006, p.3) identifies 19 major ethnic groups that fall into four larger categories (Bantu, Nilotes, Nilo-Hamites, Sudanic) that live in distinct regions of the country. Nkonya *et al.* (2008) use six different dummies to account for differences between major ethnic groups. Apart from the official language

English, there are four major languages: Luganda, Kiswahili, Luo, and Arabic. These figures illustrate the complexity of capturing heterogeneity over ethnicity or language in the context of Uganda. Categories for calculation could be highly aggregated to account for differences only among major ethnic groups. They could also be arranged according to language. Operationalizing then is highly dependent on the particular research question and available data.

After a long period of conflict, Uganda is now seen as a role model for successful post-conflict recovery. Following a number of economic reforms, today it is one of the countries with the highest economic growth rates in Africa.[14] This growth also led to a drop in poverty rates. For all income levels, consumption between 1992 and 1998 increased and inequality reduced (Appleton, 2001, p.84). However, poverty rates are still high, especially in rural areas, where they were more than two times higher compared to urban areas in 1998. At this time, more than half of the rural population lived below the poverty line, while less than 20% suffered from poverty in urban areas (Appleton, 2001, p.85). There are also major differences between regions, with the North being the poorest, followed by the East, the West, and the central region. Export is largely based on raw produce with unroasted coffee, fish, and gold being the major commodities. Major imports are cereals, fuels, electric products, machinery, and vehicles (African Development Bank, 2009). President Museveni who came into power in 1986 is chief of the state and head of the government. Uganda used to be a republic with a one-party system. In 2005, the government introduced some political reforms towards a more competitive and democratic multi-party system (Central Intelligence Agency, 2009). The next sub-chapter will deal with recent policies of economic and rural development in more detail. Sub-chapters 2 and 3 are dedicated to the two sectors that are of major importance for this analysis: agriculture and finance.

3.1 Policies and Programs

The government has set up a Poverty Eradication Action Plan which develops the key targets and concepts for poverty alleviation. It contains four main goals. These are: fostering economic growth and transformation, good governance and security, a rise in incomes of the poor, an improvement in living conditions of the poor (Ministry of Finance, Planning and Economic Development, 2000), in particular this means "improving the institutional

[14] See, for example, the book *Uganda's Recovery: The Role of Farms, Firms, and Government*, edited by Ritva Reinikka and Paul Collier (2001).

environment within which the poor can construct their own routes out of poverty" (Ellis and Bahiigwa, 2003, p.999). Since the major share of the Ugandan population lives in rural areas and poverty is prevailing also in rural areas, poverty reduction policies have to target rural communities and farmers. Pender *et al.* (2004, p.768) state: "The key to sustainable rural development is for both public and private stakeholders to invest in an appropriate and socially profitable mix of physical, human, financial, natural, and social capital in rural areas, taking into account the diversity of situations in Uganda." To achieve these goals the Ugandan government has developed the Plan for the Modernization of Agriculture, with the key target of making farmers move out of subsistence agriculture into commercial farming (Ellis and Bahiigwa, 2003, p.999). At the same time the government is implementing country-wide fiscal decentralization. Ellis and Bahiigwa (2003) show that an extremely bureaucratic and all-embracing tax system levies heavy burdens to farmers. While the general acceptance and satisfaction with "traditional" institutions and organizations is high and modern community organizations or NGOs are seen as helpful, state agencies are widely disapproved (Ellis and Bahiigwa, 2003). As a consequence, credibility of governmental actors and service providers may be at risk, even "in transition between central and local authority" (Ellis and Bahiigwa, 2003, p.1008). However, subprograms like the National Agricultural Advisory Services (NAADS), which are part of the greater Poverty Eradication Action Plan and the Plan for Modernization of Agriculture, put farmer groups in the center of services offered by them (Ugandan Ministry of Agriculture, Animal Industries, and Fisheries, 2000). Thus, they might be able to make use of the strong confidence in local community-based institutions, may they be "traditional" or "modern".

3.2 Agriculture

Agriculture is a major sector of the Ugandan economy. Four fifths of the workforce are employed in agriculture and it accounts for a large share of the income, especially for the poor. The poorest ten per cent of the Ugandan population derive two thirds of their income from agriculture (Deininger and Okidi, 2001, p.123). In most African countries, in the 1970s and early 1980s farmers suffered from poor policies and heavy taxation of export crops (Bates, 1981). Also in Uganda, exports were forced through monopsonistic marketing boards and an overvalued domestic currency led to further competitive disadvantages for export-oriented agriculture. This induced a shift from cash crop farming to subsistence farming (Deininger and Okidi, 2001). The reduction in cash crop output has been

particularly strong in cotton, where production almost fully collapsed. Aside from these difficulties, the situation worsened with expulsion of the Asian population, who played a key role in organizing trade with agricultural produce. Even though output increased in the last years, it is still far from the level of the 1950s or 1960s (Baffes, 2009). Production of other major cash crops like tea and coffee also declined under the Amin rule and remained at a low level until the late 1980s. It was only then when the new government decided to liberalize trade and cut export taxation, which has been a successful strategy to increase agricultural production. Average annual growth of the sector has been 4-4.5 per cent during the 1990s (Deininger and Okidi, 2001). Not only has total output increased, but rural incomes have also been growing which led to a growth-induced decrease in rural poverty (Appleton, 2001). This was mainly achieved by an increase in export-oriented cash crop production. Deininger and Okidi (2001, p.123) summarize the political agenda for further agri-led pro-poor growth: "Enabling the poor to accumulate additional human and physical capital and increasing the returns to assets they already own through technical progress, increased diversification, market integration, commercialization, and growth of rural non-farm enterprises will, therefore, be key elements of any strategy aimed at equitable growth and broadly based poverty reduction." Production is still constrained, *e.g.* by the limited adoption of organic fertilizer, which is mainly used in combination with high-yield varieties (Deininger and Okidi, 2001, p.126).

The cultivated crops differ by regions. Maize as a staple crop, often combined with beans, is grown all over the country and production increased over the last years. In the North drought-resistant crops like millet or trees are of some importance. In the other regions *matooke* (food banana) is grown in almost all communities, mainly as a subsistence crop or for local marketing. In the same regions coffee is of major importance as a cash crop, while cotton, as another important cash crop, is mainly grown in the North and East. The Western part of the country has successfully managed to diversify into vegetable production and now serves urban markets, which has led to rapid positive rural development, contrasted by the North that is rather marked by stagnation (Deininger and Okidi, 2001).

3.3 Finance

Even though the Ugandan economy has experienced a period of substantial growth over the last ten years—more than 5% annual GDP growth since the year 2000—these figures are even topped by the growth rates of the financial sector that on average have been above 10% during this period and similar growth rates have only been achieved by the construc-

tion and mining sector (African Development Bank, 2009, p.373). A recent privatization of a large formerly state-owned bank has contributed to this development (Clarke *et al.*, 2009). Unlike in similar cases, privatization has not led to a decrease in access, even though the new boom is concentrated in urban areas. A country-wide survey on bank branches shows that branches increased from 123 in the year 2000 to 197 in the year 2005. However, bank branches in Kampala, for example, grew over-proportionally from 39 to 98 during that period (Clarke *et al.*, 2009, p.1521). If sustained, this rapid development of formal finance may also translate into development of microfinance and therewith may initiate pro-poor growth (Cull *et al.*, 2009). As a consequence of these changes, foreign investments increased significantly and domestic credit grew by about 50% from 2000 to 2008. Moreover, especially private borrowing has increased (African Development Bank, 2009, p.375).

However, formal loan services are far from being wide-spread and the use of formal financial services in Uganda is still marginal. In the most recent household survey from about 7,400 households, covering more than 42,000 individuals, there is a total amount of 2,470 loans (UNHS, 2006). Even though at first sight this may sound a lot, less than 10% of these loans are provided by formal banks and the average bank loan size is more than three million Uganda Shillings—more than an average yearly per capita income. This may indicate that these loan services are open mainly to the rich. This assumption is supported by Beck *et al.* (2008) who find Uganda among those countries with some of the heaviest financial and bureaucratic burdens to formal bank accounts and loan services world wide.

Both, microfinance groups and local credit groups from the sample, provide more and smaller loans compared to banks. Especially local groups, provide a high frequency of loans for health and education purposes, as well as for purchasing farm inputs. However, when looking at the sample's loan numbers even those group-based forms of finance play an only slightly more important role than banks. The largest share—almost half of the loans (in terms of loan numbers, not disbursed amounts)—, is lent by family members and friends. Credit is particularly scarce in rural areas, even though access and use are increasing. However, credit use for investment in agriculture is far from reaching a level that would reflect its relative importance for the Ugandan economy, with most of the credit being disbursed to non-agricultural enterprises and for health and education purposes (Deininger and Okidi, 2001).

4 Empirical Strategy

There is a small body of recent empirical literature on financial services in Uganda. Most of these studies deal with loans and credit and usually they use econometrics. Mpuga (2004) analyzes the demand for credit by using the 1992/1993 and the 1999/2000 Uganda National Household Survey. He estimates a number of probit and multinominal logit models for different credit sources and finds that geographical location, squared age, education, gender, marital status, primary occupation, and household wealth are the major determinants of credit demand, even though they differ with respect to source. A household's assets for example are very important for determining the demand from banks, but play no role in borrowing from family, friends, or the community, while being female has a significant negative effect on credit demand from all sources, except from NGOs and cooperatives.

The article by Okurut *et al.* (2005) is probably the most comprehensive empirical work on access to credit in Uganda. They focus on the informal sector and estimate a number of econometric models on demand and supply of credit. Like Mpuga, they use the 1999/2000 Uganda National Household Survey for their analysis. However, their work differs from Mpuga's study, as they do not distinguish their analysis by credit source. They aggregate all loans that are not provided by formal banks under the label "informal" and find that gender, age, the size of land holdings, household size, dependency ratio, education, and region are important in determining the probability of both, credit demand and credit rationing, from these sources.

A study with more recent data is done by Kasirye (2007), who uses the Uganda National Household Survey 2005/2006 to estimate a probit model on the probability that at least one household member applies for credit. He finds that consumption expenditures, the size of land holdings, employment, household size, region, and maintenance of a bank account are significant explanatory variables. Two more studies, but with a different focus, than explaining merely the overall demand for credit, exist. Additionally, there are two articles on household level savings behavior.

Abaru *et al.* (2006) investigate loan approval, disbursement, and rationing within the Ugandan Rural Farmers Scheme between 1987 and 1995. This program targeted smallholders and Abaru *et al.* are particularly interested in estimating the effect on credit access of women. By using a number of econometric techniques, they find that women had a higher loan application rate, a higher approval rate, but lower loan disbursements. The study differs from the ones previously mentioned in two points. First, they do not use

general household survey data, but focus on the evaluation of a particular government program and use loan application data from within this program. Second, they have a strong focus on small holders and it is the only study that includes farm-related variables, such as the major crops grown, into the analysis. Also Ellis *et al.* (2006, pp.45-46) deal with women's access to finance. They report cases where banks discriminate against women, for example by illegally demanding co-signatures of husbands for bank account applications. They find that women hardly use formal finance, but turn to informal finance instead.

Petracco and Pender (2009) analyze the effect of land titling on credit access. The reasoning behind this is that more secure land rights would increase the value of land holdings when used as a collateral *vis-à-vis* banks and other lenders. They find that land titling has no significant impact on credit access in formal lending and only has a small effect on informal lending. They conclude that other factors are far more relevant in explaining access to loan services.

Kiiza and Pederson (2002) are interested in household level factors that affect maintenance of a formal bank deposit account. By using self-collected data from 370 households and from six different districts they find that maintaining a savings account is influenced by education, available information, bank density, and the quality of banking services. The *amount* of savings is positively affected by net income.

Kiiza and Pederson (2006) show that merely increasing access to financial services does not change Ugandan households' saving behavior. In the presence of high risks, the demand to change the household activity portfolio towards lower risk income sources outweighs the demand for the accumulation of liquid assets in bank deposits. With rising incomes, rural households will shift their liquid assets from risky ones (*e.g.* livestock) to the safer formal bank deposits. Thus, an increase in income is far more important in increasing the use of formal bank deposits than merely an increase in service access.

I will base my empirical analysis on these previous works, especially on the study of Okurut *et al.* (2005). I differ from their work in four aspects. Firstly, I am interested in the effect of inequality and leadership and I will thus use additional independent variables to test this effect. Secondly, I am using more disaggregated dependent variables. I will not examine "informal" finance in general, but differentiate between local groups and microfinance. Thirdly, I am using a tobit model instead of a selection model. Fourthly, I will not examine credit rationing, as it is beyond the scope of this thesis. To address my research questions I will use a number of econometric methods. To estimate overall credit demand and access, I will first use binary logit models. To make use of additional data

on the *size* of borrowing capacities and demanded loans, I will thereafter estimate tobit models (Tobin, 1958). Application of the tobit model becomes necessary here because the data contain censored observations, *i.e.* people without credit access or demand. One way to deal with censoring would be to select non-censored observations. This selection would most likely introduce a strong selection bias. A two-step model could be used to address this problem (Heckman, 1979). However, the tobit model seems more appropriate to me, since I am interested in the whole population and not in a selected sub-sample. Credit demand shares some properties with the historical application of the tobit model, *i.e.* rarely purchased durable consumer goods like cars. Households are not demanding loans from semi-formal sources every year and often they will not have an open loan. However, this does not mean that they *never* applied for a loan or never will do so.

As the tobit model is relatively restrictive in its assumptions, I will test if the necessary conditions of normal and homogeneous errors are met. If this is not the case, I will then make use of a so-called two-part model, which means combining the binary logit model with conditional OLS regressions on the non-zero observations (Cameron and Trivedi, 2009, pp.538-541). I will address participation in farmer groups with a binary logit model.

4.1 Modeling Credit Access, Credit Demand, and Credit Group Participation

Let the latent variable B_i^* be the expected utility from credit access, applying for credit or participating in a credit group for household i.[15] This can be modeled as:

$$B_i^* = \beta_0 + \sum_{j=1}^{J} \beta_j x_{ij} + \varepsilon_i, \quad \varepsilon_i \sim N(0, \sigma_i^2) \tag{2}$$

where the x_{ij} are the J individual (household head), household, village, and district characteristics, such as sex, age, household income, average agricultural wage in the village, presence of NGOs, or the degree of district level inequality in income of household i, ε_i is a normally distributed zero-mean error term with variance σ_i^2, and β_0 and the β_j are parameters. As one cannot directly observe B_i^*, but can only observe A_i if any member of i's household reports to have credit access, applied for credit, or participates in a farmer group, so that:

[15] Due to some inconsistencies in the data—they are described in chapter 5—i refers to household heads in the access model.

$$A_i = 0 \, if \, B_i^* < 0$$
$$A_i = 1 \, if \, B_i^* \geq 0 \tag{3}$$

Moreover, I assume that the probability to apply for credit $p_k(A = 1)$ takes the following logistic form:

$$p_i(A = 1) = \frac{1}{1 + \exp(-B_i^*)} \tag{4}$$

so that the probability for household i is given by:

$$p_i(A) = \left(\frac{1}{1 + \exp(-B_i^*)}\right)^{A_i} \left(\frac{1}{1 + \exp(-B_i^*)}\right)^{1-A_i} \tag{5}$$

To obtain the J + 1 parameters I maximize the following likelihood function ℓ, that is given by the product over the individual probabilities of all n households:

$$\ell = \prod_{i=1}^{n} \left(\frac{1}{1 + \exp(-B_i^*)}\right)^{A_i} \left(\frac{1}{1 + \exp(-B_i^*)}\right)^{1-A_i} \tag{6}$$

To transform this product into a sum—that can be maximized with the Newton-Raphson-Algorithm—I logarithmize ℓ, which after some simple conversions yields the following log-likelihood function $\ell\ell$:

$$\ell\ell = \sum_{i=1}^{n} \left[A_i \ln\left(\frac{1}{1 + \exp(-B_i^*)}\right)\right] + \left[(1 - A_i) \ln\left(\frac{1}{1 + \exp(-B_i^*)}\right)\right] \tag{7}$$

Parameters that maximize ℓ also maximize $\ell\ell$.

4.2 Modeling Access Amounts and Demanded Amounts

I define access to credit as the monetary amount an individual can borrow from a certain source. As this *borrowing capacity* and loan sizes are subject to left-hand censoring—they cannot become smaller than zero—, I will use a Tobit model (Tobin, 1958) for a truncated dependent variable. Following Cameron and Trivedi (2009, pp.522-524), one can use the following specification of the tobit model. The equation of interest on the unobserved latent variable y^* is defined as:

$$y_i^* = x_i'\beta + \varepsilon_i, \quad i = 1, ..., N \tag{8}$$

where $\varepsilon_i \sim N(0, \sigma_i^2)$ and x_i is a $(K \times 1)$ vector of exogenous and fully observed regressors. If there were only uncensored y^*, one could estimate (β, σ^2) by running an OLS regression. However, in case of censoring the observed y_i is related to the latent variable y_i^* in the following way:

$$\begin{aligned} y &= y^* \, if \, y^* > L \\ y &= L \, if \, y^* \leq L \end{aligned} \tag{9}$$

where L denotes the left-hand censoring limit; in this case $L = 0$.[16] The probability for having a censored observation is $Pr(y^* \leq L) = Pr(x_i' + \varepsilon \leq L) = \Phi\{(L - x_i'\beta)/\sigma\}$, where $\Phi(\cdot)$ is the standard normal cumulative distribution function. For uncensored observations the expected value (truncated mean) is given by:

$$E(y_i | x_i, y_i > L) = x_i'\beta + \sigma \frac{\phi\{(x_i'\beta - L)/\sigma\}}{\Phi\{(L - x_i'\beta)/\sigma\}} \tag{10}$$

where $\phi(\cdot)$ is the standard normal density. The density function then consists of two terms—one for censored (left side) and one for uncensored (right side) observations:

$$f(y_i) = \left[\frac{1}{\sqrt{2\pi\sigma^2}} \exp\left\{-\frac{1}{2\sigma^2}\left(y_i - x_i'\beta\right)^2\right\}\right]^{d_i} \left[\Phi\left\{\frac{(L - x_i'\beta)}{\sigma}\right\}\right]^{1-d_i} \tag{11}$$

where d_i takes the value 1 for a censored and the value 0 for an uncensored observation. On the basis of this I can construct the following likelihood function over all N observations.

$$\ell = \prod_{i=1}^{N} \left[\frac{1}{\sigma}\phi\left(\frac{y_i - x_i'\beta}{\sigma}\right)\right]^{d_i} \left[1 - \Phi\left(\frac{x_i'\beta'}{\sigma}\right)\right]^{1-d_i} \tag{12}$$

Logarithmization of ℓ yields the log likelihood function $\ell\ell$, which can then be maximized:

[16] I will use this model for the borrowing capacity and the amount of credit a household applied for. Both dependent variables are censored at $L = 0$, as there can be zero amounts, but none of the two can become negative.

$$\ell\ell = \sum_{i=1}^{N} \left\{ d_i \left(-\ln\sigma + \ln\phi\left((y_i - x_i'\beta)/\sigma \right) \right) + (1-d_i)\ln\left(1 - \Phi\left(x_i'\beta/\sigma\right)\right) \right\} \tag{13}$$

As application of the "tobit model relies crucially on normality" (Cameron and Trivedi, 2009, p.531), and "expenditure data are often better modeled as lognormal" (*ibid.*), I will use the lognormal model, proposed by Trivedi and Cameron (2009, pp.531–538), as one could expect that borrowing capacities and demanded amounts are distributed in a similar way. Thus, I assume that these data are better modeled lognormal.[17] As there are no borrowing capacities below 1, ln y will be a positive number for all uncensored observations. This condition can be met by setting all censored observations to zero.[18] As mentioned above, application of the tobit model requires normality. In case this condition is not met, I will use OLS estimates on non-zero observations. As this of course involves a strong selection bias, I will interpret results only against the background of the logit estimates.[19]

The standard (log-normal) OLS equation can be defined as follows:

$$y_i = x_i'\beta + \varepsilon_i, \quad i = 1, ..., N \tag{14}$$

[17]This is indeed the case. Testing the symmetry of the uncensored observations of the borrowing capacities from microfinance groups in the data, shows that the distribution is highly skewed and non-symmetric. If I use the natural logs of the same data, I achieve an almost perfect symmetric distribution, with kurtosis and skewness sharply reduced. Mean and median value are almost equal. A view on the histogram yields further confirmation. However, for borrowing capacities there are also some problems in the data. The "hypothetical character" of the borrowing capacity—people are asked, how much they *theoretically* can borrow from a certain source, and this of course cannot be adequately measured—leads to a situation where the data are "quasi-discrete", because people tend to respond with "lumpy" sums. For example, 16.47 per cent (184 respondents out of 1,117 with a non-zero borrowing capacity) of the respondents with any borrowing capacity have a borrowing capacity of *exactly* half a million Uganda shillings from microfinance. This problem is less severe, but still relevant with respect to the demanded amounts. It can also be illustrated by plotting the empirical probability against the standardized normal probability for borrowing capacities, as done in Figures 1 and 2 in Appendix A.2. One can overcome the highly non-normal distribution of the uncensored borrowing capacities, but it is not possible to get rid of the "steps". As can be seen in figures 3 and 4, this problem also occurs in demanded loans. One reason for this may be that people apply for rounded loan amounts. Another reason may be that interviewees cannot exactly recall amounts for the survey and respond with rough figures only.

[18]In the survey, I used, there are two questions regarding the borrowing capacity from different sources. First it is asked *if* there is access, and second if the answer is yes, *how large* the borrowing capacity is. I will treat all borrowing capacities as censored if the answer to the first question is *no*. Hence, missing observations do *not* become censored observations, but are *left out* of the analysis to avoid mixing of two different biases—the bias of using OLS on censored dependents and a potential sample selection bias (Heckman, 1979) from missing observations. To avoid more complicated modeling, I implicitly assume that the second bias does not play a systematic role here and that it will not lead to any serious distortions in my estimates.

[19]Of course, household heads with credit access and households that applied for loans are not randomly drawn from the population. For an example see Okurut *et al.* (2005).

where y_i are the natural logs of the borrowing capacities or the loan sizes, x_i' is a $(K \times 1)$ vector of exogenous regressors, β is a parameter vector, and ε_i is a normally distributed error term.

5 Data

To answer my research questions I will draw on two datasets. To examine access and demand of financial services I will use the most recent Uganda National Household Survey. Unfortunately, these data do not contain any information on participation in farmer groups. To address the third research question, I will make use of an additional dataset, originally collected by IFPRI. The remainder of the chapter is dedicated to the description of these two datasets.

5.1 The Uganda National Household Survey 2006

The Uganda National Household Surveys (UNHS) are large household surveys, conducted every three years. The most recent surveys are available for the years 1999/2000, 2002/2003, and 2005/2006. The UNHS 2005/2006 was organized by the Uganda Bureau of Statistics (UBoS), and the Ministry of Finance, Planning and Economic Development. Assistance was provided by the Economic Policy Research Center, the Makerere University in Kampala, the Research and Analysis Population Secretariat, the Ministry of Finance, Planning and Economic Development, and the World Bank for the design of instruments. Funding was provided by the UBoS, the Ministry of Finance Planning and Economic Development, the Second Economic Financial Management Project, and the World Bank. Two-stage sampling was used to draw the sample. At the first stage, more than 700 enumeration areas were drawn proportional to size, based on Census data from 2002. At the second stage, ten households were randomly selected from each enumeration area, resulting in a total of more than 7,000 households with more than 40,000 respondents. The questionnaire consisted of five modules, a community questionnaire to collect community level information, a socio-economic questionnaire for each household member, an agricultural module on farming practices, land tenure *etc.*, a price module, and a qualitative module. In total the data contain more than 1,000 variables (UBoS, 2010). With respect to credit there are a number of useful variables. The questionnaire contains questions on access, demand, and supply for various sources of finance. However, there are also some inconsistencies and gaps with respect to finance data. First, information on

savings is limited to formal bank accounts. The data do not contain any information on informal savings in saving groups or liquid assets.[20] Second, there are some problems regarding access and use of financial services. With respect to loan *access*, for example, the data contain information only for household heads and their spouses, while loan *demand* is defined on the individual level.[21] These inconsistencies also exist with respect to the sources. The access data, for example, do not differentiate between sources with respect to local credit groups, while the demand data do contain these information. However, the data are of high quality and have already been used to model credit access, demand, and rationing by a number of authors.[22]

As I am particularly interested in group-based finance and the role of inequality and leadership, I will make use of a number of variables in this regard. The data allow to address this question, with one exception: they do not contain any information on ethnic groups. To address this shortcoming I made use of the UNHS 1999/2000. This survey contains community level information on the proportions of the three major ethnic groups in the community. From these shares I calculated the community level ELF index as in Equation (1).[23] As the communities from the older survey (UNHS 1999/2000) are not the same as in the recent survey (UNHS 2005/2006), I could not merge the ELF indices on the community level. Thus, I averaged the community level ELFs weighted by the population size on the district level and then merged these measures by districts. It would also have been possible to calculate a district level ELF from the UNHS 1999/2000, but as I am interested in *local* cooperation I find this approach more appropriate. Imagine a district of fully homogeneous villages with respect to ethnicity, but in each village the population belongs to another ethnicity. The district level ELF index would be very high, while the average village level ELF of the district would be zero.[24] For the inequality measures with respect to consumption and income I used Gini coefficients[25], as done for example in similar studies by La Ferrara (2002a) or Alesina and La Ferrara (2000). The calculation

[20] Of course the data contain a lot of information on assets, but unfortunately it does not become clear if these assets, *e.g.* livestock, are accumulated for *saving* purposes.

[21] This is one reason why access is not necessarily a prerequisite for an actual loan application. If this was the case, I would again face a selection bias, as only those having access could apply for loans.

[22] Kasirye (2007) and Petracco and Pender (2009), for example, use the most recent UNHS. Okurut *et al.* (2005) or Mpuga (2004) use earlier versions. More details on the survey and sampling are available in Petracco and Pender (2009).

[23] I used the given shares of the three largest groups and added a fourth share for the remaining percentages, so that all 4 shares add up to 100 per cent.

[24] Of course this is a compromise, as the district average cannot capture the variance between villages.

[25] For calculation I used the STATA package *ginidesc*. A description and a formula can be found in Deaton (1997, p.139).

was based on the household level information on consumption expenditures and assets. As per community there were only about ten observations, I decided to calculate these Ginis on the district level. In this regard, they differ from the ELF measures, as they do not refer to the community average, but are based on the whole district. It is possible that in case villages are highly homogeneous, but there are very different consumption and asset levels *between* villages, these measures do not correctly account for the effect on *community* level cooperation. I will have to keep this in mind when I interpret the results. For my analysis I will use the variables presented in Table 1.

Table 1: Description of independent variables for the Uganda National Household Surveys

Variable	Description
LN_AGE	Natural log of age
SEX	Sex (=1 if male)
LN_SCHOOL	Natural log of years schooling + 1
LN_CONS	Natural log of household consumption expenditures
LN_ASTS	Natural log of household assets
LN_HHDSIZE	Natural log of household size + 1
DEPRATIO	Dependency ratio
URBAN	= 1 if located in urban area
R_EAST	=1 if region Eastern
R_NORTH	=1 if region Northern
R_WEST	=1 if region Western
LN_WAGE	Natural log of average wage in community
LN_COMSIZE	Natural log of number of households in the community
GINI_ASTS	District level Gini on assets
GINI_EXP	District level Gini on consumption
ELF	District level average of community ELF
HALL	=1 if community has a community hall
NAADS	=1 if community is covered under NAADS
MEET	=1 if meetings have been held to address problems
COOP	=1 if cooperative in community
REL	=1 if religious organization active in community
NGO	=1 if NGO active in community
MICRO	=1 if microfinance in community
BANK	=1 if bank in the community

Sex, age, and schooling refer to the household head. It is reasonable to assume that these variables have an impact on the household's access and demand to loans. The same applies to the other household level variables (see for example Okurut *et al.*, 2005). I also

added two community level control variables, namely LN_WAGE and LN_COMSIZE, to check whether the inequality measures are not only good proxies for these variables, *e.g.* it could be the case that regular meetings are a good proxy for community size as they may be more likely in small communities, or that inequality in consumption decreases with an increasing average wage in the community. MEET and HALL refer to the "democratic culture" and the respective infrastructure of the village. As argued in chapter 2.1 democratic decision-making and forums to address problems may play an important role for successful collective action. To examine the impact of the various forms of leadership I added the following dummy variables: NAADS if the community is covered under the described *government* program for agricultural development, COOP if there is a *cooperative* in the community, REL if a *religious organization* assisted in addressing problems within the community, NGO if a *NGO* assisted to address problems within the community.[26] I added the last two variables MICRO and BANK to check if geographic proximity is facilitating loan access and loan demand. Descriptive statistics for the independent variables are presented in Table 9 in Appendix A.1.

5.2 The IFPRI Data

I now turn to the second dataset. The data were collected by the International Food Policy Research Institute in 2003. They consist of a number of household and community level variables from rural areas in eight districts. Aside from a number of "standard" socio-economic variables, the data contain variables on the biophysical conditions of farm land, access to services, and—most important for my study—participation in farmer groups. The dataset differentiates between eight different organizations by their purpose: agricultural and environmental organizations, educational organizations, health-related organizations, infrastructure-related organizations, finance and credit organizations, poverty reduction organizations, community service organizations, and marketing and processing organizations. Almost half of the households—43.81 per cent out of a total of 2,426 households with list-wise non-missing data for the variables in Table 2—had at least one household member participating in a credit group. Not only does this show the great

[26]Unfortunately, the data do not contain information on the *presence* of religious organizations and NGOs in the community. As a compromise, I make use of a question regarding problems that occurred in the community and a subsequent question regarding external assistance in addressing these problems, where REL refers to the case that a religious organization assisted and NGO to the case that a NGO assisted. As there were missing data for more than half of the communities, I transformed all missing data of these two variables into zeros. Otherwise I would have lost too many observations. Again, I will have to keep this in mind when interpreting the results.

importance of self-help groups in finance, but due to the balanced ratio of positive and negative cases—which was a problem with the UNHS—it allows a reliable analysis of the determinants of group participation. In my analysis I used the variables presented in Table 2. Summary statistics for all variables can be found in Table 10 in Appendix A.1.

Table 2: Description of independent variables for the IFPRI data

Variable	Description
SEX	Sex of household head (=1 if male)
LN_AGE	Natural log of age of household head
LN_INCOME	Natural log of household income + 1
LN_DURA	Natural log of value of durable household items + 1
LN_BUILD	Natural log of value of buildings + 1
LN_HHDSIZE	Natural log of household size + 1
LN_FARM	Natural log of farm area
DEPRATIO	Dependency Ratio
TRAIN	Dummy (=1 if yes) if anybody in household received training
LN_WAGE	Natural log of average wage in community
LN_DISTROAD	Natural log of distance to road + 1
LN_HHDSCOMM	Natural log of number of households in community
ELF	District level ELF index
GINI_INCOME	District level Gini on income
GINI_DURA	District level Gini on durables
LN_CREDORG	Natural log of credit related organizations + 1 in community
LN_POVORG	Natural log of poverty related organizations + 1 in community
LN_AGRORG	Natural log of agriculture related organizations + 1 in community
LN_SOCORG	Natural log of social organizations + 1 in community

5.3 Comparing the two datasets and detecting potential endogenous variables

Since I use two different datasets which were gathered for different purposes, I have to make some compromises regarding the use of the variables. Even though some variables are available in both datasets (age of the household head, sex of the household head, dependency ratio, community size, average wage in the community), others differ. While I use consumption expenditures in the UNHS data, I use income in the IFPRI data. Even though the two are related, they capture different things and behave differently over time.

Consumption expenditures are usually met by generated income.[27] Since households will also have non-consumption expenditures (*e.g.* taxes or investments), consumption expenditures are likely to be lower than income in the long-run. Another difference is found in the behavior over time, which is especially relevant in agrarian economies. Even though incomes may be highly volatile—*e.g.* due to unstable weather conditions in rain-fed agriculture—, consumption is often smoothed and less volatile. However, *both* consumption expenditures and income do not fully capture long-run wealth. This is especially the case for households who are engaged in subsistence agriculture, where large shares of the well-being are derived from own produce. To overcome these problems and calculate a good indicator for long-run well-being, one could, for example, use the wealth index, developed by Filmer and Pritchett (2001). However, the available data did not allow for such a procedure in both cases.

Another difficulty arose with respect to the inequality measures. The ELF, for instance, was calculated differently in the two datasets. As there was no information on the community level proportions of ethnicities and there were too few observations on the community level, I calculated ELF from the observations in the IFPRI data. The data contain information on the ethnicity of household heads with respect to seven major ethnic groups, which I used to calculate the district level ELF according to Equation (1).[28] With respect to the Gini coefficients I followed the same procedure in both datasets, with the small difference that the IFPRI contains information on income, while the UNHS has information on consumption. With respect to education, leadership, and community attributes variables, I also included different variables according to their availability. The IFPRI data contain no variable on the years of schooling, but a dummy if any household member received training. Moreover, there is only limited information on leadership and I rely on the number of credit-related, poverty-related, agricultural, and social organizations that are active in the community. The distance to an all-weather road was only included in the IFPRI data.

A potential bias may arise from endogenous variables in both models. As discussed before, credit may be used for consumption smoothing or income-generating investments. In this case causality may not only run from income and consumption expenditures to credit use, but also from credit use to income and consumption. The same applies to assets.

[27] Exceptions are, for example, state transfers or savings which could also be used for consumptive purposes.

[28] In stark contrast to the IFPRI data, the UNHS data differentiated between more than 40 different ethnic groups. Thus, the two measures are capturing fractionalization on rather different levels of aggregation. In the UNHS data even minor differences in ethnicity are treated as distinct, while the IFPRI data differentiate only between major groups.

They do not only reflect collateral or the ability to repay, but may be the *result* of credit use. As school expenses are often paid from credit, also education may be endogenous. However, as the variable is not referring to the household head—whose education is likely to be "completed"—, this bias might be limited. Also the independent variables may not be fully exogenous to the model. To name two examples, causality may run from income to education and *vice versa*, or inequality in income may lead to inequality in assets, which again may result in more income inequality, as assets bear the potential of income generation. I will have to keep this limitations in mind and treat the estimation results carefully.

6 Results

This chapter presents the results of the empirical analysis. I divided it into three parts. The first part deals with access to microfinance and bank loans. In the second part, I examine the actual use of these loans. I present regression results on household level loan applications and the amounts applied for with respect to local credit groups, microfinance groups, and formal banks. In the third sub-chapter, I report results on the determinants of participation in credit-related farmer groups.

6.1 Credit Access

As defined in chapter 4.1, in the logit model I assume that there is a benefit B_i^*, from asking for loans or participating in groups. With *access* to loan services, however, I face a problem. There are observations on household *choices* in credit demand (the household decided to apply for a loan) or in group participation (at least one individual from the household chose to become and stay a member). I can then run a model on the observed choices and I can indirectly find out which variables determine the benefits for the household. However, I cannot assume that the household took a choice to have credit *access*. Rather it is up to the *lenders* to grant or to deny access and households may have only limited knowledge on these choices that lenders make. Neither it is clear if all households really receive clear signals from lenders, nor that these signals are interpreted correctly. It could be the case that a household does have credit access from a certain source, but that no household member actually knows about it. The other case where the *perception* of access does not match with "real world access" would refer to a situation in which the household only *believes* to have access to credit, but in fact this is not the case. As there

are so few observations on actual loan applications, I will still use these information on household heads' *perception* of their credit access.[29]

Given that lenders clearly communicate their willingness to lend to the household, *lenders* expect a benefit from granting this access. Hence, I am estimating the benefits for borrowers, rather than for lenders. Due to the many possible ways in which a household's response can differ from reality I will have to treat these estimates with the highest care. Table 3 presents logit estimates on the household head's access to banks and microfinance.

Education of the household head, household assets, and household consumption have a highly significant positive effect on the probability that a household head has access to microfinance and bank loans. An increase in household size leads to a significant decrease in the probability that a household has access to banks, but plays no role with respect to microfinance. The region dummies are jointly significant in the bank model but not significant in the microfinance model.[30]

Microfinance is negatively affected by inequality in assets, while this variable is not significant in the bank access model. Moving from a completely equal distribution (Gini = 0) to a completely unequal distribution (Gini = 1), decreases the odds of microfinance access by the factor 0.02 (exp(-3.89)). ELF has a significant and negative impact on bank access, while the coefficient of the same variable is close to zero and not significant in the microfinance model. In both models there is a significant decrease in access if the

[29] Application of the binary logit model demands a somewhat balanced ratio of negative to positive choices. One reason for that is that "ML estimation is not possible when the dependent variable does not vary within one of the categories of an independent variable" (Long and Freese, 2001, p.107). For example, if one observed that only ten people out of thousand applied for a loan and in all of the villages where these ten people live there is an active NGO, one would have to drop the NGO variable as it perfectly predicts loan application and the respective coefficient would have become infinite. Long and Freese (2001, p.65) name some more of the prerequisites for ML estimation: a minimum of 100 observations, at least 10 observations per independent variable, *and* a larger number of observations if there is little variation in the dependent variable. It is the third point that I am dealing with here. In my data there are only a very few households that actually *applied* for loans—out of more than 7,000 households only 366 households applied for at least one loan from a local groups, 316 applied for a loan from a microfinance organization, and merely 192 households applied for at least one loan from a bank. This is one reason why I will also examine credit *access*, as there are more than 1,100 respondents who mention to have access to microfinance loans and more than 900 who believe to have access to bank loans. The difference between access and actual application is also reflected in the predicted probabilities. While there are many probabilities higher than 0.5 in access, these are much less for those who actually applied (see Figures 5 to 9 in Appendix A.3). One way to deal with the problem would be to reduce the "cut-value" to a value somewhere below 0.5. By doing so, I would get more correctly predicted positive outcomes. However, I would also increase the erroneous positive predictions (Greene, 2003, p.716).

[30] I tested this with a likelihood ratio test for both models. In both cases I compared the full model with a reduced model, where the region dummies were jointly removed. For the microfinance model the chi square statistic was $Chi^2(3) = 2.68$ ($p = 0.4441$) and for the bank model $Chi^2(3) = 12.29$ ($p = 0.0064$), where the p-values denote the probability that the test statistic is greater than zero.

Table 3: Logit estimates on access to microfinance and banks

	MICROFINANCE	BANK
LN_AGE	-0.2379 (0.1589)	-0.0781 (0.2132)
SEX	-0.0144 (0.1205)	0.2067 (0.1510)
LN_SCHOOL	0.3659*** (0.0906)	0.8931*** (0.1148)
LN_CONS	0.6100*** (0.0911)	0.8727*** (0.1046)
LN_ASTS	0.1926*** (0.0440)	0.2979*** (0.0540)
LN_HHDSIZE	-0.1549 (0.1064)	-0.3739*** (0.1211)
DEPRATIO	0.1234 (0.2560)	0.1442 (0.2988)
URBAN	-0.0776 (0.1504)	-0.1886 (0.1679)
R_EAST	0.2444 (0.1664)	0.5837*** (0.2092)
R_NORTH	0.1347 (0.2596)	0.1889 (0.2998)
R_WEST	0.1045 (0.1977)	0.3992* (0.2313)
BANK	0.3990 (0.3762)	0.1955 (0.3669)
MICRO	-0.0048 (0.1839)	0.1484 (0.2033)
GINI_ASTS	-3.8950*** (1.0878)	-1.2105 (1.3619)
GINI_EXP	1.9811 (1.2639)	1.6176 (1.4693)
ELF	-0.0343 (0.4885)	-1.3295** (0.5579)
HALL	-0.0331 (0.2130)	-0.3173 (0.2673)
NAADS	0.1165 (0.1147)	-0.0413 (0.1406)
MEET	-0.2092** (0.1003)	-0.2455** (0.1178)
COOP	-0.0565 (0.1613)	-0.1758 (0.1918)
REL	-0.9326 (0.8126)	-0.6152 (0.6844)
NGO	0.3891 (0.2420)	0.3574 (0.2916)
LN_WAGE	-0.0245 (0.0856)	0.0440 (0.1087)
LN_COMSIZE	0.0474 (0.0838)	-0.0819 (0.0993)
Constant	-8.5865*** (1.2592)	-16.3260*** (1.6013)
Observations	4177	4177
Pseudo R^2	0.103	0.217
Log lik.	-1767.6660	-1330.7605
Chi-squared	313.8835	406.2829

Standard errors in parentheses

Source: UNHS, 2000, 2006; own calculations

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

community has held meetings to address problems in the community.

With a look on the Chi² statistics, the hypothesis of jointly zero coefficients can be rejected for both models. A look on the pseudo R² reveals that both models reach acceptable levels of their overall explanatory capacity (I also checked this with looking at other pseudo R²s),[31] with the bank model explaining a little more variance, probably because people tend to think they have *access* to bank loans when there is a bank in their community.[32]

As these results are not fully satisfactory, I will now turn to the loan amounts household heads believe they have access to and provide further evidence on bank access. Table 11 in Appendix A.7 presents tobit estimates on the log borrowing capacities for household heads from microfinance and banks. As coefficients reflect the marginal effects on the latent variable, it is very likely that I will find similar relationships as in the logit model.[33] The only difference with respect to significant coefficients is that the NGO dummy and GINI_EXP become significant in the microfinance model (both with $p<0.1$).[34]

As mentioned before, validity of the tobit model critically depends on normality and homoskedascity and I will therefore have to test if these conditions are met. The testing procedure is rather difficult and complicated and therefore shall not be presented here in detail. I used the user-written STATA command *tobcm* and followed the procedure proposed by Cameron and Trivedi (2009, pp.534-38). I found that both models do *not* meet the conditions of normality and homoskedascity, even though I transformed the dependent variables into natural logs.[35] In this case I can make use of a so-called hurdle or two-

[31]However, if I run the STATA command *linktest* to compare the explanatory capacity of the predicted probabilities and the square of the predicted probabilities I find that in both models the prediction *and* the squared predictions become significant. This may be an indicator for poor model specification, for example through omitted relevant variables or added irrelevant variables. However, even after trying around a bit with adding other variables, adding interaction terms, and removing variables, specification of the model does not really improve. This could mean that the true determinants of stated bank access are different from those I used.

[32]Again there are conceptual difficulties with the perceived access. While one respondent may define access as the mere possibility to physically enter a bank to ask for a loan, another respondent may define access as given only if there is a realistic chance that the bank takes the loan approval serious. A possible explanation for the non-significance of the microfinance dummy may therefore be found in the poorer knowledge on existing microfinance organizations.

[33]The strength of the tobit model is not to "throw information away". However, in the case presented here, there is not much additional information compared to the binary model, as most of the observations are censored. The tobit estimates are "dominated" by the censored observations that carry no additional information.

[34]Like in the logit models the region dummies are jointly significant only in the bank model. The likelihood ratio test yields Chi²(3) = 2.59 (p-value = 0.4598) for the microfinance and Chi²(3) = 13.78 (p-value = 0.0032) in the bank tobit model.

[35]For both models the test strongly rejects acceptance of the Null hypothesis of normality, with a p-value

part-model.[36] This means, I will first estimate the probability of censoring with a binary discrete choice model, like the logit or probit model (fortunately I did this already) and then use (log-linear) OLS regression on the uncensored (*i.e.* under the condition that access = 1 or demand = 1) observations, only. The first advantage is that I am able to estimate different coefficients and use different variables for the probability of censoring and the uncensored borrowing capacities, as they are likely to have quite different determinants. Thus, I do not anymore rely on a joint likelihood function such as in Equation (13). Second, estimators in OLS regression are less restrictive in their distributional assumptions. Even with non-normality estimators are consistent, but test statistics in this case may be miscalculated. Table 4 presents conditional OLS regression results on the determinants of uncensored borrowing capacities of household heads from microfinance and banks.

The results show that education, consumption, and schooling do not only have a positive effect on general access to both microfinance and banks. They also positively impact the *amounts* household heads have access to. With respect to the inequality measures, I find that the coefficient of GINI_ASTS is significant and negative in the bank model and ELF is significant and positive in the microfinance model. Additionally, I find that REL is negative and significant in the microfinance model and COOP is negative and significant in the bank model. The variables are explaining around 30% of the variance in both models. If I test for normality and heteroscedacity, for both models I cannot reject the Null hypothesis of homoskedascity. The error term is normally distributed.[37] I also tested for collinearity by calculating variance inflation factors (VIFs). The highest VIF was 4.27 in the bank model and 3.28 in the microfinance model. Given this, I can expect that standard errors and test statistics are correctly calculated and follow the normal distribution. However, if I conduct specification tests, I find that both models are not perfectly specified.[38] After analyzing access, I now turn to demand.

<0.0001.

[36] For more information see Cameron and Trivedi (2009, pp.538-541).

[37] I used STATA's *hettest* command. For the microfinance model $Chi^2(1) = 0.00$, Prob > chi2 = 0.9619, and for the bank model $Chi^2(1) = 1.14$, Prob > chi2 = 0.2864.

[38] If I make use of the STATA command *linktest* I find that both models may contain irrelevant variables or important variables may be missing. Again, I tried around with adding more variables (including interaction terms and squared terms) and removing variables, but it was not possible to find a model that was specified much better and still met the necessary conditions. If I use *ovtest* instead, I find that in both models the Null hypotheses of omitted variables cannot be rejected (with Prob > F = 0.8519 for the microfinance model and Prob > F = 0.1211 for the bank model.

Table 4: Conditional OLS estimates on log borrowing capacities of household heads from microfinance groups and banks

	MICROFINANCE	BANK
LN_AGE	0.0471 (0.1925)	-0.0068 (0.1843)
SEX	0.3632*** (0.1059)	0.5370*** (0.1408)
LN_SCHOOL	0.1597** (0.0731)	0.1341* (0.0795)
LN_CONS	0.4464*** (0.0876)	0.4667*** (0.0904)
LN_ASTS	0.1856*** (0.0422)	0.2063*** (0.0424)
LN_HHDSIZE	-0.0064 (0.1019)	-0.0370 (0.1184)
DEPRATIO	-0.2423 (0.2382)	-0.0943 (0.2549)
URBAN	0.0025 (0.1455)	0.0108 (0.1355)
R_EAST	0.1199 (0.1608)	0.2133 (0.1691)
R_NORTH	-0.1003 (0.2254)	0.0214 (0.2269)
R_WEST	0.1408 (0.1823)	-0.2192 (0.1729)
BANK	0.4997 (0.3925)	0.4445 (0.3814)
MICRO	-0.1146 (0.1359)	0.1612 (0.1405)
GINI_ASTS	-0.3999 (1.0831)	-1.9953* (1.1428)
GINI_EXP	-0.6377 (1.2481)	1.4349 (1.5734)
ELF	0.8607* (0.4808)	-0.1199 (0.4658)
HALL	-0.1002 (0.2099)	-0.1677 (0.1675)
NAADS	0.0102 (0.1100)	-0.0702 (0.1159)
MEET	0.1601* (0.0944)	0.0656 (0.0953)
COOP	-0.0743 (0.1533)	-0.4357*** (0.1302)
REL	-0.7541*** (0.2373)	-0.1508 (0.8252)
NGO	-0.0359 (0.1487)	-0.0355 (0.2129)
LN_WAGE	-0.0415 (0.0869)	-0.0585 (0.0905)
LN_COMSIZE	0.0544 (0.0709)	0.0880 (0.0818)
Constant	4.3754*** (1.2639)	5.2583*** (1.3073)
Observations	759	598
R^2	0.305	0.361
Adjusted R^2	0.283	0.335
F	15.2642	12.8120

Standard errors in parentheses

Source: UNHS, 2000, 2006; own calculations

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

6.2 Credit Demand

To examine credit demand, the data allow for a similar empirical procedure as in the access models, but for the reasons mentioned in chapter 5, I turn from the individual level to the aggregate household level. Again, I start by looking at the binary variable whether a household demanded credit, *i.e.* at least one household member had applied for credit from the respective source. Like in the previous sub-chapter, I will continue with a log-normal tobit model. If the crucial conditions of normality and homoskedascity are not met, then once more I will make use of the two-part model. That means I will perform conditional OLS regressions on the uncensored observations to analyze the determinants of loan *amounts*. As mentioned in chapter 5, I have the chance to make use of loan data on local credit groups. While the data on access didn't contain any information on this source of finance, I now have the chance to take a deeper look. The logit estimates are presented in Table 5.

The estimates indicate that, analogous to the *access* models, education, consumption expenditures, and assets are also important determinants of *demand* from these two sources. With respect to local groups, LN_ASTS is not significant and LN_SCHOOL is significant with a negative sign, implying that education has a *negative* effect on loan demand from local groups. Only LN_CONS, the natural log of the household's consumption expenditure, has the intuitively expected sign and is significant. The region dummies are highly significant in model (1), not significant in (2), and significant in (3).[39] While in model (1) the R_EAST and R_NORTH are close to zero, R_WEST is very high. Moving from the central region (the reference category) to the Western region increases the odds ratio almost fifteen fold, but also the odds of demanding a loan from a bank are increased by three. In model (1) the probability of a household member applying for credit from a local group is negatively affected by living in an urban area and the size of the community. These seem to be different effects, as both variables are not highly correlated (Pearson's r = 0.26) and there are no problems with collinearity. I observe a positive effect of household size on the probability of borrowing in model (1). The four leadership variables, namely NAADS, COOP, REL, and NGO are not statistically different from zero. The measures of inequality are not significant and GINI_EXP has an unexpected positive sign. The coefficient of the MEET variable is slightly significant and negative, probably because addressing problems occurs mainly in communities which *face* problems and the

[39]The results of the likelihood ratio test are: LR $Chi^2(3) = 197.43$ (p-value 0.0000), LR $Chi^2(3) = 5.02$ (p-value 0.1703), and LR $Chi^2(3) = 10.68$ (p-value 0.0136) for the local group, microfinance, and bank model, respectively.

Table 5: Logit estimates for household level credit demand

	(1) LOCAL GROUP	(2) MICROFINANCE	(3) BANK
LN_AGE	-0.2860 (0.2818)	0.0917 (0.2464)	0.2413 (0.3977)
SEX	0.0716 (0.2214)	-0.3633* (0.2059)	0.0336 (0.3242)
LN_SCHOOL	-0.2456* (0.1353)	0.5111*** (0.1587)	2.3300*** (0.3651)
LN_CONS	0.3952** (0.1565)	0.4719*** (0.1597)	0.6787*** (0.2210)
LN_ASTS	-0.0457 (0.0771)	0.2022*** (0.0753)	0.2060** (0.1009)
LN_HHDSIZE	0.3188* (0.1829)	0.1200 (0.1790)	-0.3360 (0.2170)
DEPRATIO	0.2520 (0.4252)	0.4033 (0.4308)	0.6773 (0.5649)
URBAN	-0.7240** (0.2945)	0.0073 (0.2681)	-0.1469 (0.3252)
R_EAST	-0.0255 (0.3981)	0.6233** (0.2900)	0.5458 (0.4261)
R_NORTH	-0.0629 (0.4935)	0.6472 (0.4917)	0.8770 (0.5493)
R_WEST	2.6912*** (0.3408)	0.9768*** (0.3589)	1.0686** (0.4535)
BANK	-0.3567 (1.1931)	-0.2812 (0.5833)	0.6323 (0.4693)
MICRO	-0.1539 (0.3587)	0.0896 (0.2869)	0.1708 (0.4307)
GINI_ASTS	-1.9922 (2.0442)	1.2156 (1.8327)	-0.4200 (2.4537)
GINI_EXP	2.2796 (1.9221)	-4.9331** (2.2223)	1.0731 (3.1340)
ELF	-0.8707 (0.8540)	1.6555* (0.8624)	-1.0057 (1.1110)
HALL	-0.4962 (0.4288)	0.5494* (0.3221)	-0.1405 (0.4397)
NAADS	-0.1999 (0.1871)	0.3235* (0.1966)	-0.1034 (0.2917)
MEET	-0.2906* (0.1736)	-0.2137 (0.1739)	-0.2331 (0.2565)
COOP	0.2081 (0.2628)	-0.1087 (0.2881)	-0.5785 (0.4333)
REL	0.4892 (1.0250)		
NGO	0.2402 (0.5571)	-0.0663 (0.4260)	-0.2977 (0.6327)
LN_WAGE	-0.0234 (0.1780)	-0.0229 (0.1585)	-0.1127 (0.2438)
LN_COMSIZE	-0.4852*** (0.1472)	0.0474 (0.1355)	0.0542 (0.2048)
Constant	-3.4639 (2.1955)	-12.5835*** (2.1817)	-20.0067*** (3.0831)
Observations	4195	4161	4161
Pseudo R^2	0.258	0.107	0.282
Log lik.	-672.1019	-699.9607	-353.1339
Chi-squared	344.3511	208.1336	293.1947

Standard errors in parentheses

Source: UNHS, 2000, 2006; own calculations

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

MEET variable might be a proxy for that.

The probability of applying for a loan in the microfinance model increases with being female, probably because microfinance programs are often targeting women. From the inequality measures only GINI_EXP is significant and has the expected sign. The ELF index is significant at the 10% level and has a positive effect on the probability of borrowing. A community hall within the community and being covered under the NAADS program, do have a positive effect. The religion dummy has been dropped from (2) and (3), because in both cases it predicted failure perfectly.[40] If I now turn to the bank model—as expected—none of the inequality and leadership variables becomes significant. From the model fit statistics I find that (2) seems to explain less variance than (1) and (3), probably due to the strong explanatory power of education, consumption expenditures, and assets for bank loan applications, and the strong regional and community size coefficients in the local group model.[41]

Let us now have a look at the tobit models. Once more, the significant parameters do not differ considerably from the logit models, as again the likelihood function is "dominated" by the censored information. Thus, the estimates are only presented in Table 12 Appendix A.7. Like in the tobit models on access, the Null hypotheses of normal errors cannot be accepted.[42] Again, I make use of the alternative two-part model. The respective conditional OLS estimates are presented in Tables 6 and 7.

I present two models, one with all variables and one without the region dummies and the REL variable. I do this because the region dummies had high VIFs in this model and the REL dummy had only one positive value (out of all the 211), which is associated with one household that had asked for a relatively high loan from a local credit group. In both models, I find that the uncensored log loan amounts demanded from local credit groups are significantly and positively affected by consumption expenditures and assets. While consumption expenditures also have a positive effect on the likelihood of applying, assets were negative (but not significant) in the logit model. The other significant variable in the OLS regression is the URBAN dummy. Being located in an urban area had a *negative*

[40]This refers to the aforementioned problem. There are only a few positive outcomes (loan applications) and very few communities with active religious organizations. Obviously, from the very few households that are located in communities with REL = 1 nobody applied for a loan from microfinance or banks.

[41]If I conduct STATA's *linktest* specification test, (1) and (3) are specified correctly, while in (2) there is strong evidence against correct specification and it is likely that there are omitted variables in (2). Maybe, a better NGO variable could explain much more of the microfinance access and demand.

[42]The conditional moment test statistics of the user-written *tobcm* in STATA are 64.512, 328.55, 32.134 for the local group, the microfinance, and the bank model, respectively. In all three cases the p-value is so small that with five digits it is displayed as 0.00000.

Table 6: Conditional OLS estimates on log borrowing demands of households from local credit groups

	(1) DEMAND LOCAL	(2) DEMAND LOCAL
LN_AGE	0.0082 (0.2929)	0.0282 (0.2889)
SEX	0.1926 (0.2280)	0.2320 (0.2216)
LN_SCHOOL	0.1748 (0.1376)	0.1688 (0.1366)
LN_CONS	0.3420** (0.1428)	0.3675** (0.1423)
LN_ASTS	0.3075*** (0.0850)	0.3082*** (0.0833)
LN_HHDSIZE	0.0171 (0.2093)	-0.0020 (0.2037)
DEPRATIO	0.1076 (0.4662)	0.1356 (0.4636)
URBAN	0.5914* (0.3030)	0.6097** (0.2872)
R_EAST	-0.2971 (0.4484)	
R_NORTH	-0.6682 (0.5471)	
R_WEST	-0.1354 (0.4123)	
BANK	-0.1815 (0.5816)	-0.2512 (0.4655)
MICRO	-0.1712 (0.3380)	-0.1288 (0.3375)
GINI_ASTS	0.8298 (1.7432)	-0.1014 (1.5994)
GINI_EXP	1.0516 (1.8634)	2.5657 (1.6714)
ELF	-0.3036 (0.9926)	0.1902 (0.5986)
HALL	0.6007 (0.4431)	0.6205 (0.4604)
NAADS	0.0079 (0.1820)	0.0426 (0.1785)
MEET	-0.0354 (0.1642)	0.0181 (0.1637)
COOP	0.2634 (0.2399)	0.2814 (0.2317)
REL	1.5072*** (0.3891)	
NGO	0.1317 (0.3275)	0.0206 (0.2795)
LN_WAGE	-0.0971 (0.1708)	-0.0473 (0.1663)
LN_COMSIZE	0.0518 (0.1505)	0.0500 (0.1449)
Constant	1.7688 (2.0577)	0.7504 (1.9418)
Observations	211	211
R^2	0.375	0.363

Standard errors in parentheses

Source: UNHS, 2000, 2006; own calculations

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

and significant effect on the likelihood of applying. Taking into account only those who applied, it has a *positive* effect on the *amount* applied for. This means, when taking into account the whole population, it is more promising to demand loans from local credit groups in rural areas. If I look only at those who use these services, I find that loan *sizes* are higher in urban areas.

All other coefficients, including the inequality and leadership variables, are not statistically different from zero. The R^2 is relatively high, as both models explain more than 30 per cent of the variance.[43] If I test for homoskedascity, the Null hypothesis of homogeneous errors cannot be rejected.[44] This can be further confirmed by having a look on the probability plot (see Figure 10 Appendix A.5).

Let us now turn to the other two examined sources. The OLS regression results on log borrowing capacities for loans demanded from microfinance and banks are presented in Table 7. Again, I had to drop the region dummies in one of the models due to collinearity. In all three cases REL had to be dropped, because there was no variance, as in all cases REL was zero. Thus, I present two models (2) and (3) on bank demand. In (1) I find that male-headed households apply for higher loans, and that assets lead to applications for higher loans. While female-headed households are more likely to apply for microfinance loans, male-headed households apply for the larger amounts (under the condition of application). In the reduced bank model (3), apart from the constant, only one coefficient is significant. For the households which applied, only log household consumption expenditures have a positive effect on the log loan amounts.

[43]The reason for this may be the relatively homogeneous sub-population I selected.
[44]The *hettest* result for model (2) was $Chi^2(1) = 0.23$ with $Prob > Chi^2 = 0.6287$.

Table 7: Conditional OLS estimates on log borrowing demands of households from microfinance and banks

	(1) MICRO DEMAND	(2) BANK DEMAND	(3) BANK DEMAND
LN_AGE	-0.1054 (0.3656)	-0.2735 (0.4046)	-0.1886 (0.4002)
SEX	0.5485** (0.2145)	0.1739 (0.2329)	0.1785 (0.2467)
LN_SCHOOL	0.0722 (0.1717)	0.1894 (0.1821)	0.2469 (0.1797)
LN_CONS	0.2167 (0.1747)	0.5348*** (0.1665)	0.5666*** (0.1558)
LN_ASTS	0.2255*** (0.0669)	0.1863 (0.1265)	0.1477 (0.1302)
LN_HHDSIZE	-0.0564 (0.1924)	-0.4341* (0.2305)	-0.2994 (0.2141)
DEPRATIO	-0.2496 (0.5067)	0.2244 (0.4940)	-0.0368 (0.4757)
URBAN	0.1871 (0.1987)	0.1733 (0.2779)	0.0239 (0.3280)
R_EAST	0.0469 (0.2615)	0.8297 (0.5565)	
R_NORTH	-0.2802 (0.3502)	1.1276 (0.7440)	
R_WEST	0.2034 (0.3426)	0.3556 (0.4119)	
BANK	0.1004 (0.4869)	0.3904 (0.5097)	0.4454 (0.4898)
MICRO	0.1255 (0.2210)	0.0052 (0.3172)	-0.1020 (0.3254)
GINI_ASTS	1.4323 (1.9785)	-3.5448 (2.8063)	0.5799 (2.3094)
GINI_EXP	-1.1352 (2.2451)	3.0590 (3.1349)	-0.4634 (1.9919)
ELF	-0.5774 (0.8305)	0.6795 (1.0834)	-0.1358 (0.7460)
HALL	0.3180 (0.3345)	-0.2092 (0.3302)	-0.3351 (0.3318)
NAADS	-0.0661 (0.2378)	0.1507 (0.2311)	-0.0231 (0.2664)
MEET	0.0070 (0.1701)	0.0424 (0.1831)	0.0543 (0.1807)
COOP	-0.2982 (0.2198)	0.2350 (0.2618)	0.2967 (0.2762)
REL	0.0000 (.)	0.0000 (.)	0.0000 (.)
NGO	0.3429 (0.2554)	0.4640 (0.5567)	0.5665 (0.4928)
LN_WAGE	-0.0103 (0.1398)	-0.1352 (0.2192)	-0.2233 (0.1880)
LN_COMSIZE	0.1919 (0.1169)	-0.0886 (0.1250)	-0.0614 (0.1264)
Constant	5.5118** (2.4013)	7.7165** (3.2801)	7.0238* (3.5941)
Observations	206	125	125
R^2	0.310	0.383	0.344
F	4.5479	2.8780	3.4940

Standard errors in parentheses

Source: UNHS, 2000, 2006; own calculations

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 8 presents the logit estimates on participation in credit-related farmer groups. Model (1) contains only the household level controls, model (2) presents the full model without LN_SOCORG and model (3) the full model without LN_AGRORG. I estimated (2) and (3) separately, because of the high (positive) correlation ($r > 0.8$) between LN_SOCORG and LN_AGRORG which is very likely to cause misspecification of standard errors and subsequent wrong calculation of test statistics due to collinearity.[45] Participation in credit groups is negatively affected by age, household size, ethnic fractionalization, inequality in assets (GINI_DURA), and the number of organizations with respect to agriculture, poverty, and social welfare. I find a significant positive effect on the probability to join a credit group, with increasing income, assets, training, community size, and the number of NGOs and programs that are active in credit provision. Following the results of STATA's *linktest* command, all three models are specified correctly. However, from the pseudo R^2 and the Chi^2 statistics I find that (2) and (3) are better specified and that the inequality and leadership variables, as well as the community variables, have a large explanatory capacity.

[45] In an OLS regression with the same independent variables as in the logit model the VIF was higher than 16 for at least one of the two variables.

Table 8: Logit estimates on participation in credit groups

	(1) CREDITMEMB	(2) CREDITMEMB	(3) CREDITMEMB
SEX	0.3438** (0.1444)	0.1527 (0.1686)	0.1425 (0.1676)
LN_AGE	-0.6397*** (0.1641)	-0.6256*** (0.1876)	-0.6502*** (0.1869)
LN_INCOME	0.0906*** (0.0267)	0.0517** (0.0254)	0.0549** (0.0255)
LN_DURA	0.1519*** (0.0347)	0.1103*** (0.0310)	0.1057*** (0.0307)
LN_BUILD	-0.0387*** (0.0102)	-0.0085 (0.0110)	-0.0071 (0.0111)
LN_HHDSIZE	-0.3116*** (0.1131)	-0.3555*** (0.1299)	-0.3650*** (0.1288)
LN_FARM	0.0395 (0.0469)	0.0336 (0.0615)	0.0519 (0.0619)
DEPRATIO	0.0245 (0.5267)	-0.6628 (0.5426)	-0.6435 (0.5314)
TRAIN	0.2222** (0.1031)	0.5530*** (0.1242)	0.5007*** (0.1203)
ELF		-4.2797*** (0.9496)	-4.1639*** (1.0228)
GINI_INCOME		-1.2426 (0.8440)	-1.3241 (0.8573)
GINI_DURA		-19.9064*** (2.3315)	-20.9055*** (2.3471)
LN_CREDORG		0.2164* (0.1209)	0.2754** (0.1150)
LN_POVORG		-0.2105** (0.0981)	-0.2230** (0.0987)
LN_AGRORG		-0.4420*** (0.1213)	
LN_WAGE		-0.0805 (0.1037)	0.0193 (0.1047)
LN_DISTROAD		0.2511 (0.1716)	0.2195 (0.1762)
LN_HHDSCOMM		0.2978*** (0.0911)	0.2804*** (0.0917)
LN_SOCORG			-0.3078** (0.1226)
Constant	-0.3225 (0.7413)	12.1383*** (1.9072)	12.0058*** (1.8800)
Observations	1778	1744	1744
Pseudo R^2	0.036	0.146	0.142
Log lik.	-1179.3636	-1027.6602	-1032.1289
Chi-squared	85.2972	261.2574	263.0155

Standard errors in parentheses

Source: IFPRI, 2003; own calculations

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

7 General Discussion

The effect of inequality and leadership on outcomes of collective action is a highly contested research area and the effects are still disputed in both the theoretical and the empirical literature. So far, empirical work in this regard has been carried out mainly with a focus on user groups of common pool resources. With respect to farmer groups, there is only limited evidence. Especially, in group-based finance only a few studies which explore the effects of inequality and leadership on group-based finance exist.

I have asked how these variables affect collectively organized financial services in Uganda. I have put a clear focus on ethnic heterogeneity, economic inequality, and leadership. I operationalized the two dimensions of inequality by calculating the widely used (and widely criticized) ELF index and Gini coefficients on consumption/income and assets. To examine the effect of these variables together with the effect of leadership, I have used a number of econometric techniques, namely a logit model to estimate access and demand for different sources of finance, a tobit model to integrate borrowing capacities and demanded loans, and subsequent OLS regressions on uncensored observations, as the tobit models did not prove to meet the necessary prerequisite of normality. Additionally, I made use of a second dataset and estimated a logit model to examine the determinants of participation in credit groups. In the next sub-chapter I will discuss the key findings of my analysis and in an additional chapter bring them together with the hypotheses that I have derived from reviewing the relevant literature. A third sub-chapter is dedicated to present the limitations of the study.

7.1 Discussion of Key Findings

In my analysis I have shown that access, demand, and participation in microfinance groups are positively affected by consumption expenditures/income, education/training, and household assets. The same variables have a positive impact on bank access and demand. For local credit groups this is not the case. Here, only consumption expenditures have a positive effect. Beside that, the probability increases with being located in a small and rural community.

In the logit model on bank access, I found that the Gini coefficient of assets had a negative and significant impact on access to microfinance, that ELF had a negative significant effect on bank access, and that in both cases access decreased if the community held meetings to address problems within the community. The negative effect of inequality in

assets on access to microfinance loans is in line with my propositions and there are several potential mechanisms through which this may work. If the microfinance organization is not flexible in the size and repayment schemes of the provided loans and in the presence of economic inequality, it may become difficult to form groups, as preferences regarding loan sizes or repayment periods will vary a lot over potential borrowers. Additionally, peer-pressure and monitoring may be affected, as proximity of living standards is likely to have an effect on local information. Even though this problem may be less severe in rural areas—here, due to the small community size, observability is likely to be very high, even when individuals differ a lot—in urban areas or larger rural communities this may play a role. Moreover, class solidarity or a lack of empathy for the living conditions of the economically distant counterparts may inhibit cooperation or lead to group conflict.

The results showed that ethnic heterogeneity has a significant negative effect on bank access. As banks are unlikely to operate in small villages and will rather be located in the districts' highly populated centers, I would not expect the district average of community level ELF to have an effect on bank access. If community level ELF was correlated with district level ELF, the measure could be associated with the district level of ethnic conflict or patronage which could then represent risks and unfavorable business environments for commercial banks.

I found that regular meetings in the community have a negative effect on access to *both* microfinance and banks. As regular meetings may ease conflict settlement, facilitate access to local information, and create social networks, I would expect them to have a *positive* effect at least on group-based microfinance. However, problems can only be addressed if problems exist. Maybe the MEET variable is in fact proxying for a "problematic" community. It could be the case that microfinance organizations are aware about this community attribute and are consciously avoiding respective communities. As commercial banks typically do not engage in group-lending, this argument would also work to explain the negative effect of regular meetings on bank access, as also the banks may want to avoid problematic communities since they may present higher risks.

In the OLS estimates on the available amounts, I have found that inequality is of less importance.[46] With respect to the leadership variables I have shown that REL has a highly

[46]ELF is positive and significant in the microfinance model and GINI_ASTS is negative and significant in the bank model, in both cases only at at the 10% significance level. The negative effect of the Assets Gini on the size of bank loans may be explained by an increase in information asymmetry. When a community is homogeneous the bank can easily assess a borrower's assets—which may serve as collateral—from the population mean. This will not be possible in a heterogeneous population. To account for this risk the bank cannot react by increasing interest rates, as this may lead to adverse selection.

significant negative effect on accessible microfinance loan sizes and COOP has a significant negative effect on accessible bank loan sizes. Since the REL variable has very little variance and only a very few communities received help from religious organizations, I should be careful with interpretations. It is highly doubtful that assistance of a religious organization really decreases borrowing capacities. The significant COOP variable may have little to do with leadership, too. For the bank I would expect leadership to be irrelevant. It may be that cooperatives predominantly form where banks are absent. In this case, however, the implicit assumption of fully exogenous independent variables would be violated.

On the demand side I am dealing with real household behavior and observed choices and do not rely on the "fuzzy" information on finance access. Moreover, there is information on another form of group-based credit: local credit groups. In contrast to microfinance, these groups accumulate member-funds that form the basis for loans.

With respect to local groups, I find that none of the inequality measures is significant, but the Asset Gini and ELF have the expected sign. Again, there is a slightly significant negative relationship ($p<0.1$) between meetings and the probability of having asked for a loan from a local credit group. As in the access models on microfinance and banks, I could argue that the *existence* of major problems and addressing are correlated and the variable may be in fact a proxy for problems, not for addressing them.

Another interesting point is that the probability of credit applications to local groups is higher in small and rural communities, while both variables do not play a role with respect to the other two sources. It is unlikely that this effect can be explained by mere geographic proximity, since neither the existence of a microfinance organization nor a bank within the community have a significant limiting effect on demand from local groups. Hence, the best explanation may be found in the higher observability, better access to information, and the better functioning of social punishment to enforce compliance in these groups. In case of open access, population size may limit group size, which may have a positive effect on collective action (Olson, 1965).

In the microfinance model, the Expenditure Gini is significant and negative, which is in line with my expectations. Like the Gini on assets in the microfinance access model, GINI_EXP may inhibit loan demand, as households are less likely to believe in the success of a microfinance group under economic inequality. Household expenditures depend critically on household income and income reflects the ability to repay loans. If the microfinance organization strives to disburse relatively equal loan amounts to all potential borrowers of a to-be-formed group, these may be either too high for the poor or too low

for the rich. However, then there should be a similar effect with respect to inequality in assets, and the Asset Gini should have a negative sign, because also assets reflect repayment capacities when they can be cashed in. One should not be misled by the positive sign of the Asset Gini in the microfinance demand model. Since both Ginis are fairly correlated (r=0.60), the positive sign largely reflects the estimation technique.[47] Like in the OLS access model, there is a significant positive effect of ELF in the logit microfinance demand model. How can this be explained? Is there really a positive effect of living in an ethnically heterogeneous community on demand of microfinance loans? Are groups functioning *better* in ethnically diverse communities? One explanation could be that microfinance organizations pursue the goal of inter-ethnic cooperation and are thus encouraging loan demands from these communities which then leads to a higher probability of demand. Another explanation could be that only co-ethnics will join a group and that in the presence of high ELF in a small community these few co-ethnics may already form a strong network with a high level of social cohesion that may translate into a well-functioning *homogeneous* group. On the other hand, it could also be possible that in fact *heterogeneous* groups have an advantage. If ethnicity goes along with complementary skills—at least with respect to language it often will—and these complementary skills are needed to approach a microfinance organization, the heterogeneous community will have a direct advantage, as it is able to draw on all the necessary abilities to form a heterogeneous group. If the various forms of finance interact and microfinance organizations go where there is a lack of local groups, local groups do not work with ELF, this could also be a reason. I implicitly assumed that there are no omitted variables in the model and all independent variables are fully exogenous and another econometric technique (*e.g.* Instrumental Variable Regression) would be needed to show this.

The last two significant variables of interest in the microfinance demand model are HALL and NAADS, both with a positive sign and significant at the ten per cent level. This may indicate that the NAADS program has been successful in facilitating group formation also in microfinance, probably by spreading information on microfinance or by linking farmers to microfinance organizations. The positive impact of HALL, may easily be explained by the positive effect on regular group meetings.

In the OLS estimates on local group loan sizes none of the variables with respect to heterogeneity, inequality, and leadership is significant. Loan sizes increase with consumption

[47] If I drop GINI_EXP in this model, indeed, the coefficient of GINI_ASTS becomes negative, even though not significant. However, the problems with collinearity are not as severe to present a reduced model. All VIFs were still below 4.

expenditures, assets, and living in an urban area. Likewise, loan sizes from the other two sources are not significantly affected by heterogeneity, inequality, or leadership. These variables have an impact on the incidence of demanding a loan, but once this condition is met, they do *not* impact the demanded loan *size*.

By using an additional dataset in the last—and probably most interesting and best performing—model, I have examined the determinants of participation in farmer groups with a focus on savings and credit. Due to the different data, I was not able to use exactly the same variables, but the dataset contained useful information on the availability of external leadership on the community level and it was possible to calculate measures of ethnic heterogeneity and economic inequality from the observations on the district level. From the results I find that participation is negatively and significantly affected by ELF and inequality in assets. This mirrors the findings on demand, where I observe a negative effect of these two measures in the logit model on local groups, even though not significant. However, since I am observing exactly the opposite relationships in the microfinance model, I am probably facing a problem of non-exogenous or omitted independent variables. Maybe local credit groups and microfinance are strongly interrelated. If, for example, ELF and inequality in assets inhibit formation of local credit groups, microfinance organizations could subsequently target the "left-over" communities. In this case, the presence of microfinance would not be *caused* by ELF or inequality in assets, but by the absence of local groups.

With regard to leadership, I find that the number of active organizations and programs with a focus on credit, significantly increases the probability of participating in a group, while the presence of organizations and programs with a poverty, social, or agricultural focus *decrease* the probability. The most likely reason for this would be that these organizations provide some good *substitutes* to credit. An agricultural organization, for example, may inform on less capital-intensive forms of farming, which will limit the need of credit. Subsequently, the benefits from participating in credit groups may be lower. Another possible explanation could be that households have limited capacities to participate in community groups. Organizations with a different focus will not encourage formation of *credit* groups, but of other groups and households are more likely to join groups with other purposes, leaving behind only small remaining capacities for *credit* group participation. Again there could also be a conceptual problem, since leadership may not be fully exogenous. Organizations may be requested by the community, rather than just being there and waiting to assist in group formation. If a community faces only one major problem and is rather content with everything else, it will try to attract external help only for this

particular problem and causation rather runs from the problem to leadership, than from leadership to groups. Thus, *correlation* between group participation and leadership does not have to mean *causality* as assumed in the model. However, an extensive testing of endogeneity and the direction of causality would go beyond the scope of this thesis. For now, I will stick to the assumption that leadership is fully exogenous.

7.2 Hypotheses Testing

From the literature I have derived a number of hypotheses on the effects which heterogeneity, inequality, and availability of external leadership may have on group-based financial services.

In *H1* I stated that ethnic heterogeneity has a negative effect on these services. With respect to access, I have to reject this hypothesis. I made use of a logit model, a tobit model, and an OLS regression to examine the impact of ELF on access to microfinance and formal banks. The ELF measure is not significant in the microfinance logit model, and I observe a slightly significant ($p > 0.1$) positive effect when I look at the amounts. Moreover, contrary to my expectations, the ELF index is negative and significant in the bank access logit model. I find a similar evidence for microfinance and banks. In the model on demand from local groups the coefficient is negative for ELF, even though it is not statistically different from zero. By looking at the demanded amounts, I find that for none of the sources under examination ELF it has a significant effect. Once a group is formed and has managed to cope with ethnic heterogeneity, the amounts are not negatively affected. One exception could be a case similar to the one described by La Ferrara (2002b). She argues that heterogeneity may result in "equalizing institutions". In the case presented here this could culminate in a "the-same-loan-size-for-everybody"-policy. Subsequently, this may lead to lower average amounts disbursed, as the group is likely to try keeping default rates low and in this case loan amounts will be constrained by the repayment capabilities of the poorest members. Here economic inequality and ethnic heterogeneity are interacting. While economically *homogeneous* groups may function well with these "equalizing institutions", economically *heterogeneous* groups may face severe problems to balance the demand for flexible loan amounts with "equalizing institutions". However, empirically I cannot observe such interaction with my research design. One possibility to check for such effects, would have been to add interaction terms to the regressions. Unfortunately, both datasets do not allow for such interaction terms, as the variance of ELF is much higher than the variance of the Gini coefficients. As a consequence, in both datasets the interaction

term is highly correlated (r > 0.9) with the ELF measure. Perhaps, it is more promising to address this question with a completely different method, for example by designing an economic experiment. In the participation model I find that ELF has a significant negative effect on participation, indicating that ethnic conflict may inhibit group formation, or that the existing strong ties between co-ethnics may foster group-functioning, because monitoring and sanctioning may work much better. With regard to access and participation in local credit groups, I can accept *H1*. In microfinance I am observing the opposite relationship—a positive effect of ELF on microfinance access. As already mentioned, this could be caused by the erroneous assumptions of the model. With respect to microfinance, I will, therefore, neither accept nor reject *H1* and leave this question open for further research.

In *H2* I stated that economic inequality has a negative effect on group-based credit. I would expect these negative effects especially in finance, because, as argued before, equal loan sizes and repayment capacities may be crucial for group functioning. Indeed, I find negative and significant effects of the asset and expenditure Gini coefficients in the microfinance access and demand logit models, respectively. I also find a highly significant negative effect in the logit model on participation in credit-related farmer groups. I can only speculate which of the aforementioned mechanisms are responsible for these results. However, I can conclude that economic inequality has a negative effect on group-based finance. I will therefore accept *H2*.

In *H3* I pronounced that heterogeneity, inequality, and leadership play no role in formal finance. Contrary to this, I observed a significant and negative coefficient of ELF in the access model. I argued that indeed low levels of ELF may be a proxy for a district free of (ethnic) conflict, subsequently representing lower risks for investments or lower levels of patronage. A similar argument was developed for economic inequality. Moreover, I pointed out that in a community of economically heterogeneous borrowers it may be more difficult for banks to assess individual credit worthiness. However, if these effects of heterogeneity and inequality existed, I cannot find any reliable statistical evidence for them. I will neither accept nor reject *H3*, as from my perspective the effect of inequality on bank services demands deeper *theoretical* exploration first.

In *H4*, I stated that external leadership facilitates access and demand to group-based finance, namely local groups and microfinance groups. Generally, I cannot accept this hypothesis. I do not find any positive relationship between availability of external leadership and access and demand, probably because the respective variables are not appropriate for my purposes. I only find that the coefficient for the NAADS is slightly significant and positive, which may indicate some first successes of the program.

The fifth hypothesis, *H5*, refers to the form of leadership and the positive impact of democratic decision-making. As I am hardly observing any significant effects of leadership on local groups and microfinance, I cannot answer the question of differences. Hence, I cannot accept *H5*. With respect to regular meetings, I find a surprising negative effect—even though not significant in all cases—on access and demand for *all* sources of finances. Therefore, it is likely that this effect is rather related to finance in *general*—for example it may proxy for a community with a lot of problems—, than to groups in *particular*.

In *H6*, I have assumed that the presence of leadership increases the likelihood of participation. Here I have to differentiate by the form of leadership. Indeed, I find a significant positive effect of the number of organizations and programs with a focus on credit on the probability to participate in a credit group. The presence of other programs and organizations reduces this probability. I have argued before that these results may be misleading. Under the condition that leadership is fully exogenous, I can accept *H6* with respect to credit-related organizations and programs. Moreover, I could then argue that *unspecific* assistance provides substitutes to credit or that households have limited group participation capacities and the presence of leadership with different focii has a negative effect, as it distracts households from pursuing membership in *credit* groups.

7.3 Limitations of the Study

The analysis is limited in some ways. In this chapter, I will present some of the limitations that, from my point of view, are the most relevant. First of all, the data I used were from secondary sources, and not primarily gathered by me to answer my particular research questions. This has led to a number of compromises, especially with respect to the leadership variables. For the presence of NGOs and religious organizations, for example, I relied on a question from the community module of the UNHS that has asked whether an organization of this kind assisted in addressing problems within the community. This includes much more than mere availability or existing contacts and links with community members. Moreover, the data did not contain any information on burial societies. I have shown that these societies are widespread in Africa and also play a vital role in the civil life of rural Uganda. Probably, they have a high explanatory capacity with respect to the formation of local credit groups. Also the measures of ethnic heterogeneity and economic inequality suffer from a lack of accuracy. Aside from the conceptual difficulties of ELF which I have discussed in chapter 2.2, there may be the mentioned computational diffi-

culties as well. For the UNHS data I calculated the ELF on the community level from an older survey and then used the mean of the district to merge it with the more recent survey. For the IFPRI data, I calculated it on the district level, directly from the observations. In both cases, I do not have a precise measure of community level ELF. The same applies to the Gini coefficients. For both datasets I calculated them on the district level, and, for example, in case of high *intra*-community homogeneity, and high *inter*-community heterogeneity they are not capturing the local inequality that I was interested in. Another difficulty arises from the simple *per se* effect of heterogeneity and inequality which I have assumed. As argued for example by Poteete and Ostrom (2004), there are no such *per se* effects, but institutional responses to community attributes such as heterogeneity over some dimension. Unfortunately, I could not examine these institutional adaptations with my research design and all results and interpretations are based on the assumption of a simple relationship on collective action outcomes. Another critique refers to the potential endogeneity of some variables, as discussed in chapter 5.3. Inequality, for example, may be a *result* from finance, as discussed by Copestake (2001). Also other variables like income may be endogenous. Not only can income increase access and use of financial services, but the use of financial services can *vice versa* have a (positive) effect on income.

8 Conclusion

In my thesis I have asked whether ethnic heterogeneity, economic inequality, and availability of external leadership have an effect on group-based lending in Uganda. I have shown that the role of inequality and leadership is highly disputed in the theoretical and empirical literature on collective action. A large number of studies explore these effects, especially with respect to collective management of the commons. While a number of authors implicitly assume a *per se* effect of various dimensions of inequality on collective action and group formation, others argue that these attributes do only affect collective action outcomes *via* institutions. This means that a group will always adapt to community attributes and there is no simple relationship between, for example, inequality and collective action outcomes. By using simple econometric techniques, I have taken an approach that refers to the first group of scholars. I have partly justified this by the fact that designing institutions is costly. Given the fact that inequality may demand adaptation means that a more equal group has a comparative advantage, as it does not have to bear the cost of institutional design and it is less constrained in its institutional choice. Even though institutions were not directly incorporated into the econometric model, I referred to them in the discussion in multiple ways. I have argued that to avoid the emergence of inter-ethnic conflict, ethnically heterogeneous groups often respond with "equalizing institutions". I have discussed that this may be irrelevant for economically homogeneous groups, but may cause problems for economically heterogeneous groups. With respect to ethnic heterogeneity and microfinance, I have argued that co-ethnics often maintain deeper social networks and that these social networks are important in determining performance—*i.e.* repayment rates in most of the empirical work—in group-based finance.

Evidence from the empirical part on this issue is mixed. While ethnic heterogeneity has a highly significant negative effect on participation in credit-related farmer groups, and also has a negative sign in credit demand from local credit groups, in microfinance it has a slightly significant *positive* effect. I have argued that in small communities high ethnic fractionalization may lead to even stronger ties between co-ethnics. As a consequence, co-ethnics may sort into highly homogeneous microfinance groups. However, I would expect the same thing to happen with respect to local groups. It might be the case that complementary skills are necessary to approach microfinance organizations and that ethnically heterogeneous communities are more likely to come up with all these necessary skills. Another reason could be that an important variable is missing in the microfinance model. I have argued that microfinance organizations serve the "left-over" communities.

In this case, the positive effect of ethnic heterogeneity is caused by correlation, but not by causality and the model is misspecified.

I have discussed how economic inequality may affect group-based finance. Economic inequality is likely to translate into high differences in preferences regarding loan sizes or repayment schemes. Traditional voting rules, like "one member, one vote" may not work in the presence of inequality. Those with the higher shares and interests may want to exert more influence on decision making. Local groups often work with simple rotating pot arrangements and also microfinance organization may want to encourage formation of groups that do not largely differ in their loan sizes. As a consequence, it is likely that in an economically heterogeneous community prospects for group formation are limited. The results reveal that this is indeed the case. At least one of the Gini coefficients on expenditures, income, and assets was significant and negative in the microfinance models and in the group participation model. As a matter of course, wealthier users do not contribute more to organizing these groups. They may easily find alternatives and opt for exit, *i.e.* they turn to commercial banks. Contrary to public good production, their individual benefits from participating in an unequal group will be low.

The third question, I have asked what is the role of external leadership in group-based finance. Evidence on this issue is mixed. While I found a highly significant positive effect of the number of programs and organizations with respect to credit on participation in credit-related farmer groups, I could hardly show any effect of religious organization, cooperatives, or NGOs on credit access and demand from local groups and microfinance groups. The latter point can partly be explained by the limited suitability of the available data. An interesting exception in this regard has been the slightly significant positive effect of NAADS on access to microfinance, which may indicate some first impacts of the program. I have found strong negative effects of the number of programs and organizations with different focii on participation in credit groups. One explanation, I have discussed, was that these other organizations may provide substitutes to credit and will therewith decrease the benefits from *credit* group participation.

Since the presented analysis has several limitations and only touches a small extract of the complex reality, one should be careful with deriving any simple policy implications. As shown before, ethnic heterogeneity and economic inequality may have an effect on group-based finance, and policy makers should keep this in mind, for example, when they design respective programs. Group lending that is based on peer-pressure may work much better when social ties between members are strong. If these ties are related to ethnicity or economic endowments in the short-run, it may be a successful strategy to encourage

formation of homogeneous groups. However, this may create a deepening of social cleavages and further isolation of societal sub-groups. In the long-run the outcomes of such segregating policies may be misleading. It will be particularly challenging to balance the need for well-functioning groups with the intrinsic positive effects of cooperation between distant groups. Policy makers should also consider the negative effects of economic inequality on credit access. Any policy which increases economic inequality will have a negative effect on individual credit use, while moving to a more equal distribution will facilitate credit access. I have shown that *specific* leadership has a positive effect on group formation. Provided that the group participation model is correctly specified, it is also the case that *unspecific* leadership has a negative effect on the probability of a household's choice to participate. In this case, a detailed analysis of a community's needs is essential. Moreover, it is worth further exploration whether this negative effect is caused by the provision of substitutes. I have shown that income/expenditures, assets, and education/training positively impact access to microfinance. If these results do not suffer from an endogeneity bias, creating opportunities for higher incomes—*e.g.* by further reducing cash crop taxation—or providing easier access to training and education, may be a good policy option to improve access and use of finance.

In my attempt to answer my research questions I have faced a number of limitations and the results call for further confirmation. The research questions remained partly open and a number of new interesting questions arose. Further research is desperately needed to validate the presented results and address the new questions. I have concentrated on two of the most relevant dimensions of heterogeneity and inequality: ethnicity and economic endowments. However, there are many more dimensions which may play a role. With respect to microfinance and rural areas, gender inequality and inequality in land may be of special interest in the context of Uganda. Moreover, the *interaction* between various dimensions is not yet fully explored. Another important point is that in my analysis I was not able to incorporate the institutional dimension of group formation. Releasing the simplifying assumption of a *per se* effect of inequality on collective action outcomes will be necessary to derive more meaningful policy recommendations and knowledge on institutions of adaptation. This could be achieved by comparative in-depth case studies on homogeneous and heterogeneous groups. I have argued that dimensions of heterogeneity and inequality are likely to interact. However, I was not able to further explore this interaction. The proposition that ethnic heterogeneity and subsequent "equalizing institutions" may affect collective action outcomes differently, depending on the level of economic inequality, could be tested by building on respective research in experimental economics.

With respect to leadership, my work was constrained by the limited suitability of the secondary data. Gathering of primary survey data which goes into more detail in this regard, would be a promising way to explore this question in more detail. This could be accompanied, for example, by interviews with community members that make use (or want to make use) of external leadership and the representatives of organizations which provide leadership. It would be interesting, for example, to ask how "modern" organizations like NGOs relate to "traditional" ones like burial societies. Do these newer forms of leadership crowd out the older ones? And if so, what are the effects? By doing this analysis, new and highly policy-relevant knowledge could be generated.

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Declaration

I do hereby solemnly declare that I have completed the preceding Master Thesis independently, and have not used any other sources or aids apart from those listed.

Date Signature

A Apendix

A.1 Summary Statistics

Table 9: Summary statistics UNHS

Variable Name	Mean	Standard Deviation	Minimum	Maximum
LN_AGE	3.68	0.36	2.56	4.65
SEX	0.73	0.44	0.00	1.00
LN_SCHOOL	1.88	0.65	0.00	2.94
LN_CONS	11.05	0.86	8.02	14.84
LN_ASTS	13.09	1.70	5.99	20.26
LN_HHDSIZE	1.56	0.68	0.00	3.50
DEPRATIO	0.50	0.26	0.00	1.00
URBAN	0.23	0.42	0.00	1.00
R_EAST	0.26	0.44	0.00	1.00
R_NORTH	0.22	0.41	0.00	1.00
R_WEST	0.24	0.43	0.00	1.00
LN_WAGE	7.33	0.58	4.61	8.52
LN_COMSIZE	4.99	0.66	3.26	7.69
BANK	0.02	0.13	0.00	1.00
MICRO	0.06	0.25	0.00	1.00
GINI_ASTS	0.78	0.08	0.45	0.93
GINI_EXP	0.44	0.06	0.25	0.60
ELF	0.31	0.17	0.01	0.73
HALL	0.07	0.25	0.00	1.00
NAADS	0.21	0.41	0.00	1.00
MEET	0.58	0.49	0.00	1.00
COOP	0.10	0.29	0.00	1.00
REL	0.00	0.07	0.00	1.00
NGO	0.05	0.22	0.00	1.00

Source: UNHS, 2000, 2006; own calculations

Table 10: Summary statistics IFPRI

Variable Name	Mean	Standard Deviation	Minimum	Maximum
SEX	0.82	0.38	0.00	1.00
LN_AGE	3.67	0.33	1.79	4.45
LN_INCOME	12.13	2.27	0.00	17.77
LN_DURA	10.98	1.90	0.00	14.77
LN_BUILD	6.00	5.47	0.00	16.12
LN_HHDSIZE	1.55	0.53	0.00	2.83
LN_FARM	0.74	1.18	-8.00	3.49
DEPRATIO	0.02	0.10	0.00	1.00
TRAIN	0.30	0.46	0.00	1.00
LN_WAGE	7.15	0.63	6.16	9.21
LN_DISTROAD	0.60	0.35	0.00	1.58
LN_HHDSCOMM	4.59	0.68	3.09	6.55
ELF	0.16	0.23	0.00	0.90
GINI_INCOME	0.73	0.09	0.46	0.83
GINI_DURA	0.56	0.04	0.45	0.64
LN_CREDORG	0.65	0.59	0.00	1.95
LN_POVORG	0.45	0.62	0.00	2.20
LN_AGRORG	0.90	0.60	0.00	2.08
LN_SOCORG	0.60	0.60	0.00	1.95

Source: IFPRI, 2003; own calculations

A.2 Probability Plots for Borrowing Capacities, Log Borrowing Capacities, Demanded Loans, and Log of Demanded Loans from Microfinance

Figure 1: Plot of standardized normal probability against uncensored borrowing capacity of household heads from microfinance

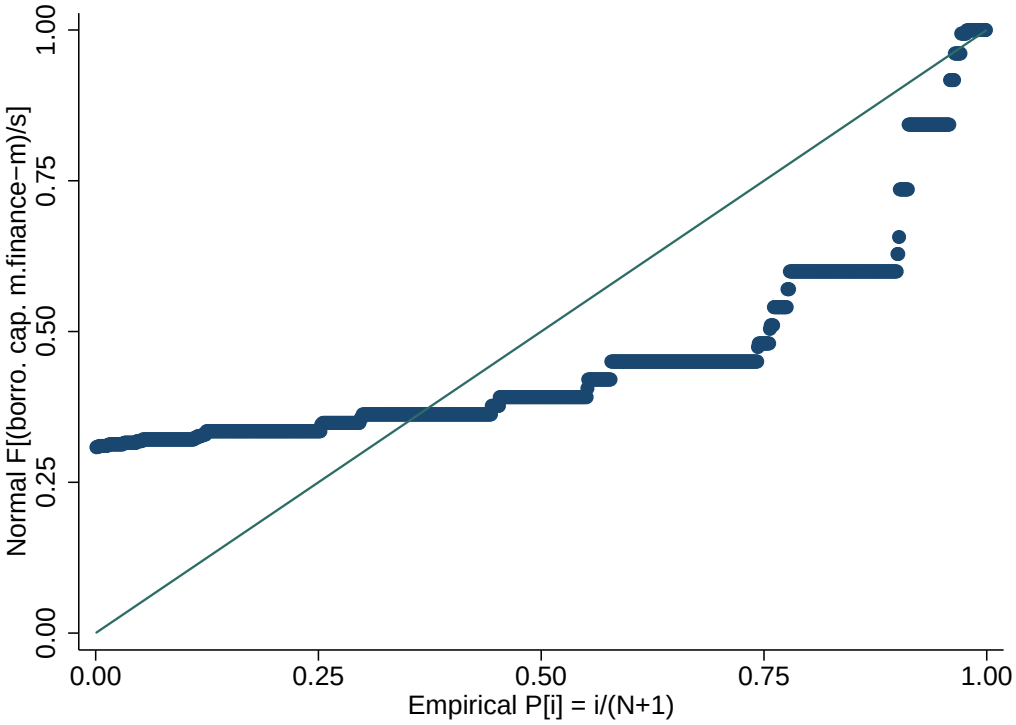


Figure 2: Plot of standardized normal probability against natural logs of uncensored borrowing capacity of household heads from microfinance

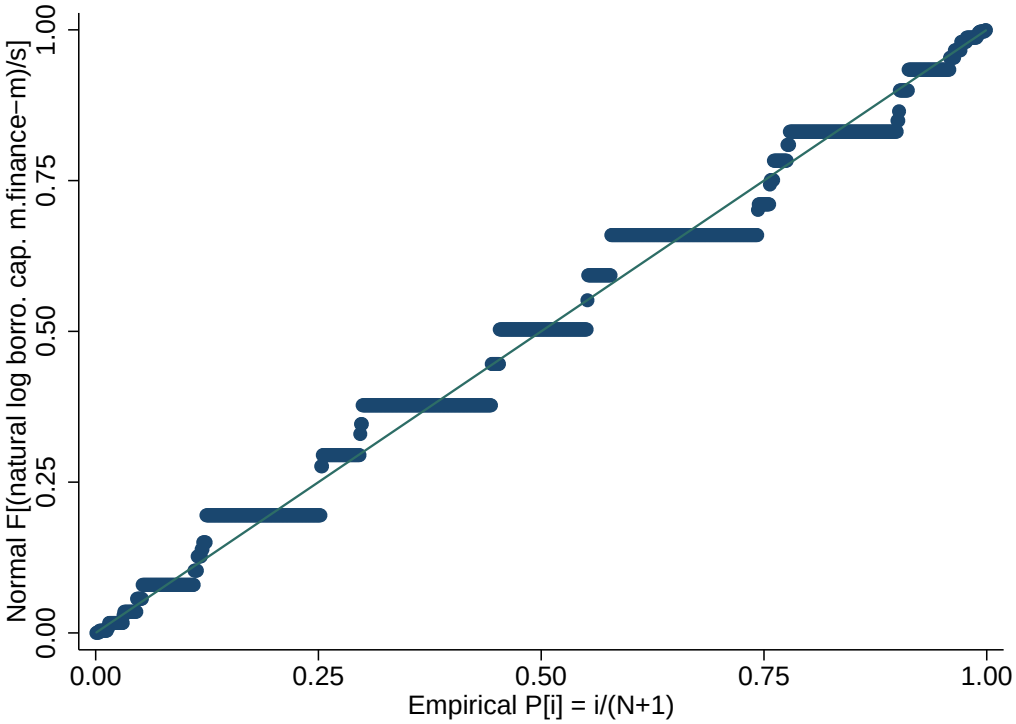


Figure 3: Plot of standardized normal probability against uncensored demanded loans of households from microfinance

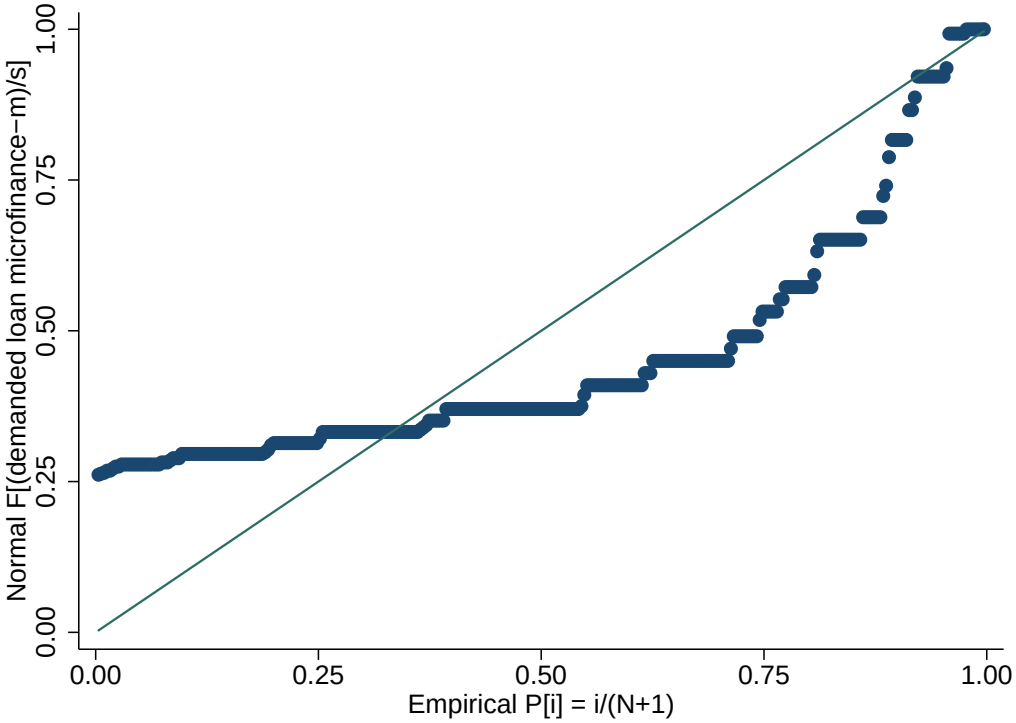
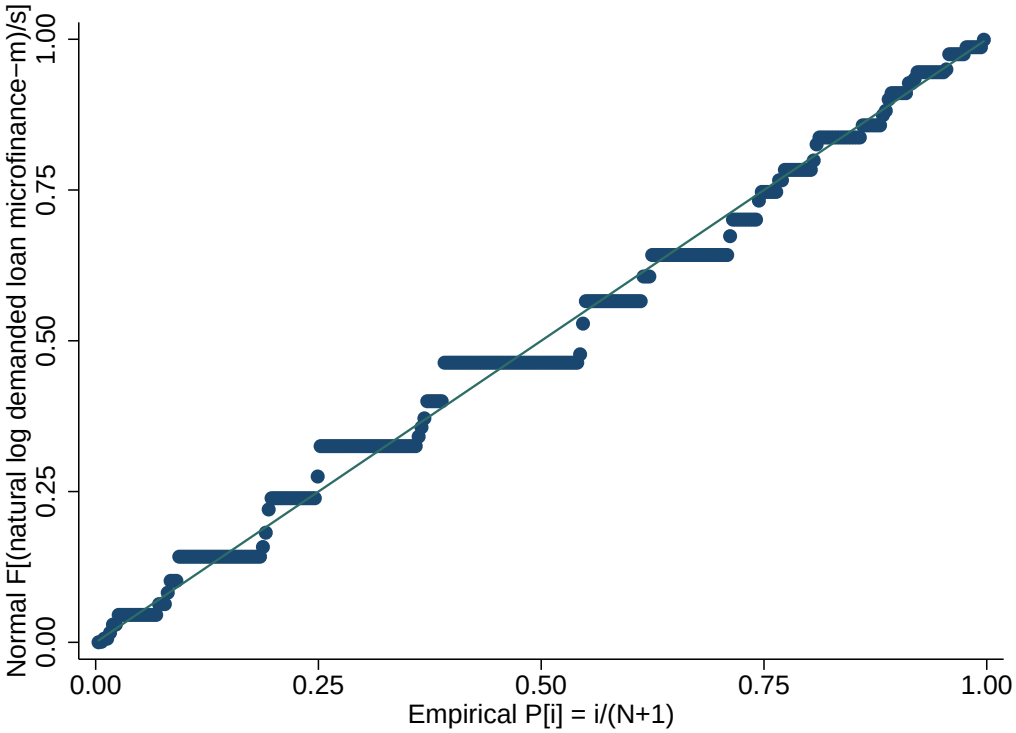


Figure 4: Plot of standardized normal probability against natural log of uncensored demanded loans of households from microfinance



A.3 Dotplots of Frequencies of Predicted Probabilities for Access to Microfinance and Banks

Figure 5: Plot of frequencies of logit estimated probabilities for household head's access to microfinance

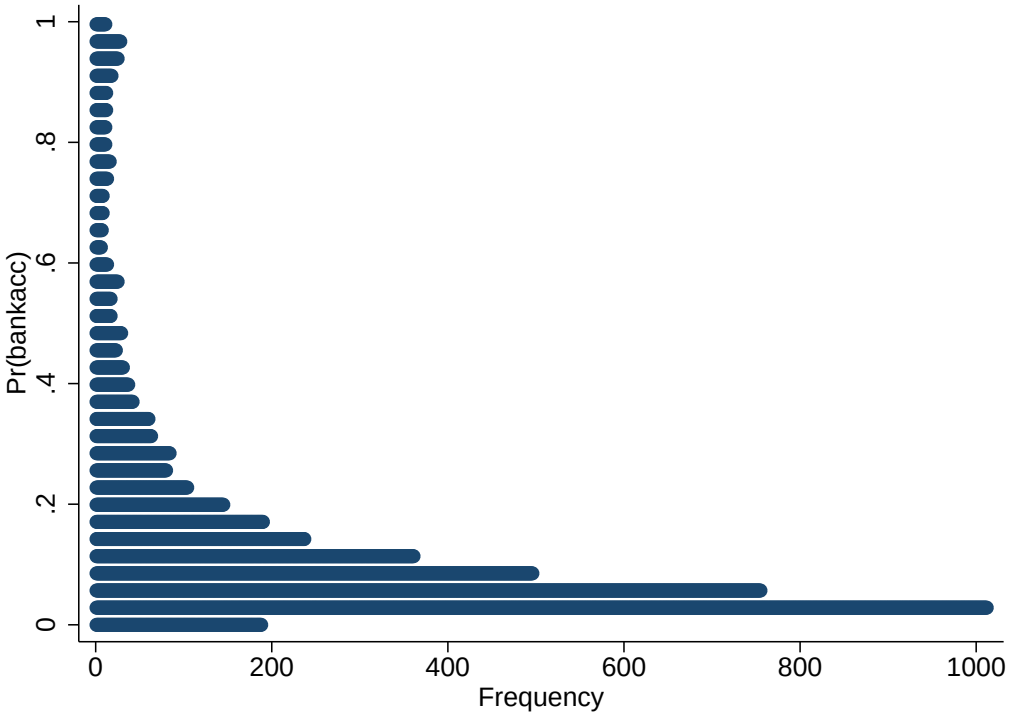
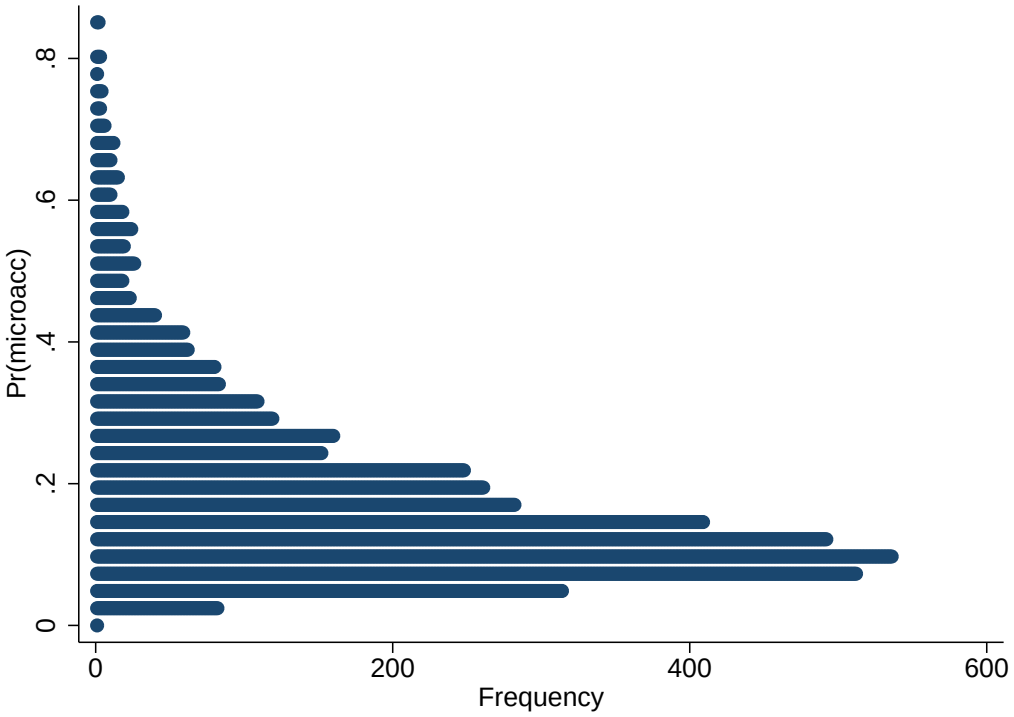


Figure 6: Plot of frequencies of logit estimated probabilities for household head's access to banks



A.4 Dotplots of Frequencies of Predicted Probabilities for Demand from Local Groups, Microfinance, and Banks

Figure 7: Plot of frequencies of logit estimated probabilities for household level loan demand from local groups

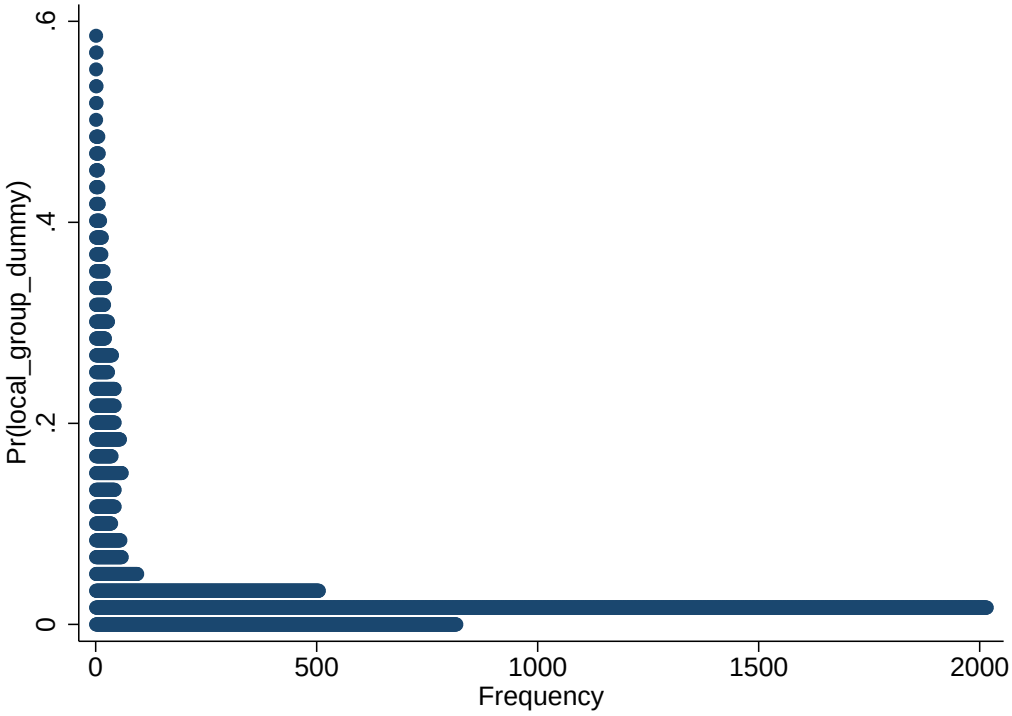


Figure 8: Plot of frequencies of logit estimated probabilities for household level loan demand from microfinance

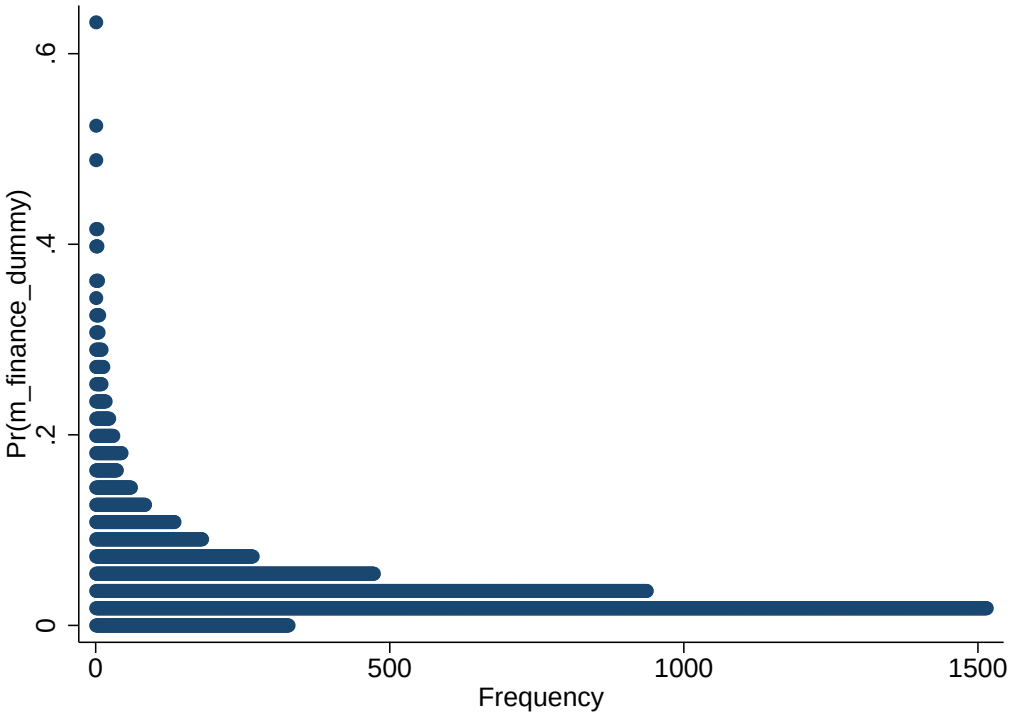
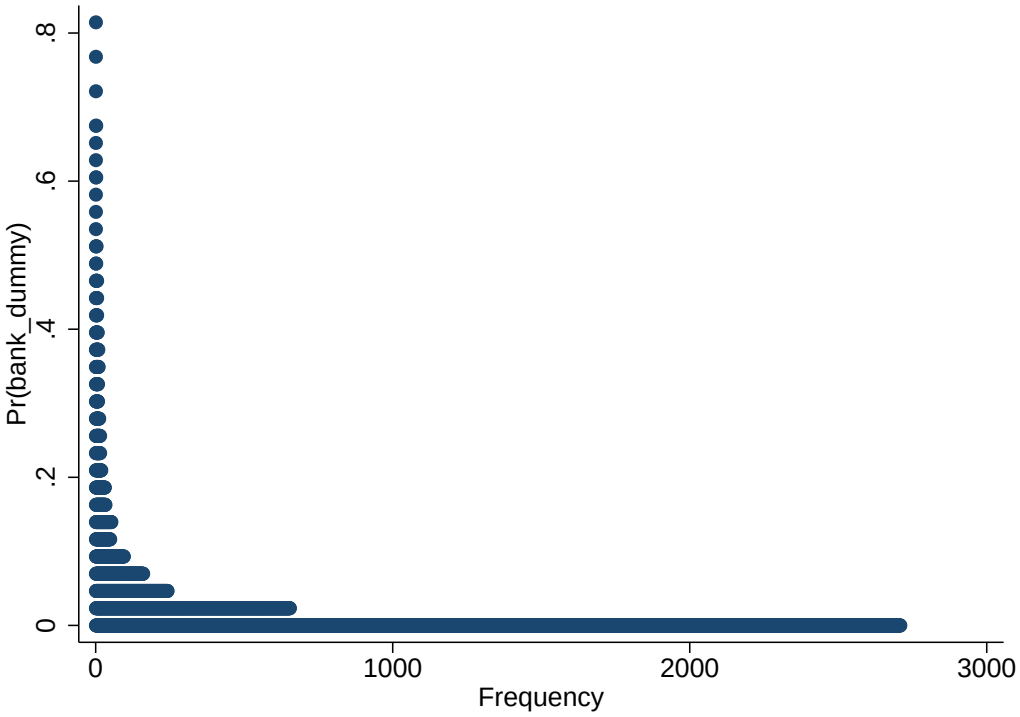


Figure 9: Plot of frequencies of logit estimated probabilities for household level loan demand from banks



A.5 Probability Plots for Residuals of Conditional OLS on Log Loan Amounts from Local Groups, Microfinance, and Banks

Figure 10: Plot of standardized normal probability against residuals of OLS on uncensored log loan amounts from local groups

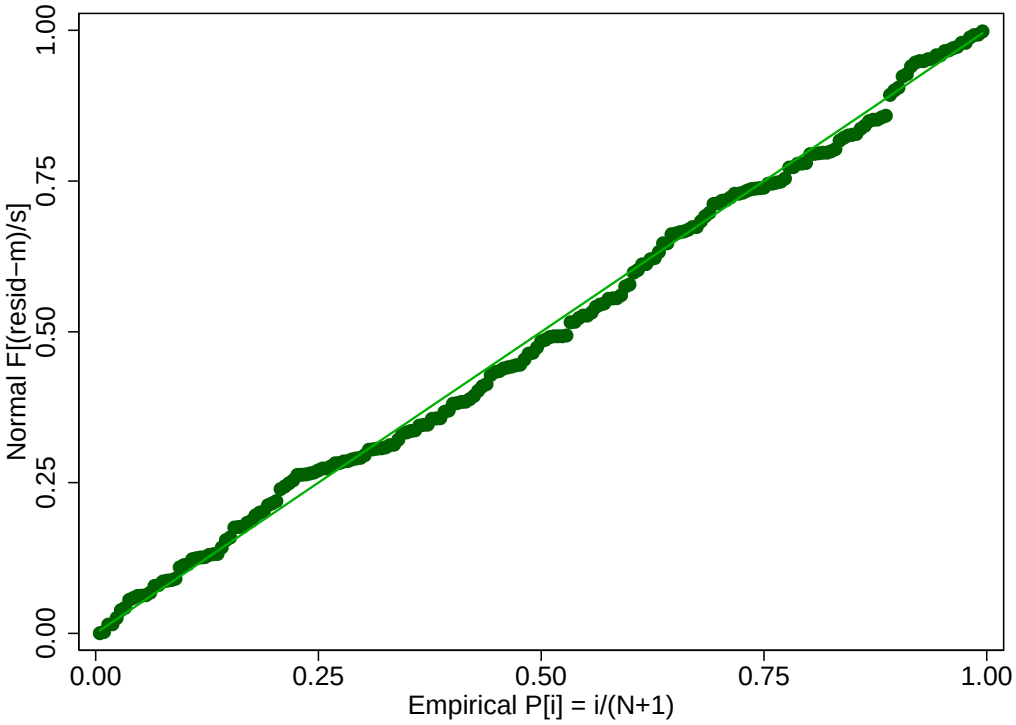


Figure 11: Plot of standardized normal probability against residuals of OLS on uncensored log loan amounts from microfinance

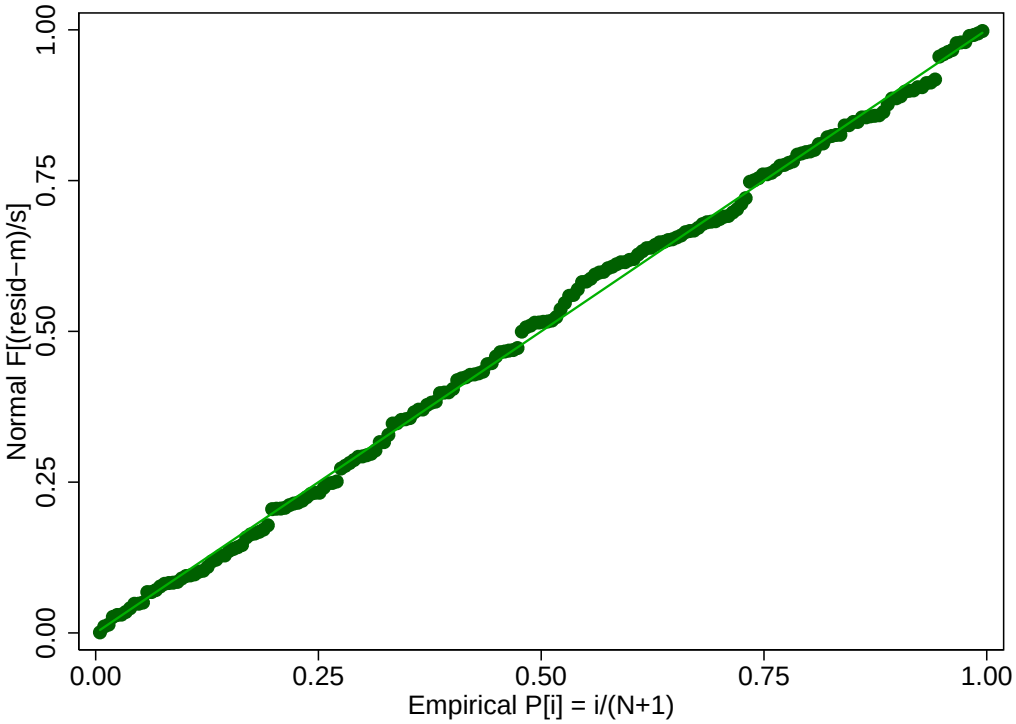
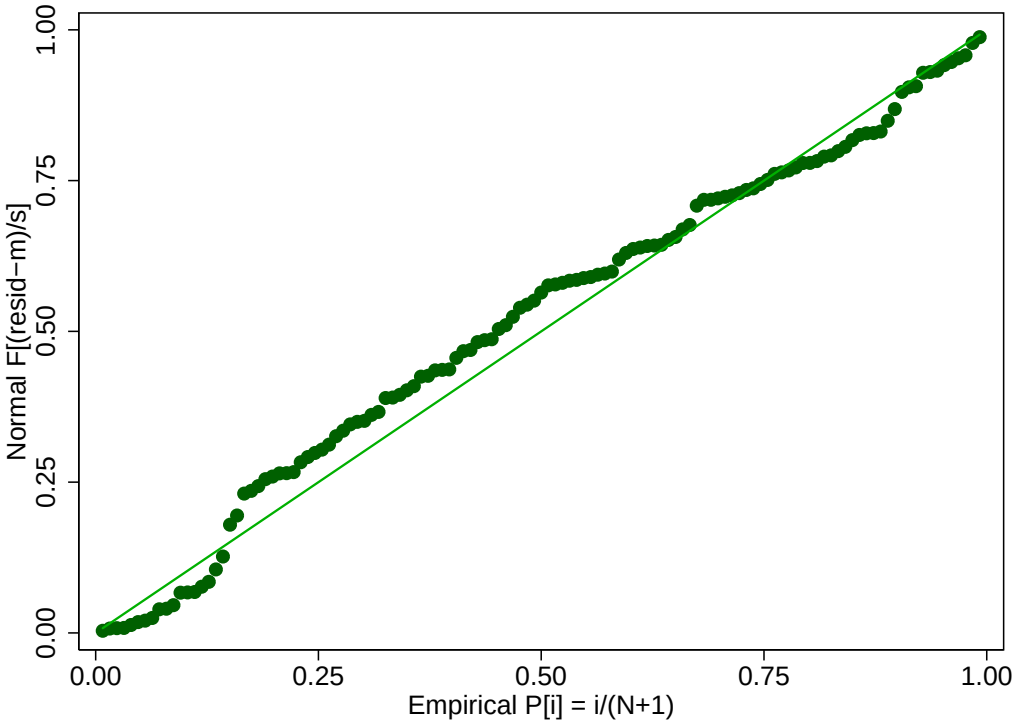


Figure 12: Plot of standardized normal probability against residuals of OLS on uncensored log loan amounts from banks



A.6 Plots of Residuals vs. Fitted Values for Log Loan Amounts from Local Groups, Microfinance, and Banks

Figure 13: Residuals vs. fitted from OLS on loan amounts from local groups

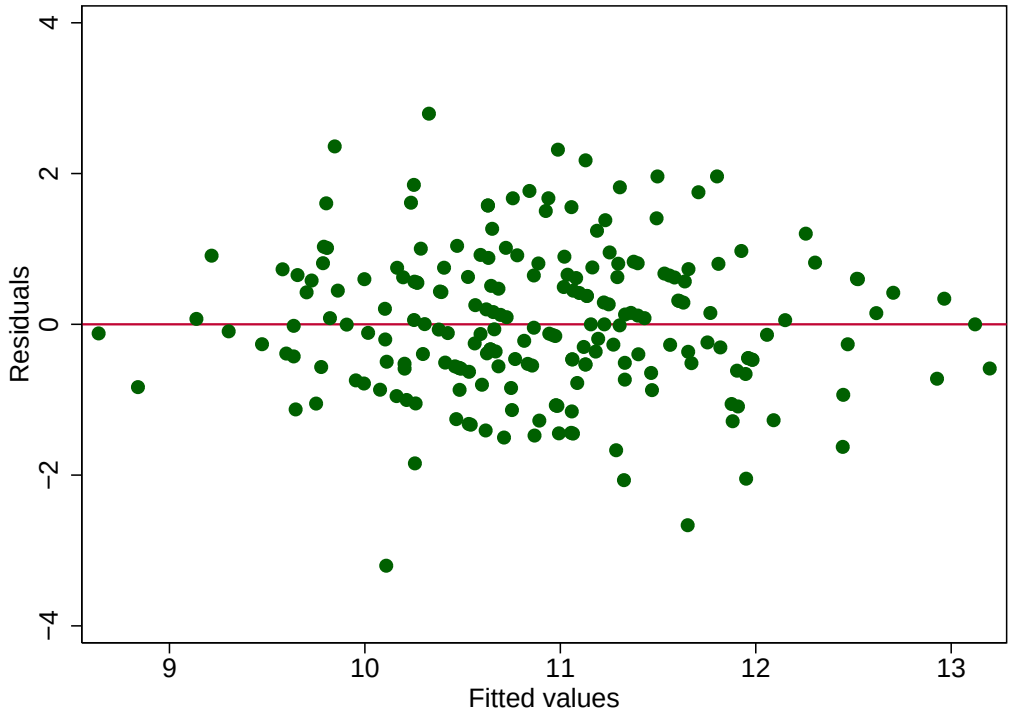


Figure 14: Residuals vs. fitted from OLS on loan amounts from microfinance

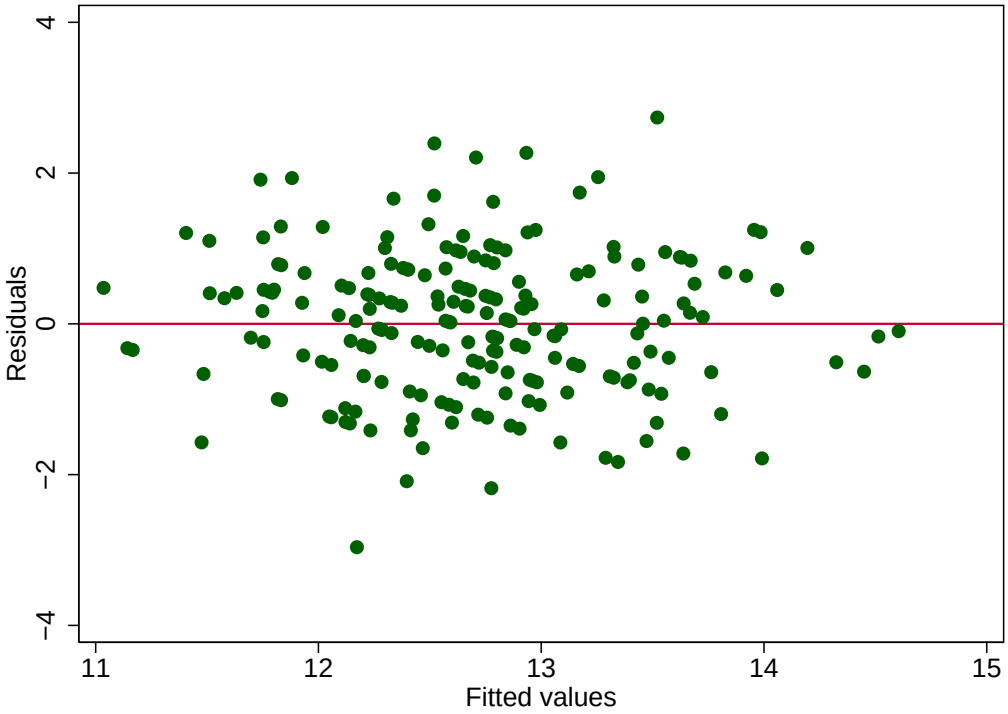
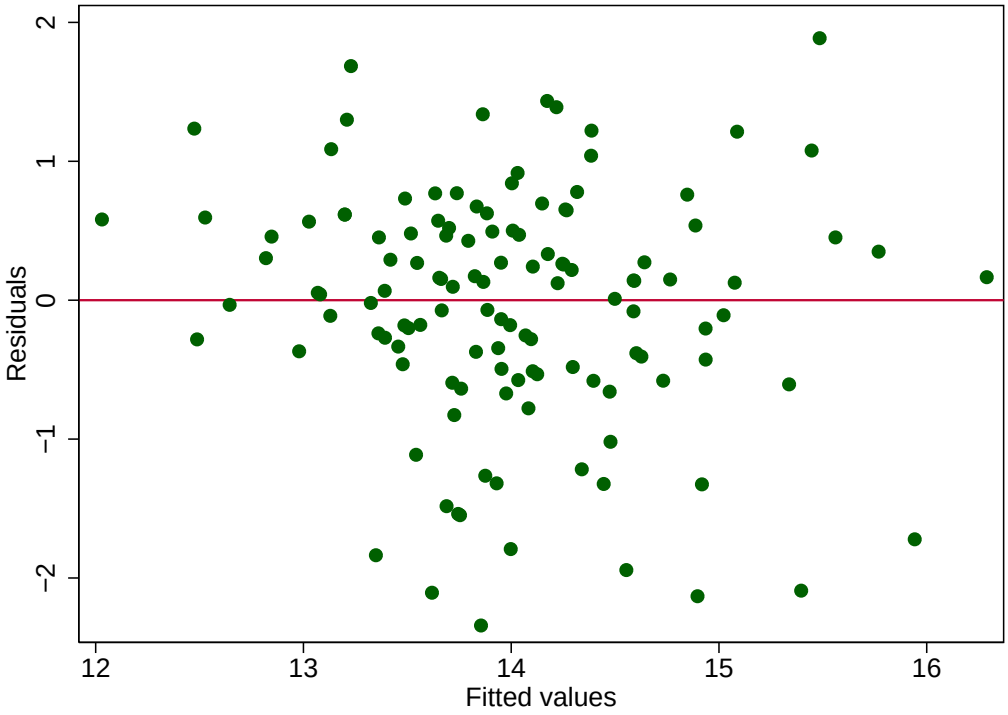


Figure 15: Residuals vs. fitted from OLS on loan amounts from banks



A.7 Tobit Estimates on Credit Access and Credit Demand

Table 11: Tobit estimates on log borrowing capacities of household heads from microfinance groups and banks

	MICROFINANCE	BANK
LN_AGE	-1.9148 (1.4759)	-0.3930 (1.9997)
SEX	0.0265 (1.0901)	2.1634 (1.3182)
LN_SCHOOL	3.1476*** (0.7892)	7.4620*** (0.9319)
LN_CONS	6.1210*** (0.8163)	8.1259*** (0.8890)
LN_ASTS	1.8517*** (0.4009)	2.6461*** (0.4635)
LN_HHDSIZE	-1.5448 (0.9640)	-3.3565*** (1.0648)
DEPRATIO	1.0489 (2.2659)	1.2632 (2.6482)
URBAN	-0.7291 (1.3452)	-1.4729 (1.4749)
R_EAST	2.1461 (1.5243)	4.8766*** (1.8591)
R_NORTH	1.2507 (2.3188)	0.6457 (2.6278)
R_WEST	0.7263 (1.8032)	2.9047 (2.0378)
BANK	3.2632 (3.4715)	1.1412 (3.2163)
MICRO	-0.0913 (1.6417)	0.9926 (1.8086)
GINI_ASTS	-36.5732*** (10.0494)	-12.7523 (12.7378)
GINI_EXP	19.1631* (11.5205)	14.2100 (13.1290)
ELF	0.5342 (4.4774)	-12.0329** (4.9121)
HALL	-0.3562 (1.8941)	-2.9509 (2.2057)
NAADS	1.1204 (1.0370)	0.2269 (1.2442)
MEET	-1.9069** (0.9125)	-2.2459** (1.0557)
COOP	-0.5142 (1.4783)	-1.5870 (1.7005)
REL	-7.5901 (6.8787)	-6.8983 (5.9916)
NGO	3.7605* (2.1582)	4.1009 (2.5900)
LN_WAGE	-0.2499 (0.7619)	0.3871 (0.9516)
LN_COMSIZE	0.4721 (0.7550)	-0.5496 (0.8546)
Constant	-87.2628*** (11.2357)	-149.8826*** (12.9963)
sigma	17.3645*** (0.2895)	17.5954*** (0.4053)
Observations	4169	4172
Pseudo R^2	0.048	0.100

Standard errors in parentheses

Source: UNHS, 2000, 2006; own calculations

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 12: Tobit estimates on amount demanded for three different sources

	(1) DEMAND LOCAL	(2) DEMAND MICRO	(3) DEMAND BANK
LN_AGE	-2.4929 (2.2749)	1.2809 (2.7559)	3.2801 (4.1722)
SEX	0.0464 (1.7314)	-3.9440* (2.2576)	-0.4572 (3.5743)
LN_SCHOOL	-2.0730* (1.0877)	5.4674*** (1.6711)	24.3641*** (3.1036)
LN_CONS	3.5262*** (1.2249)	5.6903*** (1.7374)	8.6955*** (2.4975)
LN_ASTS	-0.2750 (0.6063)	2.5346*** (0.8221)	2.7914** (1.1282)
LN_HHDSIZE	2.7339* (1.4720)	1.0329 (2.0189)	-4.6910** (2.3049)
DEPRATIO	0.8478 (3.5153)	3.4430 (4.6693)	10.0488 (6.3201)
URBAN	-4.8175* (2.4574)	1.0812 (3.0103)	-0.1348 (3.4983)
R_EAST	0.4707 (2.9370)	7.2007** (3.1581)	7.3585 (4.5324)
R_NORTH	0.0813 (3.7225)	7.1120 (5.1894)	11.9098** (5.9054)
R_WEST	22.5452*** (2.5436)	10.1107*** (3.8250)	13.9793*** (4.9701)
BANK	-4.4434 (8.9111)	-3.4423 (6.8098)	5.9243 (5.6221)
MICRO	-2.0256 (2.7974)	0.8983 (3.3445)	2.1150 (5.1462)
GINI_ASTS	-20.6858 (15.6328)	14.7878 (20.0953)	-3.3184 (25.4387)
GINI_EXP	22.1724 (16.2307)	-52.4844** (24.6454)	12.6773 (33.4789)
ELF	-6.9122 (6.7511)	18.4808** (9.3850)	-8.4383 (12.1565)
HALL	-3.4709 (3.4591)	6.6392* (3.6278)	-3.2602 (5.0170)
NAADS	-1.6481 (1.5086)	3.5092* (2.1157)	-0.8443 (3.2021)
MEET	-2.1857 (1.3630)	-3.1214 (1.9073)	-2.4310 (2.7748)
COOP	1.4659 (2.0964)	-1.3625 (3.0980)	-4.8213 (4.5802)
REL	3.1450 (7.5480)	-124.3125 (.)	-125.9640 (.)
NGO	3.2013 (3.9879)	-0.3429 (4.6056)	-1.4546 (6.4196)
LN_WAGE	-0.1561 (1.3541)	-0.2539 (1.6957)	-1.1850 (2.6292)
LN_COMSIZE	-4.0685*** (1.1622)	0.5216 (1.5259)	0.0042 (2.2542)
Constant	-32.6953* (18.1005)	-156.6745*** (23.2160)	-248.1969*** (30.9951)
sigma	17.2984*** (0.5775)	24.4096*** (0.5398)	24.7927*** (0.8864)
Observations	4195	4195	4195
Pseudo R^2	0.139	0.061	0.167

Standard errors in parentheses

Source: UNHS, 2000, 2006; own calculations

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$