

Cooperation in collective actions: Enforcement spillover and repayment behavior within the informal saving groups in Tanzania



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May 2012

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ACKNOWLEDGMENT

The financial support from the Consortium on Financial Systems and Poverty (CFSP) at the University of Chicago is gratefully acknowledged. I am also grateful to numerous people for their varying contributions. To Social and Economic Development Initiative of Tanzania (SEDIT) and Care International for providing the list of groups they have mobilized. To the dedicated Community Based Trainers (CBTs) who clarified issues and provided contacts and physical guide to the precise locations of these groups. Many appreciations go to group leaders and members who responded to my questions and spent time filling questionnaires. I am also grateful to group leaders for authorizing the research team to attend and observe all activities taking place in those weekly group meetings. To the dedicated research assistants who helped me in planning and executing the field survey. Many thanks to the staff of Savanna Forever Tanzania, in particular Ms. Susan James for coordinating the transfer of financial resources from the sponsor to the researcher as well as reporting back on financial spending. Sincere thanks also go to Professor Monique Borgerhoff Mulder from the University of California, Davis in discussing issues and providing her perspectives on matters relating to fieldwork and analytical process. Many appreciations goes to some of the staff at the Department of Political Economics at the University of Siena for commenting on both the proposal and draft report. Their inputs were invaluable.

"Altruistic punishment enhances cooperation among members of a group; People enjoy cooperating and punishing free riders; purely symbolic punishment is effective."
Bowles and Gintis (2011)

"Humans are prone to cooperate, even with strangers; cooperation is contingent on many things; institutions matter e.g. punishes those who defects; variation in institutions is huge."
Richerson, Boyd and Henrich (2003)

"Individuals interacting within rule-structured situations face choices regarding the actions and strategies they take, leading to consequences for themselves and for others; thus, understanding institutions is a serious endeavor."
Ostrom (2005)

Abstract

Several attempts have been made by economists to investigate the effects of negative incentives such as punishments on enforcing loan repayments within economic groups. Differently from the existing literature, this research disentangles punishment into two categories i.e. punishments directly relating to an offence of defaulting; and those punishments enforcing non-default related rules e.g. compulsory meeting attendance. Results from both ethnographic and multilevel statistical model confirm that spillover effects occur on repayment behavior when individuals are punished for non-default related offences. In other words, by being punished in other offences not related to defaulting, repayment performance improves. Non-default related punishment, therefore transmit information about the risk of being punished when individuals have to decide whether to repay or default.

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Acronyms

AIC	-	Akaike's Information Criterion
AIDS	-	Acquired Immune Deficiency Syndrome
ASCA	-	Accumulating Savings and Credit Associations
BoT	-	Bank of Tanzania
CBT	-	Community Based Trainers
CFSP	-	Consortium on Financial Systems and Poverty
EQN	-	Equation
FSDT	-	Financial Sector Deepening Trust
HBS	-	Household Budget Survey
HIV	-	Human Immunodeficiency Virus
NGO	-	Non Governmental Organization
RIM	-	Random Intercept Model
ROSCA	-	Rotating Savings and Credit Associations
RSM	-	Random Slope Model
SACCO	-	Savings and Credit Co-operative
SEDIT	-	Social and Economic Development Initiative of Tanzania
URT	-	United Republic of Tanzania
VCM	-	Variance Component Model
VICOBA	-	Village Community Banks
VIF	-	Variance Inflation Factor
VPC	-	Variance Component Model
VSLA	-	Village Savings and Loans Associations

1.0 Introduction

“Madam, it is one hundred shilling fine for being late, the collection pot is just in front of you”

“We cannot allow her to continue missing our weekly meetings, next week we will not accept her savings from a third person and she will pay a fine for missing the last 4 meetings”

“We will send a delegation to her house to enquire on the reasons behind her late repayment, we just saw her 5 minutes ago but she is absent in this meeting where she is obliged to start repaying her Loan”¹

Which factors affect cooperation in non-firm economic institutions such as the informal financial self-help groups? I am addressing this question by focusing on the role of punishments on repayment behavior of members of the informal financial self-help groups in Tanzania². Lending is always a risky activity. It is even more risky when it takes place in an informal group of people, some with limited knowledge of each other and they cannot offer any conventional physical collateral. In other words, in an economic exchange situation such as lending which is not determined by enforceable contracts, there are always material incentives to cheat the exchange partners (Fehr, Fischbacher and Gächter, 2002). For these reasons, various means have been discussed in the literature on conditions in which, lending in informal economic groups persists even in the presence of severe risks of defaulting.

Using multilevel statistical model, this study, differently from the existing literature, disentangles punishment taking place with ASCAs into two categories i.e. punishments directly associated to an offence of defaulting; and those associated to non-defaulting offences. Throughout this report, I will refer to **other punishments** as penalties not related to an offence of defaulting (e.g. lateness on meeting attendance etc), while **direct punishment** will refer to penalties directly related to an offence of defaulting. It is important that the reader understand and remember the differences between these two categories of punishments. While the positive influence of direct punishments has been widely explored in both theoretical and empirical literature, this study focuses on the effects of other punishments on repayment performance. Therefore, the main guiding question is “do other punishments address repayment problems within ASCAs? In

¹ Statements emerged during the weekly group meetings in which the research team attended.

² In the literature these types of groups are referred to as Accumulating Savings and Credit Associations (ASCA) i.e. savings are left to accumulate first before members apply for loans. I will be using the term ASCA from here onwards. See Bouman (1995) for the similarities and differences between ASCAs and Rotating Savings and Credit Associations (ROSCA).

other words, this study concentrates on the spillover effects of other punishments on repayment performance.

The importance of the informal savings and credit groups such as ASCAs cannot be ignored. The national wide survey of access to finance (FSDT, 2009) shows that only 12 percent of the adult population in Tanzania have bank account i.e. they are included in the formal financial sector. Furthermore, 27 percent of the population is informally included in the financial sectors i.e. they are members of the informal savings groups of various types including ASCAs. These statistics shows that there is a long way to go before majority of the population is included in the formal sector. Given this factor, Tanzania has embraced the idea of local collective actions (or groupings) as one of the means to economically empower vulnerable groups in the society. Proliferations of economic groups such as ASCAs have been widely reported in the local media, revealing exceptionally high participation rates in these groups. For instance, in the span of 3 years, CARE International has facilitated the establishments of more than 2,615 groups, while ORGUT-SEDIT program mobilized more than 2,000 groups across Tanzania. As these groups proliferate (with many more emerging even without external facilitation), scientific investigation becomes a necessity to better understand social institutions facilitating cooperative behavior between members. This is importantly so, because the mere presence of common interests and common expected benefits between members, are not sufficient to determine behavior in collective actions, leading to wide variations with some communities being able to generate collective goods for their members while others failing to do so (Curin, 2007). It is, therefore, important to understand the conditions working for and against sustainability of local cooperation and provision of collective goods. In other words, we are asking ourselves, what factors are working for or against cooperation in economic groups? This is because in the presence of higher repayment rates, the probability of groups being sustainable will be higher, and the more sustainable these groups are, the more they can contribute to improve access to credit for the majority of the poor.

There are several social dynamics taking place within these groups. However, one of the most interesting is the prevalence of informal sanctioning mechanisms aiming at enforcing cooperative behavior. The importance of sanctioning mechanisms arises as a result of high level of informality in these groups. For instance, they are not registered with either the central or local government authorities, and therefore they do not rely on external enforcements such police or other state authorities. Given this attribute, vast majority of empirical literature has confirmed the critical role of rewards and punishments in maintaining compliance to collective agreements

(Boyd and Richerson 1992; Boyd and Henrich 2001; Sober and Wilson 1998). To be specific most of the literatures in microfinance have dealt primarily with the effects of direct punishment on repayment behavior, with comparatively little attention given to examine the spillover effects of other punishments on repayment performance. Given this limitation, this study disentangles punishments taking place within ASCAs in order to capture the effects of each punishment category on repayment performance. The specific hypothesis to be tested is that loan repayment is influenced by other punishments.

In general, punishment is a human institution, not a natural event outside human purposes, it is therefore deliberately and intentionally organized and practiced (Bedau and Kelly, 2010). Punishment has been defined and debated in many field, from political science, philosophy, psychology to socio-biology as well as in economics. For instance, in psychology, punishment refers to an application of adverse stimulus ("positive punishment" or punishment by application) or removal of a pleasant stimulus ("negative punishment" or punishment by removal) aiming at reducing inappropriate behavior (Azoulay, 1999; Carlsmith, Darley and Robinson, 2002; Butterfield, Trevino and Ball, 1996). Examples of positive punishment include criticizing a wrongdoer harshly and openly; while making an offending person loses a particular privilege refers to negative punishment. In philosophy, punishment involves the imposition of something unpleasant on a supposed offender for a supposed crime, by a person or body who claims the authority to do so. Philosophers have defined four conditions necessary to define an action as a punishment. These include i) punishment is imposed by an authority ii) it involve infliction of pain or something unpleasant to the offender ii) it is a response to an offence, and iv) the person (or animal) upon whom the loss is imposed be deemed at least somewhat responsible for the offence (Bedau and Kelly, 2010).

The rest of the paper is organized as follows. Section 2 explains in details how the groups operate, followed by the description of the research site in Section 3. Sampling strategy and details about the survey instruments are covered by Section 4 and 5 respectively, while Section 5 gives explanation on the structured of the data collected. Research problem is described in Section 7, while Section 8 outlines the literature review. Analytical framework follows next in Section 9 while Section 10 described an empirical model used in the study. Section 11 gives an extensive description of the variables used in the study; followed by diagnostic exercise and univariate analysis in Section 12. Section 13 presents the results which also include discussion in each of the major findings within the same section. Section 14 concludes while Section 15 gives the limitations of the study.

2.0 Context and the groups' operational model

"Credit from my group paid for the school fees of my children, it was really a struggle before I became a member"

"When I first joined, my husband was completely against these groups, after loans from the group financed some of our family needs, he became a member and even permitted the weekly group meetings to be hosted at our home"

2.1 Management and group composition

ASCAs have two different names in Tanzania. For groups mobilized by CARE International, they are referred to as "Ongeza Akiba" in Swahili language³. It is Village Community Banks (VICOBA) for those which have received support from SEDIT. However, there are minor differences in their mode of operations. Each group has a constitution stipulating among other things, rules to be followed (management, operations and responsibilities), penalties etc with each member having equal voting rights regardless of the number of shares he/she hold in the group.

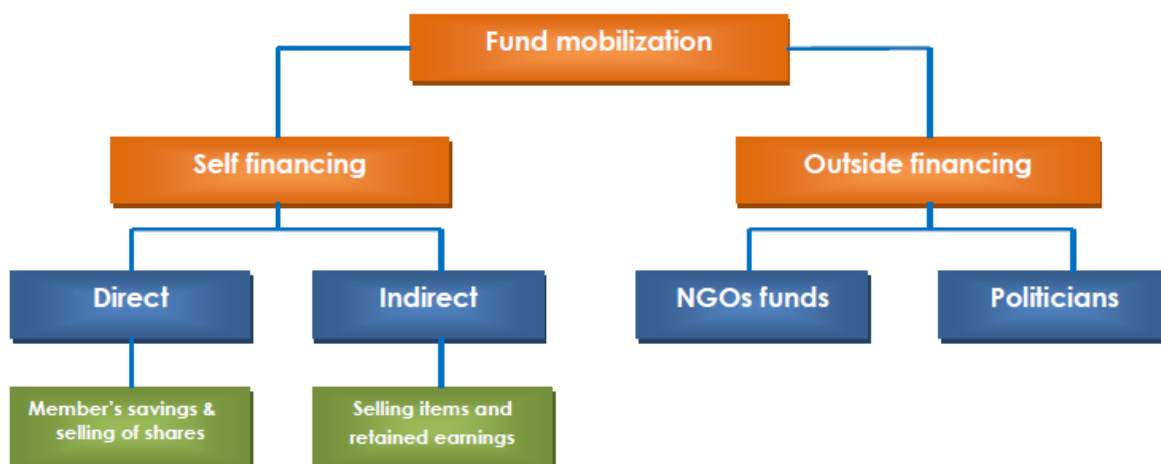
Members are the only customers and at the same time they are responsible for owning, managing and operating this joint financial enterprise. They are organized on the basis of collective decision making, with a simple management structure composing of chairperson, secretary, disciplinary officer and a cashier. The existence of a disciplinary officer evidences the importance of rules enforcement in ASCAs. The group size is usually restricted to a maximum of 30 members. The size limitation follows empirical findings which portray negative association between size and cooperation (see for instance Bardhan, 2000; Bandiera, Barankay and Rasul, 2005; and Khwaja, 2009)⁴. Some groups are composed of 6 sub-groups made up of 5 close connected members. Sub-groups have three key roles i) to provide guarantees to one of their member (that's why they are sometimes called "collateral sub-groups" ii) to peer monitor borrowers from the subgroup iii) to account for the absence of any of colleagues during the obligatory weekly meetings. Instead of having collateral groups, other groups require loan applicants to be guaranteed by any 2 members within the same group.

³ Officially, CARE International uses the name Village Savings and Loans Associations (VSLAs), while for the local community the popularized title is "Ongeza Akiba" (meaning "Add Savings")

⁴ However, some literatures have disputed this claim of decreasing cooperative behavior in large groups. For instance Gintis et al (2001) find that altruistic punishments allows cooperation in large groups because the payoff disadvantage of altruistic cooperators relative to defectors is independent of the frequency of defectors in the population, while the cost disadvantages of those engaged in altruistic punishments declines as defectors become rare.

The obligatory weekly meetings are important for transparent group operations. During the meetings, loans applications and repayment updates are openly discussed and decided as well as any emerging issue relevant to the group. Most groups have low overhead costs. Management is a voluntary job with major operating costs including stationeries as well as payment to the Community Based Trainers (CBT) who visit these groups occasionally. Sources of revenue include interest income, fines collected from punishing wrong-doers, fees and donation paid by outsiders visiting these groups. Another source of revenue is the profit generated when members sell e.g. rice which is purchased using the group's fund. This means that, instead of members buying rice from surrounding shops, they buy within the group at the same market price, with the profit transferred to the group.

Figure 1: Sources of funding/revenue



2.2 Financial management and transactions

Every group possesses a metal cash box. The cash box contains cash and management records such as attendance sheets, loans forms, records on loans etc. The group's stamp and stationeries are also stored in the box. The cash box (Figure 2) has three locks, one lock on three of the four sides. Keys are normally kept by three different members. Such that even if the chairperson or the secretary stays with the cash box, he/she cannot open it (you need three member-key holders to do that). Opening and closing of the box is done during the weekly meetings in the presence of all members. Money being collected in each meeting is stored in three bowls (inside the cash box), the first one containing "fines" collected from the application of punishments; the second one containing proceedings from selling shares (savings are made

in terms of selling shares similar to a traditional corporate entity i.e. members are savings by investing). The third bowl containing weekly members' contribution to the social fund. Most of the amount collected in each meeting is immediately disbursed to loan applicants. Therefore, the box is either left with either zero balance or very small amount. This is one of the reasons why ASCAs do not maintain bank accounts.

Each member maintains an individual "savings book" (Figure 4 and 5) containing records of all shares he/she has been purchasing overtime as well as repayment trends. In some groups the saving books are kept inside the cash box while in others, they are kept by respective members. In the latter case, it is compulsory for members to bring their savings books in weekly meetings, failing to do so usually attract a fine.

Official stamps of the groups normally differ from the modern ones. They consist of a specific symbol such as a "cow" or a "fish" or a "coconut tree" (see Figure 5). A "cow" represents one share. The reason behind using symbols is to conceal from outsiders that "cows" is equivalent to money, in case the savings book is lost. Each group maintains two types of funds (i)Empowerment Fund which is made up of the amount collected from selling share, and; (ii) Social Fund where members can borrow to meet emergencies such as medical or death of a family member.

Figure 2: The cash box



Figure 3: Management records

Kasi cha kiba zikomo wa (TSh)														
Tarifa	Muhimbiano	Mt.	Kf.	Maish.	Mt.	Maish.	Mt.	Maish.	Mt.	Maish.	Mt.	Maish.	Mt.	Maish.
M/Jan	15	15	2.0	1000000	5000	5200	2500	10000	30000	10000	10000	10000	10000	10000
16	14	14	2.0	1000000	5000	5200	2500	10000	30000	10000	10000	10000	10000	
17	13	13	2.0	1000000	5000	5200	2500	10000	30000	10000	10000	10000	10000	
18	12	12	2.0	1000000	5000	5200	2500	10000	30000	10000	10000	10000	10000	
19	11	11	2.0	1000000	5000	5200	2500	10000	30000	10000	10000	10000	10000	
20	10	10	2.0	1000000	5000	5200	2500	10000	30000	10000	10000	10000	10000	
21	9	9	2.0	1000000	5000	5200	2500	10000	30000	10000	10000	10000	10000	
22	8	8	2.0	1000000	5000	5200	2500	10000	30000	10000	10000	10000	10000	
23	7	7	2.0	1000000	5000	5200	2500	10000	30000	10000	10000	10000	10000	
24	6	6	2.0	1000000	5000	5200	2500	10000	30000	10000	10000	10000	10000	
25	5	5	2.0	1000000	5000	5200	2500	10000	30000	10000	10000	10000	10000	
26	4	4	2.0	1000000	5000	5200	2500	10000	30000	10000	10000	10000	10000	
27	3	3	2.0	1000000	5000	5200	2500	10000	30000	10000	10000	10000	10000	
28	2	2	2.0	1000000	5000	5200	2500	10000	30000	10000	10000	10000	10000	
29	1	1	2.0	1000000	5000	5200	2500	10000	30000	10000	10000	10000	10000	
30	0	0	2.0	1000000	5000	5200	2500	10000	30000	10000	10000	10000	10000	

2.2.1 Savings through purchasing of shares

Members can purchase from 1 to a maximum of 3 or 5 shares. In most groups the price per share is US\$ 1.00⁵. The reason for setting the maximum share a member can purchase is to avoid wealthy members dominating the group. As you can see from figure 5, the book has only three columns, meaning that, for that particular group, there is a maximum of 3 shares which can be purchased per week by each member. The common rule is that members are obliged to purchase shares every week. However, this rule is enforced in very few groups. When buying shares, the Secretary will call the number of a member who should stand and declare publicly the number of shares he/she is purchasing on that particular day. Members will then clap hands as a "reward" to the colleague for buying shares. It is a "rewarding" mechanism for abiding to the collective agreement i.e. compulsory savings every week. Only the Secretary is allowed to register and stamp the number of shares in the savings book. Due to the need of keeping simple accounting procedures, members are not allowed to buy shares retrospectively.

Groups usually evolve yearly while it is a year and half for others. Once a member is registered he/she is compelled to retain his/her membership till the end of the year as shares cannot be withdrawn prior to that. At the end of each cycle members get dividends and restart a new round. Similar to traditional profit making corporate entity, dividends per member depend on the number of shares he/she has accumulated overtime. In some cases, the entire profit or some of it is retained to boost the group capital for the next round. From here we can see one of the main differences between a formal bank and ASCA. In the case of Banks, customers benefit only in terms of access to finance (savings and credit), but the profit goes to the owners of the bank. With respect to ASCA, members benefit not only in terms of access to finance but also get a return from their investment (recall that members save in terms of purchasing shares). They are the owners of the groups.

⁵ The exchange rate is TShs 1,600/1US\$

Figure 4: The savings book (the cover page)

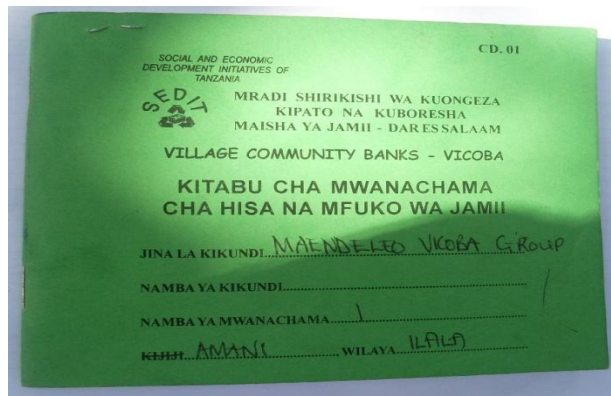


Figure 5: The savings book (inside pages)

Wika ya	Tarehe	Hisa zilizowekwa	Sababu ya Katibu wa Kikundi
3	5/08/010	500	Abdullah
4	12/08/010	500	Abdullah
5	19/08/010	500	Abdullah
6	26/08/010	500	Abdullah
Salio Anzao			6
Hisa zilizowekwa mwezi huu			12
Hisa zilizotolewa mwezi huu			-
Salio Ithina			18

Wika ya	Tarehe	Hisa zilizowekwa	Sababu ya Katibu wa Kikundi
7	2/9/010	500	Abdullah
8	9/09/010	500	Abdullah
9	16/09/010	500	Abdullah
10	23/09/010	500	Abdullah
11	30/09/010	500	Abdullah
Salio Anzao			18
Hisa zilizowekwa mwezi huu			15
Hisa zilizotolewa mwezi huu			-
Salio Ithina			33

2.2.2 Access to credit

The principal fund being maintained by ASCA is the “empowerment fund”. In this fund members can borrow either for consumption or financing their private individual income generating activities. The fund is mainly generated from weekly sales of shares. The maximum loan which can be drawn from this fund is 3 or 4 times the total individual contributions. For instance if a loan applicant total savings has reached US\$ 100, she/he is then eligible to a maximum loan of US\$ 300 or US\$ 400. However, a loan applicant needs to secure 3 or 4 guarantors within the group. For other groups the guarantors are colleagues from the sub-groups. The interest rate is usually determined by members collectively at the beginning of each financial year. In most cases it is 5 percent per month, while some few groups charge up to 10 percent. This rate is much higher than the Bank market rate of around 2 percent per month. Repayments begin a month after a loan has been issued, weekly scheduled repayments follow thereafter. Similar to the case of share purchasing, members are rewarded by special way of clapping of hands when they are repaying their loans on schedule. Repayment on schedule also increases the probability of accessing future loans.

2.3 Welfare and social roles of the groups

In addition to the role of financial intermediation i.e. savings and credit, these groups also maintain social and welfare functions. This is evidenced by the existence of “social fund” where every member is obliged to contribute US\$ 75 cents every week. The social fund provides credit to members who have experienced social and/or economic shock. While no interest is charged, members can borrow to a maximum of three times a year.

Some groups have prescribed rates for each member to support a colleague facing emergencies (e.g. medical care). There are also rates for contributing to weddings. For instance, each member has to contribute US\$ 3 to a colleague whose daughter/son is getting married. The same amount also in the case of sickness or death of a family member. These individual contributions are in addition to US\$ 18 coming out of the social fund. Other functions such as consoling each other (for instance during a death of relatives) was mentioned by some members as an important function of these groups. There are groups which were formed by members facing common problems such as widows and those living with HIV/AIDS. These groups consider social and welfare functions to be more important than financial intermediation. They usually invite counselors to help them coping with the psychological pressure of living with HIV. In rare cases they support some of their colleagues financially to purchase shares.

2.4 Punishment behaviors

Punishment is one of the frequent activities taking place during the weekly meetings. They are financial reparation and are administered based on offences stipulated in their constitutions. Table 1 lists different types of offences warranting other punishments. They include lateness in weekly meetings, sleeping and phone ringing during meetings, lack of purchasing shares every week etc. Permanent expulsion is always avoided unless the offence is serious e.g. repeated defaulting or consistently failing to purchase shares. Punishment for defaulting including raising interest rates for the remaining balance, liquidating shares of both debtors and of his/her guarantors. There is also a threat of confiscating household items of the borrower. Failing to repay loans usually starts with investigation, followed by informing your partner (husband or wife) about the default.

The goal of punishments is to bring the offender in line. There are evidences of coalitions within groups who jointly engaged in punishment. Similar to the findings by Wiessner (2004), the cost of punishment includes (i) loss of a productive or valuable group member (ii) reduced social ties (iii) escalation of minor disputes into a large one (iv) time and energy costs of undertaking punishment i.e. time spent to discuss types of punishment to administer and energy to follow up a member (v) damaged reputation for being too critical or harsh i.e. those who punished can gain negative reputations, for instance, punishing lightly (lelemama) or too harshly (mnoko). The benefits of punishing include limitation of free-riding behavior, bringing offenders back into the line, the expulsion of undesirable group members, and strengthening of bonds within coalitions of punishers (Wiessner, 2004).

Table 1: Penalties for different offences (other punishments)

Offence	Penalties (US\$)
Phone ringing in a meeting	0.20
Lateness in weekly meetings	0.20
Forgetting the saving book	0.20
Absenteeism from weekly meetings	1.00
Not savingf/buying shares	1.00
Sleeping while the meeting is ongoing	0.20

Exchange rate: TShs 1,600/1US\$

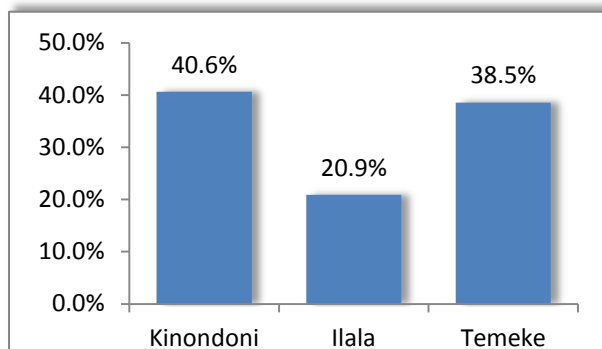
3.0 Description and characteristics of the research site

3.1 Economic and social development

Ilala district is one of the three districts in the commercial capital of Tanzania, Dar es Salaam. The other districts are Kinondoni and Temeke. It is a district where the main city centre is located. Based on the population census undertaken in 2002, Ilala is the least populated with 637,573 people, followed by Temeke and Kinondoni with 771,500 and 1,088,867 population respectively. With respect to wealth, the district is mainly divided between the rich and the poor, with the rich people living near and around the city centre, while the relatively poor people living on the outskirts of the district. These poverty stricken areas were the main sites covered by this research. Ilala district has limited social services such as health facilities; and if they exist, they are of poor quality compared to those near the city centre. For instance, the Household Budget Survey (URT, 2007) shows that the percentage of respondents in Ilala with access to pipe-water was substantially low compared to those in Kinondoni and Temeke (Figure 6). The same results reappear in the case of electricity (Figure 7), though marginal difference exists between Ilala and Temeke. In addition, the wards in which surveyed ASCAs are located are high density areas with limited drainage facilities and rough interior roads, which are difficult to pass by using small cars, especially during rainy seasons. Most of these areas are unplanned and in some cases one has to walk a long distance of about 500 meters from the main road to reach some of the residential houses because the infrastructure was not planned for during construction of some of the residential buildings.

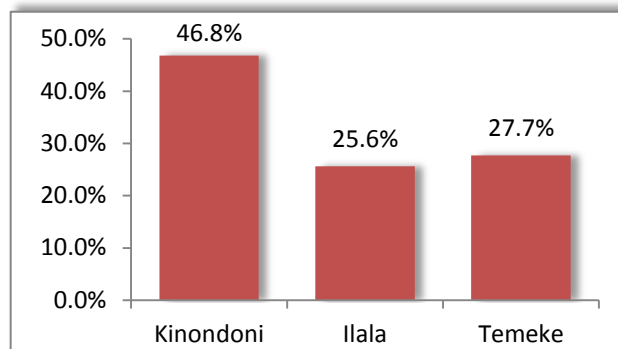
Majority of households in Ilala generate their income from employment (52 percent) and business (27 percent)⁶. However the proportion of households in Ilala district engaging in these two sectors is less when compared to Kinondoni and Temeke (Figure 7). This means that, the residents of Ilala are comparatively more engaged in sectors with limited potential for income to grow areas such as sale of food crops and cash remittances (Figure 9). Hence, the choice of Ilala district as a research site is based on its dual characteristics i.e. it is a commercial district capital of Tanzania and it is relatively poor compared to the other two districts.

Figure 6: Access to pipe-water



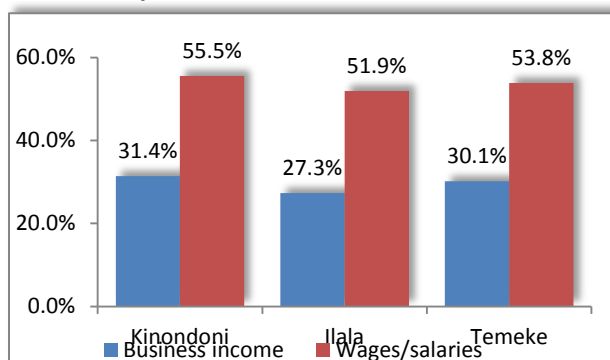
Source: URT (2007) HBS

Figure 7: Access to electricity



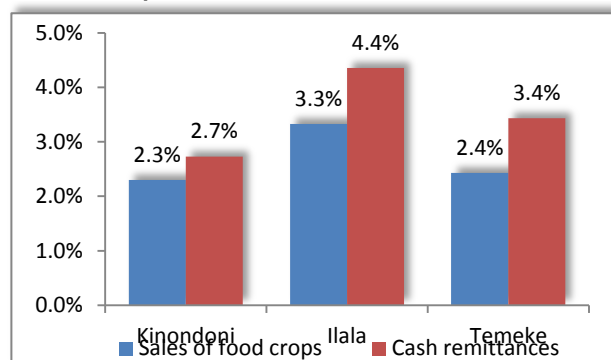
Source: URT (2007) HBS

Figure 8: Proportion of respondents indicating particular sources of income



Source: URT (2007)

Figure 9: Proportion of respondents indicating particular sources of income



Source: URT (2007)

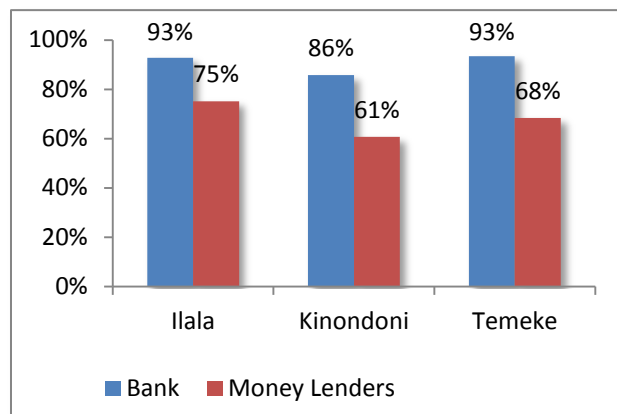
3.2 Financial development

It is also interesting to understand the financial characteristics of Ilala when compared to Kinondoni and Temeke. With respect to financial literacy the percentage of adult population

⁶ Both Kinondoni and Temeke bear the same characteristics. This is consistent with the characteristics of most commercial cities where employment is normally a leading source of income.

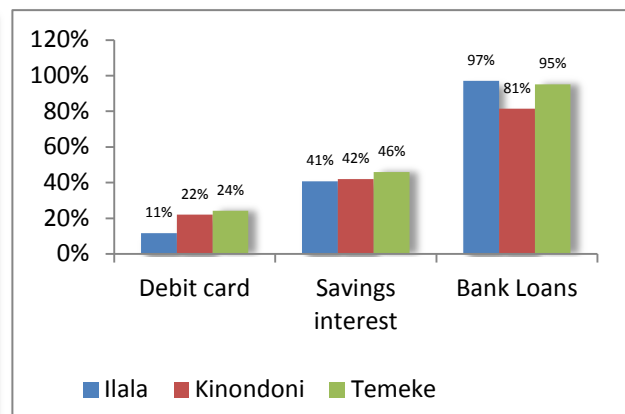
who have heard and understand what banking is all about is 93 percent in Ilala district the same as in Temeke (Figure 10) High cost of borrowing and requirements for physical collateral (URT, 2009) as well as high transaction costs (World Bank, 2007) have been cited as some of the reasons behind limited engagement in formal financing. Figure 10 shows that Ilala has a higher percentage of populations that is familiar with the individual money lenders than in the remaining two districts. This implies that Ilala is largely characterized by informal financing activities than the other two districts. Though awareness of debit cards is less than 50 percent of adult population in all districts, the situation is worse in Ilala where only 11 percent understand what debit card is all about. Furthermore, only 41 percent of Ilala residents understand interest on savings compared to 42 and 46 percents in Kinondoni and Temeke respectively (Figure 11).

Figure 10: %age of those understanding banking & acknowledged the presence of money lenders



Source: FSDT (2009)

Figure 11: %age of those understanding debit cards, interest on savings and bank loans



Source: FSDT (2009)

4.0 Sampling strategy and technique

The populations of interest for this study are all ASCAs in Tanzania⁷. However, the population that was accessible are groups based in Ilala district in the commercial city of Tanzania (Dar es Salaam)⁸. The sampling frame was obtained from records of SEDIT and CARE International. There are estimated 244 ASCAs in Ilala district listed by these two NGOs. As of March 2011, SEDIT had facilitated the formation of 60 ASCAs compared to 184 groups mobilized by Care International.

⁷ Theoretical population

⁸ Accessible population

The estimated average number of members per group is 22, yielding a sampling frame (at the sub-unit level) of 5,368 individuals in Ilala.

However, I included only those which have been operational for more than 16 weeks⁹. This leaves us with 45 SEDIT groups and 164 groups from CARE International making a sampling frame of 209 groups with an estimated membership of 4,598 individuals. To get the representative sample for the 4,598 individuals, the confidence level of 95 percent is converted to a Z-score of 1.96 with the expectation that 50 percent of the respondents will respond affirmatively. In this case the representative sample comes to 348 individual members (see appendix 1 for the formula).

However, a much large sample was needed because of the following reasons (i) this study is a multivariate study i.e. large number of variables to be controlled in the analysis; and, (ii) the data structure is such that members are nested into groups necessitating the analysis to take into account the influence of the group level variations on the dependent variable.

To maximize the number of respondents I decided to conduct the survey at the site where weekly meetings were being held. The first stage was to select randomly the groups to be visited in order to interview their members. The group representative sample from the sampling frame of 209 groups requires 136 groups¹⁰. Though the representative sample for individual members is 348, the intention was to increase the sample to around 650. Therefore, for 650 respondents, I needed about 45 groups (the assumption is that there is an average attendance of 14 members during those weekly meetings). To get from 136 groups to 45 groups, I applied stage sampling i.e. selecting samples in stages by taking samples from samples. First I selected 136 groups randomly from the sampling frame of 209 groups and thereafter I randomly selected 45 groups from the 136 selected from the previous stage.

While the sample cannot be considered representative of the original population of interest (i.e. the theoretical population of all ASCAs in Tanzania), the major purpose of this study was to determine whether specific factors i.e. other punishments have effects on repayment behavior in an accessible population. Any evidence of effects in this study can be generalized to peri-

⁹ The basis for setting 16 weeks as a cutting point is as follow. Groups are not allowed to provide loans until they have accumulated savings i.e. selling shares for 11 consecutive weeks. Therefore, loans are provided from the 12th week and because repayment usually start one month after a member has been issued with a loan, then from the 16th weeks repayment on schedule or defaulting materializes.

¹⁰ Recall, 45 groups from SEDIT and the remaining 164 from CARE International

urban groups that have similar characteristics and operational methodologies to the ones considered in this study.

5.0 Survey instrument

Three main salient features of the target audience were considered during the construction of the survey instrument. First, limited formal education and lower reading levels of the respondents. In such a situation the format as well as the wording needed to be as simple as possible. Secondly, as the survey was conducted during weekly meetings, the instrument was shortened in length, covering only those variables which were of high relevant to the objectives of the study. This was crucial as it would have been difficult for members to tolerate long survey as they are also occupied with other responsibilities¹¹. In order to save time and be more precise, the format was made simple to make it easier for self reporting e.g. clear boxes for response options. It also adopted forced-choice items rather than free response items. The intention was to have short administration time. To encourage truthfulness in answering, the research instrument did not require the name or contact of the respondents. Hence, the research team was forthright to the respondents that their responses will be anonymous.

The questionnaire had 4 pages in total given the criteria listed above. This was consistent with several suggestions such as Sudman and Bradburn (1987) with respect of the need to save administration time. In order to ensure that respondents were able to adequately decipher, recall information and interpret the questions the enumerator was guiding respondents all together question after question. For those who could not read and write (about 12 percent of sample), the enumerators had to undertake face to face interviews. Because it was a self responding questionnaire, at the end of the survey sessions, all questionnaires where checked for unclear and incomplete response.

The main ethnographic approach applied was participant observations and interviewing knowledgeable information especially the CBTs who are familiar with the operations of the groups. Observation was mainly conducted by attending most of the weekly meetings from the beginning to the end.

¹¹ For instance, at the beginning of one of the survey session (late morning of one of the weekends) one of the respondents explicitly requested us to speed up as she needed to cook for her husband.

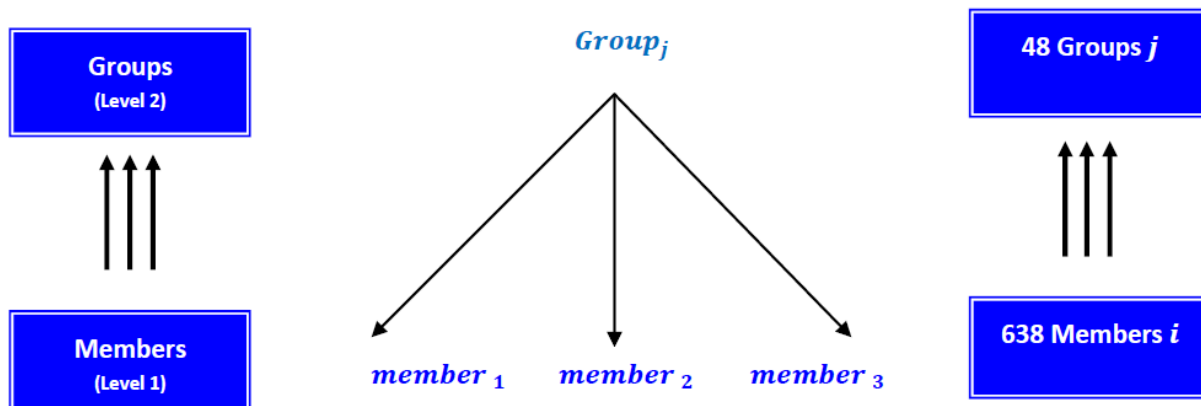
6.0 Data

The data structure consists of level-1 (individual members) and level-2 (groups). That is, there are $j = 1, \dots, m$ level-2 units and $i = 1, \dots, n_j$ level-1 units nested within each level-2 units. Hence, the data has two basic levels i.e. the first level is composed of the individual members of ASCAs; while the second level refers to the ASCAs as groups. Therefore, the total number of level-1 observations across level-2 units is given by

$$n = n_1 + n_2 + \dots + n_j = \sum_{j=1}^m n_j$$

Where $n = 638$ and $m = 48$. The group with the lowest number of respondents had 4 (i.e. minimum n in m is 4), while the one with the maximum number of respondents in the sample had 23 members. The average number of respondents per sampled group is 13.3. Figure 12 exhibits the two level nested relationships of the surveyed data:

Figure 12: Two-level data structure



The arrows indicate the existing nested relationship in the data. The groups are the individual ASCAs, while members refer to the individual members nested within each ASCA. The 48 ASCAs in this study are sufficient to apply multilevel analysis¹². The data structure indicated above means that the estimate of the average repayment rates (the intercept) and/or various repayments sensitivities (the slopes) depend in part on characteristics of the ASCAs in which individuals belong to.

¹² According to University of Bristol (2011), to undertake multilevel analysis you need to have at least 20 higher-level units.

7.0 Research problem

Numerous experimental (Turillo, et al. 2002; Fehr, Fischbacher and Gächter 2002; Fehr and Gächter, 2000), cross sectional (Barboza and Barreto, 2006; Wydick, 1999; La Ferrara, 2003; Ahlin and Townsend, 2007; Wydick, 2001) and ethnographic studies (Wiessner, 2005 and Mahdi, 1986) demonstrate the role of direct punishment on enforcing collective agreements. However, while direct punishment on defaulting has been well documented both theoretically and empirically, the existing literature largely ignores the effects of non-default related punishments on repayment behavior¹³. In other words, most of the discussion in empirical literature is on punishments that are directly related to a particular offence i.e. defaulting, ignoring the extent to which other penalties can have spillover effects on loan repayment behavior. The question that remains unanswered by the existing literature is: Does other punishment produce externalities on repayment behavior? As any other social institutions, punishments are likely to generate spillover effects beyond a situation on which particular punishment intends to address.

Differently from other empirical studies on punishment behavior, this study has, first, disentangles direct default related punishments from those addressing other behaviors. This was necessary in order to capture the spillover effects of other punishments. Second, rather than measuring punishment as a community level variable (as done by other studies such as De la Huarte, 2010); my survey captured punishment as an individual level variable; in other words, I used data on actual execution of punishments taking place in ASCA. Third, most of the published literatures have focused on Grameen type of microfinance group lending and less so on ASCAs which are in principle are based on "self-help" and do not depend on outside lending as in the case of Grameen type of microfinance groups. Lastly, given the hierarchical structure of the survey data, one of the key research problems is the examination of the cross-level interactions effects. Specifically, to what extent is group context affects the dependent variable measured at the individual members' level. This multilevel nature of the data necessitate the use of the multilevel statistical modeling.

¹³ In their community level index of legal infrastructure Ahlin and Townsend (2007) might have indirectly considered other punishments.

8.0 Literature review

8.1 Theoretical background

There are two strands of theoretical literature targeting the effects of direct and other punishments in addressing repayment challenges. The first strand originating from crime and law literature are perceptual based deterrence studies i.e. the information induced risk perceptions of agents on whether they will engage in criminal activities. This strand of literature is relevant in explaining how past experiences in punishments determines whether agents will default their loans in the future. The second strand originates from microfinance literature theorizing the effects of direct punishment on repayment performance. That is, what matters in controlling repayment behavior is the presence of direct sanctions directly associated with that particular offence of defaulting.

8.1.1 Information induced risk perceptions and changes in crime rates

Spillover effects of non-default related punishments on repayment performance can be explained by theoretical models that have stressed the role of past criminal experience (i.e. information updating) on agents' risk perceptions in reengaging in crime. In Sah's model (1991) past experience, the main source of information, plays a central role in updating agents perceptions on whether they will be detected in the next potential crime. That is, an individual's propensity for crime is higher if punishment was lower during a past period of his active life in the group. Furthermore, an individual has a higher current propensity for crime if fewer resources were spent on the criminal apprehension system during the past period of his active life. In the case of this study resources spent reflects the time and efforts spent by group leadership in enforcing rules. Sah's model demonstrates that, although social theorists argue that an environment is the main cause of crime, the current crime participation rate will be lower if apprehension and punishment have persistently been more effective in the past.

Differently from assessing the information based risk updating, Loncher (2007) focuses on the origins of risk perceptions and their connection to actual sanction policy. Intuitively, Loncher examines factors influencing individual perceptions on the probability of arrest. His model shows that individuals update their beliefs in a rational ways such that criminals who avoid arrest reduce their perceived probability of arrest, while those who are arrested increase their perceived probability. Reflecting this argument for ASCA, members who have not experienced

other punishments (or even were not punished for previous defaults) have higher probability of defaulting in the future because of having low perceived probability of being detected.

8.1.2 Punishments in microfinance groups.

In microfinance literature which is mostly dominated by Grameen type of economic grouping, punishment in the form of potential social sanction is considered as a necessary means to facilitate loan recovery. Several models have been developed including Besley and Coate (1995), Armendariz de Aghion (1999), Banerjee, Besley and Guinnane (1994) and Wydick (2001). I focus on few of them which have captured the salient features of ASCAs¹⁴.

One of the most cited theories on the effects of sanctions on defaulting is Besley and Coate (1995). In this model, group members can potentially employ social sanctions against defaulters. In particular, the borrower makes the decision whether to pay or not by comparing the repayment amount with the severity of social penalties when defaulting. Stronger social ties between group members stimulate unofficial penalties resulting in better repayment performance. That is, in the case official penalties are not strong enough to give incentives for borrowers to repay then unofficial penalties are imposed on a borrower i say, who decides to default when his partner j would want to repay. The effect of the unofficial penalties is to increase the willingness to repay of the low-output borrower i in a situation of disagreements between the group members. If unofficial penalties are arbitrarily severe the group will repay, and vice versa if they are arbitrarily weak. The Banerjee, Besley and Guinnane (1994) model places at the forefront the problem of moral hazard i.e. the temptation to gamble with riskier projects, and proposes ways in which sanctions can address the problem. Because of limited liability to borrowers, which gives an incentive for them to choose risky project, peer monitoring through the use of locally available information is coupled with the threat of punishments. In this model, the higher rate of joint liability increases the advantages of monitoring, leading to a higher the payment rates. Therefore monitoring complemented by the threat of direct punishment will lead to less risk-taking behavior of borrowers.

The structure of these two models captures the salient features of ASCAs. Some of the ASCAs are made up of joint liability subgroups in which every member of the subgroups is liable if a borrower from that group defaults. The main group thus becomes the “lender” in the sense of

¹⁴ There are several other theories based on Rotating Savings and Credit Associations (ROSCAs). However, the structure and operational modalities of ROSCAs are fundamentally different from ASCAs. Those ROSCAs related theories are therefore considered irrelevant for this study.

Besley and Coate's model, with the financee being members from sub-groups. As a financier, the group is the one administering official penalty. Members of the sub-groups are responsible for pressuring and administering "unofficial penalties" to potential defaulters within the same subgroup. Because members have self selected into these groups¹⁵, they are familiar with each other and are roughly aware of the income generating activities of each member.

8.2 Empirical literature

The empirical literature on factors affecting cooperative behavior (repayment behavior being one of the indicators of cooperation) is very diverse. First, I will concentrate on those studies providing evidence that enforcements can have spillover effects and secondly move on to evidences from microfinance literature on the role of punishments in addressing repayment challenges.

8.2.1 *Information induced risk perceptions and changes in crime rates.*

Enforcement spillover arises when an individual who was punished for breaking non-default related rules adjust his/her behavior in terms of complying with repayment norm. Tay (2005) anecdotally acknowledges the possibility of enforcement in one area to produce externalities in different areas. For instance, in road safety programmes, to deter and detect drink driving, the presence of traffic police along the roads positioned to administer random breath test will have spillover effects on other risky and illegal driving behaviors such as speeding, joy riding and aggressive driving.

Nagin (1998) gives an excellent review of the empirical literature on perceptual deterrence studies and finds that crime is lower among people who perceive that sanction risks and costs are higher. Most recent studies such as Lochner (2007) and Rinckex and Traxler (2011) also confirm the conclusion of Nagin (1998). For instance, Lochner (2007) when examining large random national samples of young males, find that, consistent with deterrence theory, a higher perceived probability of arrest reduces criminal participation. Consequently, individual heterogeneity in beliefs about the criminal justice system leads to differences in criminal participation. Rinckex and Traxler (2011) on the other hand, identify spillovers from law enforcement on would-be wrongdoers. They find a striking response of households to increased

¹⁵ Van Tassel (1999); Ghatak (1996), and Ghatak (1999) demonstrate how self-selection process of agents into microfinance joint liability groups improves repayment rates through mitigating adverse selection in credit markets. This lead to creation of homogeneous groups with members knowing each other's projects.

compliance to TV license fees in their vicinity as a result of enforcement; in particular three detections of those not paying the fees make one additional household comply with the law, indicating a sizeable externality in enforcement.

8.2.2 Punishments in microfinance groups

Different terminologies have been used in the literature to represent official and unofficial punishments including social sanctions, peer pressure, direct (formal) and other (informal) penalties. Microfinance programs and credit cooperatives operating in different parts of the world continue to provide avenues for cross sectional studies testing several hypotheses, among others, whether positive or negative incentives improve repayment performance. Majority of the literature accepts an increasing probability of loan repayment in the presence of perceived threat of punishments (La Ferrara, 2003; Ahlin and Townsend, 2007 and Wydick, 2001). For instance Bhatt and Tang (2002) show that direct punishments is not only significant in addressing repayment problems, but its magnitude was higher than other variables used in the model including transaction costs associated with access to loans. Karlan (2007) on the other hand, employs an indirect measure of punishment by examining whether relationships deteriorated after default as a proxy for punishment. While his findings are consistent with others, i.e. peer monitoring and enforcement effectively reduce default rates, he demonstrates that individuals in microfinance programs can filter who to punish (those who default strategically-moral hazard behavior) and who not to punish (because of experiencing negative personal shock). Both studies (Bhatt and Tang; and Karlan) have shown that irrespective of the way sanction in encompasses in the model i.e. whether measured directly or assumed to be part of the peer monitoring, it yields the same positive effects on repayments. Other studies such as Ahlin and Townsend (2007) and De La Huerta (2010) also supports the positive role of punishments in addressing repayment challenges.

Laboratory experimental studies also provide evidence that human punish non-cooperators at a cost to themselves as one of the means to sustain cooperation (Fehr, Fischbacher and Gächter 2002; Fehr and Gächter, 2000). For instance, a lab experiment by Fehr and Gächter (2000) consisting of real monetary stakes and two treatment conditions: punishment and no punishment, find that in the absence of punishment, cooperation decreases, while with punishment, average contributions from players approach 100 percent of their endowment¹⁶. In fact, the average contribution in the punishment condition was higher in each round than

¹⁶ Even in one-shot game, the average contribution in a game with punishment is found to be higher than a game without punishments.

average contribution in any of the rounds of the no-punishment condition with altruistic punishment found to be a common feature in most of the sessions. Details in this study show that 84.3 percent of the subjects punished at least once, with punishment following a clear pattern i.e. most of the 74.2 percent acts of punishment were imposed on defectors (that is, below-average contributors) and were executed by cooperators (that is, above-average contributors). The conclusion from this experiment is that, altruistic punishment¹⁷ of defectors is a reason behind human cooperation. Cooperation flourishes if altruistic punishment is possible, and breaks down when ruled out. As Sigmund (2007) say, by inflicting punishment, members of a society or a group can conceivably turn a defector into a cooperator. The same trend reappear when a concept of strong reciprocity was tested experimentally (see for instance Fehr, Fischbacher and Gächter, 2002) and Gintis, et al. (2003) who solicit results from several experiments that have used variety of game structures and confirm the presence of strong reciprocity behavior in human cooperation). Several ethnographic data are in line with the above results as well (see for instance Wiessner, 2005 and Mahdi, 1986).

However, other studies have disputed the influence of punishments on repayment performance. Barboza and Barreto (2006) find that learning by association i.e. peer mentoring rather than peer monitoring¹⁸ is a core element positively affecting repayment rates. The effects of peer mentoring are identified as learning spillovers first from within groups and second across groups. These results show the importance of endogenous learning rather than sanctioning to ensure high repayment rates. Using different definition of sanctioning, Wydick (1999) find that peer monitoring significantly affects borrowing group performance through stimulating intra-group insurance; while group pressure, a measure for sanctioning, have a small effect in deterring moral hazard. As you can notice, the two studies Barboza and Barreto and Wydick confine different meanings of what peer monitoring is composed of. In the case of Wydick, peer monitoring does not include sanctioning, it is a component of group pressure. This is contrary to Barboza and Barreto where sanction is an integral part of peer monitoring. However, they still arrive to the same conclusion, disapproving sanction as a force in addressing repayment problems.

¹⁷ Altruistic punishment is defined as a punishment undertaken by individual although it is costly for them and yields no material gain (Fehr and Gächter, 2000)

¹⁸ Their definition of peer monitoring embedded sanctioning as a core component within. They adopted the definition of peer monitoring from Stiglitz (1990) i.e. peer monitoring means that group members will enforce sanctions against nonpaying members thereby assisting in loan recovery.

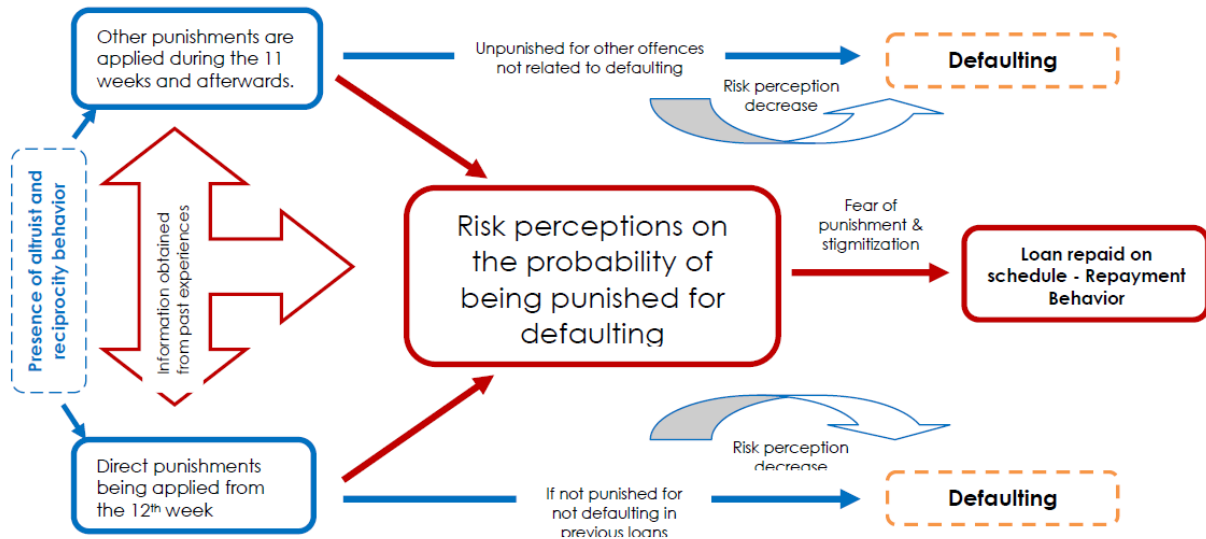
9.0 Analytical framework

Punishment is considered to be a justifiable group response to members not adhering to group beneficial norms. In principle, ASCAs are composed of individuals with four shared objectives i.e. joint savings, joint production of a collective good (i.e. loans), profit maximization and social and welfare support. To fulfill these objectives, rules and penalties have been agreed upon by all members in a collective manner. However, individuals in most of the collective agreements face conflicts between collective interests and rational private interests i.e. an individual in a collective group will receive a higher payoff for defecting than for cooperating, but all are better off if all cooperate than if all defect (Dawes, 1980; Kollock, 1998; Messick and Brewer, 1983; Dawes and Messick, 2000). Therefore, the general theoretical idea is that reward and punishments are behaviors that play an important role in upholding social norms (Boyd and Richerson 1992; Boyd and Henrich 2001; Sober and Wilson 1998; Ostrom, 1990). Based on this theoretical proposition, the specific hypothesis in this study is that loan repayment norm, as one of the social norms in ASCAs is positively affected by application of other punishments, that is other punishment not related to defaults have spillover effects on repayment behavior. Figure 13 demonstrates the analytical framework for the territories to be covered.

The analytical strategy focuses on members who will initially prefer to default once the group begins to issue loans. However, there are three mechanisms through which enforcement can produce an externality on their inclination to default (i) via the formation of the agents' risk perceptions, (ii) via an impact on a social norm for compliance, or (iii) via a preference for conformity. In principal, ASCAs operate two types of punishments as defined in the introduction (a) other punishments; and (b) direct punishments. Once a group is formed, members accumulate savings for 11 consecutive weeks without loans being issued within this period. This implies that only other punishments take place during those 11 weeks.

To uphold cooperation, punishments are applied for wrong-doers, with the application of punishment is made possible because of the presence of both altruist (Boyd et al., 2003; Boyd and Richerson, 1992) and reciprocity behavior among members (Fehr & Fischbacher, 2003; Fehr, Fischbacher and Gächter, 2002; Axelrod and Hamilton, 1981; Trivers, 1971). The mechanisms behind altruistic or reciprocity behavior is the negative emotion towards norm violators. In other words emotionally driven disposition to return good with good, and bad with bad (Sigmund, 2007).

Figure 13: A framework for understanding the effects of other punishments on repayment.



First consider a member taking a loan from the group (recall that loans are issued from the 12th week onwards). Thereafter he/she faces a decision to repay on schedule or defaulting in a simple one-period setting. The key question here is what entices him/her to repay? The first mechanism follows Sah's (1991) theoretical model. Applying Sah's reasoning to my set-up, members learn about the probability of facing punishment for defaulting from their past experience of other punishments during the past 11 weeks¹⁹. Hence, the perceived risk increases with increasing frequencies of punishments and in turn, the propensity for defaulting decreases. That is the more members experience other punishments, the perceived risk of being heavily punished when it comes to defaulting rises and so does the inclination to repay loans. Enforcement of other rules can thus produce a spillover on complying with repayment norm. In short, the main impetus of enforcing small rules is in increasing the certainty of punishment when it comes to defaulting.

The second mechanism that could mediate an enforcement spillover builds upon social norms. The literature on social norms (e.g., Lindbeck, Nyberg and Weibull, 1999) argues that the severity of social sanctions increases in the pervasiveness of norm compliance: the more people comply with a norm, the stronger are the potential social sanctions for an individual violating the norm. In the context of ASCA, when members learn about other members' commitment to repayment norm, they update their beliefs regarding the level of norm compliance. Accordingly, they would adjust their expectation regarding the severity of social sanctions, which might include

¹⁹ Other punishments also continue after the 11 weeks of accumulating savings.

stigmatization (Rasmusen, 1996). Again, this would increase the repayment performance. Note that the enforcement spillover via mechanisms (i) and (ii) stems from deterrence effects. The deterrent effect of other punishments arises from fearing that direct punishments could be triggered in the case of defaulting. In the first stage, the fearful situation activates a person's sense of risk and vulnerability. In the second stage of employing the fear appeal, the danger is depicted to be serious enough to warrant attention; while in the third phase, a solution is provided as a means of addressing the danger and reducing the fear (Tay, 2005). In my case, defaulters learn about an increased frequency of other punishments/direct punishments and severity of social sanctions and update their perceptions regarding the risk of defaulting. If potential defaulters perceive a sufficiently high risk of being punished and suffering from sufficiently strong social sanctions, they will repay their loans on time. This is the behavioral change resulting from other punishments.

10.0 Empirical approach

The literature review demonstrates the influence in which punishment can have on repayment behavior. It also shows the effects of how individuals use information from their past experiences to build risk perceptions on the probability of becoming a wrongdoer. Hence, this study estimates deterrence based on the effects of other punishments on defaulting. That is, I am estimating the independent influence of both direct and other punishments on the probability of loan repayment. My dataset include information on both categories of punishments.

Because of the binary nature of the dependent variable, the logit statistical model is adopted to estimate the effects of punishments on repayment behavior. It is a model that will ensure the predicted values lies within the interval $[0,1]$. Another key feature of the data, as elaborated in Section 6, is the way in which respondents are clustered at the group level, necessitating a multilevel modeling²⁰. Technical advances have been made on multilevel models over the past several years (See for instance Bryk and Raudenbush, 1992, Goldstein, 1995; Leckie, 2010; and Steel, 2008, 2009)²¹. The multilevel models recognize the existence of clustered data by allowing for residual components at each level in the clusters i.e. variations at the group level (i.e. level-2),

²⁰ Sociologists have been at the forefront in the use of multilevel models for binary data, adopting logistic or probit regression techniques as their standard analytical tools. Guo and Zhao (2000) outline two reasons behind this. First, sociologists, perhaps more than any other social scientists, are interested in explaining and predicting phenomena that can be characterized by a binary variable e.g. marrying, not marrying, divorcing or not divorcing, in school or not in school, voting for party A or party B. The second reason that prompted an interest in multilevel models is the practice of examining hierarchical social structure. Because social structures are often hierarchical, multilevel models have a natural appeal to sociologists. For instance, in schools, students (level 1) are nested in classes (level 2), and classes are nested in schools (level 3); individuals are nested in families, and families are nested in communities or neighborhoods etc (Guo and Zhao, 2000).

²¹ This section and the analysis of the results closely follow Leckie (2010) and Steel (2008 and 2009).

and variation attributable at the individual member level (level-1). In addition, the effects of unobservable variables (unobservable group characteristics) can be separately estimated. Traditional multiple regression techniques treat the units of analysis as independent observations; leading to the underestimation²² of standard errors if the data are hierarchical in nature²³.

Formally, consider the existence of a two-level structure where a total of n individuals (at level-1) are nested within j groups (at level-2) that is with n_j individuals in group j . The study observes y_{ij} as the binary response for member i in group j (with a respondent responding either $y = 0$ or $y = 1$). The probability of the response being one is given as $\pi_{ij} = Pr(y_{ij} = 1)$ with y_{ij} following a Bernoulli distribution. The probability of responding one, π_{ij} is transformed using the logit link function²⁴ $Pr(y_{ij} = 1) = \pi_{ij} = e / 1 + e$ which links π to the explanatory variables i.e. mapping a probability π lying between 0 and 1, to any value in the range $(-\infty, +\infty)$. Then, the model to be considered is:

$$\text{logit}(\pi_{ij}) = \log\left(\frac{\pi_{ij}}{1-\pi_{ij}}\right) = \beta_0 + \beta_1 x_{1ij} + \dots + \beta_p x_{pij} + \mu_j = \beta_0 + \sum_{p=1}^P \beta_p x_{pij} + \mu_j \quad (1)$$

Where $\mu_j \sim N(0, \sigma_\mu^2)$

- i = $i, \dots \dots n_j$ individuals within the groups.
- j = $j, \dots \dots N$ groups (financial self-help groups)
- p = subscript for independent variables. There are P number of x_s where $x = x_1, x_2, \dots \dots x_p \in R^p$ is a vector of p independent variables.
- x_{pij} = the value of the variable x_p for an individual i who is nested in group j . The i and j subscripts on x show that its values vary from individual to individual within a group.
- β_0 = is the overall intercept i.e. the overall mean of y (across all groups)
- μ_j = is the difference between group j 's mean and the overall mean. It is a random effects at level-2

²² Hence, overestimation of the statistical significance.

²³ Guo and Zhao (2000), Steel (2008) explain challenges associated with the applying single-level multiple regression model for multilevel data.

²⁴ The link function is the function of the probabilities that results in a linear model in the parameters. It is based on the logistic transformation of $\beta_0 + \sum_{i=1}^p x_i$ and is the cumulative distribution function of a logistic distribution.

Model (1) is considered as a combined model (i.e. combining both level-1 and level-2 models). Disaggregating it we get, level-1 model as:

$$\text{logit}(\pi_{ij}) = \log\left(\frac{\pi_{ij}}{1-\pi_{ij}}\right) = \beta_{0j} + \beta_1 x_{1ij} + \dots + \beta_p x_{pij} = \beta_0 + \sum_{p=1}^P \beta_p x_{pij} \quad (2)$$

Without μ_j , the level-1 model is the standard logistic regression model. Because the intercepts are random i.e. each group has different intercept, then the intercept β_{0j} is broken down into two parts. An overall or average value of the intercept i.e. β_0 and a group dependant part of the intercept μ_j giving a level-2 model as:

$$\beta_{0j} = \beta_0 + \mu_j \quad (3)$$

Model (3) indicates that the intercepts of each group line will have the same β_0 , making the differences between the groups' intercepts to depend on the value of μ_j which is the difference between the overall mean value of the dependent variable and the mean value of the dependent variable in group j ²⁵.

The common approach to multilevel modeling is to fit a series of models, testing at each step the plausibility of the different hypothesis. Therefore, three models will be tested. Model I includes individual-level effects only, to compare against models including different forms of group-level variation (Models II-III). Therefore, this study estimates two statistical models: -

Model I: The Variance Component Model (VCM)

This involves fitting the data to the unconditional means model, a simple model that omits explanatory variables. Its primary objective is to investigate the extent of the heterogeneity between the clusters (i.e. groups), thereby establishing the rationale for analyzing an extended multilevel model that would include independent variables (Glaser and Hastings, 2011). In the model, the overall intercept β_0 is shared by all groups while the random (group) effect μ_{0j} is

²⁵ The logit function (1) and (2) can take as an input any value from negative infinity to positive infinity, whereas the output is confined to values between 0 and 1 (the output is referred to the LHS representing the probability of a particular outcome, given that set of explanatory variables; while the input is the RHS i.e. the exposure to some set of independent variables). For statistical theoretical reasons, logistic regression analysis is based on a linear model for the natural logarithm of the odds. Taking the natural logarithms of the odds, changes the scale from 0 to ∞ (for odds), to $-\infty$ to $+\infty$ for log odds, centered on 0 (For technical guidance on the critical application of natural logarithms to the odds, see for instance Tarling, 2008).

specific to group j . The random effect is assumed to follow a normal distribution with zero mean and constant variance $\sigma_{\mu_{0j}}^2$.

$$\text{logit}(\pi_{ij}) = \log\left(\frac{\pi_{ij}}{1-\pi_{ij}}\right) = \beta_0 + \mu_{0j} \quad (3)$$

This model without any explanatory variables will produce an equation with an intercept but without a slope. The unconditional model gives the log odds of the dependent variable for the level-1 units (individual group members) across the level-2 units (the groups). It also partitions the variance between level-1 and level-2; with the between-group variance then representing the differences between the groups at level-2. The parameters to be estimated are β_0 and σ_{μ}^2 (and not the μ_{0j}).

Model II: The Random Intercept Model (RIM)

Model (1) is the random intercept model. It is testing the proposition that the intercept, i.e. the average repayment rates given the average values of the independent variables varies between groups. The model consists of two parts, the fixed and random part. In this model the intercepts of the group regression lines are allowed to vary randomly across groups i.e. the intercepts are allowed to take on different values from a distribution. However, the slope for each regression line remains the same i.e. parallel group regression lines. The inclusion of multiple independent variables allows for the study to focus on the variables of interest while controlling those which are considered to have some effects on the dependent variable. In other words, for instance β_1 is the effect of x_1 for individuals with the same value of x_2 and so on.

The above multilevel random intercept model consists of two parts (i) a fixed part – specifying the relationship between the dependent and independent variables (ii) a random part consisting of level-1 and level-2 residuals. The fixed part is: -

$$\beta_0 + \sum_{p=1}^P \beta_p x_{pij}$$

With the random part being μ_j . The intercept does depend on level-2 units (i.e. groups in our case). However, the regression coefficients (slopes) of the independent variables x_1, \dots, x_p are

constant. This means that the model permit the estimation of the unexplained variability in the intercepts β_{0j} across level-2 estimates.

11.0 Description of the variables

11.1 Dependent variable

The dependant variable in the analysis is REPAY, a binary variable that may be 0 or 1. In particular, REPAY = 1 if a group member indicates that he/she has repaid on schedule; while REPAY = 0 if a group member indicates that she/he has either defaulted or done late repayment of his/her loans . Repayment usually begins one month after obtaining the loan, and should be completed within 12 weeks (three months). Failure to start repayment in the first 4 weeks and after the 12 weeks warrant what I have referred as "direct punishment" i.e. *punishment directly related to an offence of late repayment*. It is in the discretionary power of the group to decide the kind of punishment (which usually starts with a higher interest rate on remaining balance). Hence, my question on late repayment refers to both failure to repay the first installment (after 4 weeks) and after the 12 weeks. In the empirical analysis, I have excluded members who are yet to apply for loans.

11.2 Independent variables

The survey included information on the two categories of punishments i.e. punishment for defaulting and punishment associated with other offences not related to credit defaulting. In particular, I have used the following individual level independent variables to measure these two types of punishment within the groups: -

Table 2: Punishment variables

Variable	Description
Other punishments	=1 If a group member has been punished (within the group) in the past 12 months by his/her colleagues on offences not related to credit repayment; =0 otherwise. Penalties are listed under Table 1. The expected direction of influence +ve.
Direct punishments	The proxy used for the punishments to defaulters is the presence or absence of perceived threat of punishments in the event of defaulting. If a group member considers that the threat of punishment for late repayment is credible (=1); while it is 0 otherwise. The direction of influence on repayment behavior is expected to be +ve. The same variable has been used by Bhatt and Shui-Yan (2002).

Next to these variables measuring punishments, I have used a number of variables measuring personal characteristics of group members. These set of variables are used as control variables. The reason why we include these variables in our analysis is that personal characteristics might influence repayment behavior in groups. They are not of major interest, but it is important to adjust for their effects to obtain more meaningful estimates of punishment effects, that we are interested in.

Table 3: Personal characteristics and socio-economic variables

Variables	Descriptions
Age	Age is measured in years. The influence of age differs depending on economic and/or social sectors to which the analysis is focusing on. In some empirical literature young people repay their loans on schedule than old people (Eze and Ibekwe, 2007 for the case of agriculture sector, and; Godquin, 2004 in the case of group lending).
Education	Refers to the number of years in formal education. Empirically, education is found to have negative effects on repayment trends (Matin, 1997) while other literatures such as (Bhatt and Tang, 2002; De la Huerta, 2010 ¹ ; and Papias and Ganesan, 2009) find education to have positive impacts on one's likelihood of repaying
Income	To minimize measurement error, monthly income is ranked from 1 to 7 following Finscope 2009 (FSDT, 2009). The hypothesis is that the higher the income, the higher the probability of repaying on schedule. In some empirical literature, income has positive influence on repayment behavior (Oke, Adeyemo and Agbonlahor, 2007); while it is negatively correlated with repayment performance (Hermes, <i>et al</i> 2005) and statistically insignificant (Bhatt and Tang, 2002).

Although the main interest is on how other punishment affects repayment behavior, there are also important non-punishment influences to consider. I specified social ties, compulsory savings, outside options and homogeneity of preferences as another set of control variables. I define them as follows:

Table 4: Other control variables

Variables	Descriptions
Preference on savings and loans	All surveyed groups consider access to finance as their principal objective. ASCA offers two categories of services i.e. first financial intermediation i.e. savings mobilization and provision of loans, while the second is non-core services, social and welfare functions ²⁶ . The responses are coded, = 1 if a respondent prefer financial intermediation; and =0 otherwise. Social identity theories show that groups in which members are linked by a collective identity will cooperate (Taylor and Whittier 1992; Hercus 1999; Cerulo 1997). Empirically, homogeneity of preferences may help groups in achieving high repayment rates (Bhatt and Tang, 2002; Anthony, 2005), while attaching high values access to loans reduces the probability of moral hazard behaviors, especially so for group leaders than for other group members (Hermes, Lensink and Mehrteab, 2004)
Social ties	Social ties is measured by the number of friends in the group. The hypothesis is that the higher the number of friends in the group, the higher the likelihood a member has strong social ties. The coding is = 1 if a respondent is having 0 friends, = 2 between 1 and 2; and lastly = 3 if having more than 2 friends in the group. The variable is exogenous because the survey question refers to friends before the formation of the group rather than friends after the group formation. Theoretically, +ve implications of social ties on loan repayment (Floro and Yotopolous, 1991; Stiglitz, 1990; Varian, 1990; Besley & Coate, 1995). Empirically, social ties seems to cement a positive role on cooperation (Zeller, 1998; Hermes, <i>et al</i> 2005; De la Huerta, 2010); negative implications (Paxton <i>et al</i> , 2000; Wahid, 1994; Devereux and Fishe, 1993; Ahlin and Townsend, 2007; Sharma and Zeller, 1997) and it is statistically insignificant in some cases (Wydick,1999). However, as indicated by Sharma and Zeller (1996) cultural factors may make it difficult to impose sanctions on close friends and in this way dilute the enforcement process (-ve effects).
Compulsory savings	Refers to the average number of shares purchased weekly. = 1 for those purchasing high number of shares; while =0 for those purchasing low number of shares. The requirement is for members to purchase shares frequently i.e. on weekly basis, enabling members to form the habit of saving regularly. Theoretically, compulsory savings reduces the payoffs of risky projects at a higher rate than in the case of safe projects (Stiglitz, 1990); increases both the probability of selecting safe projects (Banerjee <i>et al</i> , 1994); and it is part of official penalties in the case of defaulting (Besley and Coate, 1995). Empirically, savings improve repayment performances because they act as collateral (Zeller, 1998; and De la Huerta 2010).
Outside options	This question was whether an individual is a member of other financial institutions =1 and 0 otherwise. In the theoretical field outside options drives out of the market safe type borrowers (Ghatak, 1999). However, contradictory results emerge from empirical literature. To be a member of outside similar organizations contributes positively to repayment behavior (Oke, Adeyemo and Agbonlahor, 2007; Paxton <i>et al</i> , 2000); while it has negative impact (Matin, 1997; Hermes, <i>et al</i> 2005; De la Huerta, 2010; Ahlin and Townsend, 2007). One reason behind positive association is that the same set of people who are creditworthy, will also be in microfinance groups (Oke, Adeyemo and Agbonlahor, 2007), while having loans from other groups is an indication of creditworthiness rather than having obligations spread too thin (Paxton <i>et al</i> (2000). It is however perceived that, switching between groups reduces social ties and consequently lead to repayment problems (Hermes, <i>et al</i> 2005).

²⁶ Similar ASCAs outside Dar es Salaam accommodate environmental conservation objectives as well e.g. prohibiting businesses that are not environmentally friendly (Wild, Millinga and Robinson, 2008)

The expected sign for PREFERENCES FOR FINANCIAL INTERMEDIATION FUNCTION is positive. That is, if a group member considers savings and credit to be the high value group service compared to social and welfare functions this will reducing the probability of late repayment or defaulting. For SOCIAL TIES, the expected sign of coefficient cannot be predicted because of the two forces as explained above. COMPULSORY SAVINGS is expected to have a positive sign. The higher the number of shares being purchased the higher is the incentive to enforce loan repayments. The sign for OUTSIDE OPTIONS cannot be predicted given the existing different theoretical predictions. Table 5 lists the definitions and the expected signs of the independent variables.

Table 5: List of independent variables, definitions and expected signs

Variable	Variable definition	Exp. sign
Direct Punishment	=1 if punishment for defaults is considered credible; =0 otherwise	+
Other punishments	=1 if ever punished for other offences (not default); =0 otherwise	+
Income	=Ranked from 1 st to 7 th	+
Social ties	=1 having 0 friends, = 2 btn 1& 2 friends; and = 3 more than 2 friends	?
Age	In years	?
Education level	Number of years schooling	+
Outside options	=1 if a member of other financial based groups; =0 otherwise	?
Pref. for savings and credit	=1 loans and savings; =0 other services (social and welfare)	+
Compulsory savings ¹	=1 purchasing high no. of shares; =0 purchasing low no. of shares	+

¹ The maximum number of shares for groups mobilized by CARE International is five shares. In the case of SEDIT mobilized groups, the maximum is three shares. I cannot use the number of shares as a measurement of the variable "compulsory savings" because of these differences in the maximum threshold. I therefore, revert to the binary approach, such that for SEDIT based groups, low no. of shares is between 1 and 2 while it is between 1 and 2.5 in the case of CARE's groups. With respect to high no. of shares, it is 2.5 and 3 for SEDIT groups and 3 to 5 for CARE groups.

Notes: (+) positively associated with the repayment behavior of the borrowers; (-) negatively associated with the repayment behavior of the borrowers; (?) direction of association with repayment behavior is not known.

Dependent variable: REPAY = 1 if a member has repaid on schedule; = 0 if he/she has defaulted or done late repayment.

12.0 Univariate analysis and diagnostic exercise

I applied univariate analysis to identify important covariates – the ones that are at least moderately associated with the dependent variable. The *p-value* for five variables i.e. direct punishment, other punishments, social ties, income, compulsory savings and preferences reject the null hypothesis that $H_0: \beta_1 = 0$. However, gender, marital status, age and outside options have *p-value* higher than 0.25 and are therefore discarded from the model (see Appendix 2 for an extensive discussion on how the univariate analysis was applied).

With respect to diagnostic, the focus was mainly on measurement errors, specification error and multicollinearity. Appendix 3 gives an extensive explanation on how the tests were conducted. In short to address the challenge of potential measurement error, the surveyed income figures were ranked following Finscope 2009 (FSDT, 2009) i.e. from 1st to 7th, while with respect to

education, instead of asking the number of years in school, the question was on the last class attended. The number of years schooling were then computed by the researcher. In this case, the education variable is less subject to error.

The diagnostic also confirm the absence of the specification error i.e. confirming that the model has relevant independent variables and the dependent variable. With respect to multicollinearity I applied both the Tolerance and Variance Inflation Factor (VIF) tests. As moderate multicollinearity is fairly common, a rule of thumb in the literature is that of tolerance of more than 0.1 and VIF of less than 10 is an indication of absence of multicollinearity problem between the independent variables (Chen, X, et al, 2012). Only social ties, education and education squared have large VIF, however less than 10. I therefore, confirm lack of significant collinearity between the independent variables.

13.0 Results and discussion

13.1 Descriptive statistics on members' characteristics

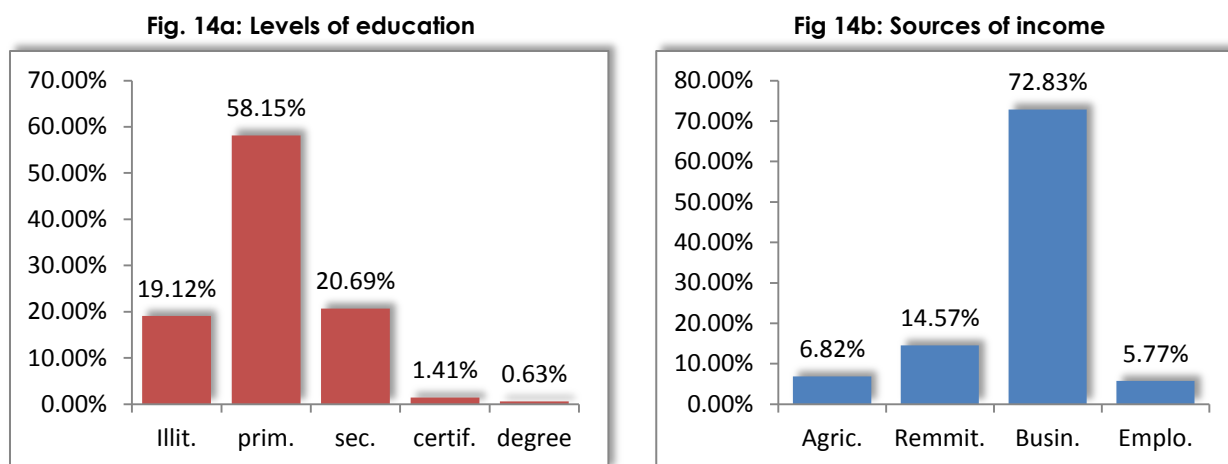
13.1.1 Socio economic characteristics

Data on ASCAs' members' individual characteristics, including their sex, age, education, and income were collected. ASCAs' membership requires individuals who can save regularly i.e. they are engaged in income generating activities. On average the age of ASCAs' members is 40 years with a standard deviation of 10.8 years, confirming that most ASCAs' members are not dependables. There are advantages and disadvantages of demographic heterogeneity within groups. In organization studies, diversity provides groups with a greater resource of experiences and viewpoints leading to greater creativity and better problem-solving ability (Ancona & Caldwell, 1992; Bantel & Jackson, 1989 cited in Valenti and Rockett, 2008). On the other hand, diversity can impede effective communication, which negates the advantages of demographic differences (Jehn, Northcraft, & Neale, 1999 cited in Valenti and Rockett, 2008). The large standard deviation is an indication that group composition in urban areas is less influenced by hierarchy compared to the tendency in rural areas. That is, elderly in rural areas prefer to have their own groups rather than mixing with young people.

With respect to education, Figure 14a shows that most ASCA members are primary school educated; they have on average spent 6 years in formal schooling with a large standard deviation of 3.7 years. In fact, 81 percent of respondents have attended formal education, with the remaining 19 percent are illiterate. It is surprising that such a large percentage of individuals are illiterate in the capital city, where access to public education is relatively easier than in rural areas. With majority of ASCAs' members being primary school educated and the quality of primary education being questioned²⁷, there is a low probability that education will confirm the theoretical predictions that formal schooling is an indicator of human capital which is expected to influence efficiency positively and thereafter address repayment challenges.

²⁷ A recently released independent evaluation of primary school education reveals shocking results. Among others, the study shows that, one in five primary school leavers cannot read Standard 2 level Kiswahili; half the children who complete primary school cannot read in English, and; only 7 in 10 primary school leavers can do Standard 2 level Mathematics (UWEZO, 2010).

Figure 14: Socio-economic characteristics



On average monthly income of ASCAs' members is US\$ 76, a median of US\$ 63 and a standard deviation of US\$ 58. This is low compared to the average household income of Dar es Salaam residents of US 94 (URT, 2007). There is a large variation in income levels between ASCA members. The distribution of income is skewed, as 60.2 percent are below the grand mean, with the remaining 39.8 percent being above the grand mean. It is an indication that the majority of members in the sample are poorer compared to the overall grand mean. Figure 14b shows that 73 percent are engaged in small businesses followed at a distance by those surviving on remittances from family and friends. The small businesses referred to include food vending, making locally decorated garments, managing small shops popularly known as "Viosks" etc

13.1.2 Social capital of ASCA members

I divided social capital into two categories. First, in terms of memberships in other groups (whether formal or informal groups) and secondly in terms of civic engagement and participation in community activities. Figure 15 demonstrates different indicators of social capital. It confirms that ASCAs are made up of individuals with high level of social capital. For instance, about 46 percent of ASCAs' members maintain multiple memberships in other informal savings groups i.e. ASCAs and ROSCAs. The reasons behind maintaining multiple memberships; first, a need to diversify access to finance (i.e. sources of savings and credit). A second important reason is that some wealthier members are constrained by the upper limit of savings in a single group. This means that the ability to save varies within groups, forcing those with high capacity to save (and/or are higher demanders of credit) to maintain memberships in more than one group. Maintaining membership in both ROSCA and ASCA type of groups is complementary. That is, ASCA has a "welfare" advantage over ROSCA and is more commercially oriented when compared to ROSCA i.e. members receive dividends at the end of the year in addition to the borrowing opportunities. As Besley, Coate and Loury (1993) indicates,

ROSCA might not be suited for insurance against risks as the fund cannot be obtained more than once, while shocks might occur several times²⁸. Finally, ROSCA obliges members to save systematically whereas it is different from some ASCA in which members are not compelled to purchase shares every week. I found that most ASCA members were members of ROSCA prior to the establishment of ASCAs. Therefore, ROSCAs can be considered as bedrocks for people to learn and build a culture of saving.

Parallel to membership in ROSCAs, ASCA's members are engaged in other social, sports and political organisations. Figure 15 shows that 85 percent of ASCA members are engaged in several economic as well as non-economic groups. Pooling of ROSCA members into ASCA is an indication that ASCAs act like insurers. Some members have confirmed that it is easier and quicker to get credit from ASCA in the case of unexpected economic and medical emergencies. This is the major purpose of the social fund maintained by all ASCAs.

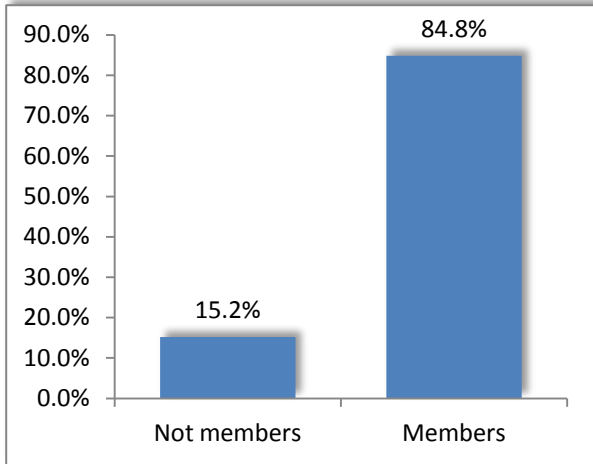
Access to formal financing is also widespread within ASCA members. Figure 15 indicates that 41 percent of ASCA members maintain bank accounts. However, despite bank loans being cheaper than loans from ASCAs (see Section 2.2.2), banks are mainly used as a place to save rather than a potential source of credit. This is because most people lack collaterals, and even if collateral exists such as houses, residential plots, farms etc they are not formalised i.e. not formally registered with title deeds, a requirement necessary to qualify for bank loans. People are also scared to lose their properties, if they fail to repay loans. Reasons behind preference to loans from informal groups such as ASCAs is (i) loans from informal groups do not require collateral (ii) in the case of ASCAs, borrowers can easily negotiate extensions (iii) with ASCA, the profit goes back to members as dividends, differently with traditional banks (see Section 2.2.1).

Furthermore, the strength of social capital of ASCA members is also evidenced by their civic engagement. Figure 15 shows that 94 percent participated in an election in the past three years. It is important to note that my survey was conducted one year after a major national election which was considered to be the most competitive one in the history of Tanzania. Though only 30 percent have engaged in public demonstrations, the number is significant in absolute terms, as demonstrations are not a common phenomenon in Tanzania. However, most of the demonstrations to which ASCAs members have experienced are peaceful ones such as those related to religious events, women day etc. Of the six indicators of social capital only participation in demonstration and number of friends have significant influence on the repayment performance.

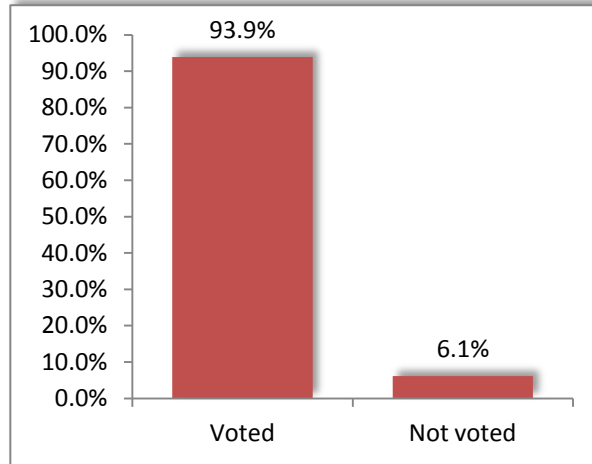
²⁸ This view is contested by Klonner (2003) who indicates that ROSCA can still fulfill an insurance function because individuals are usually in more than one ROSCA.

Figure 15: Social capital of the ASCA members

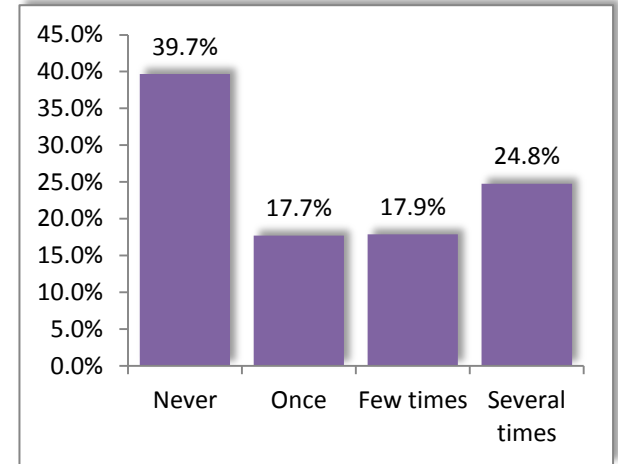
Membership in other groups: Social, political and economic (other than the current group)



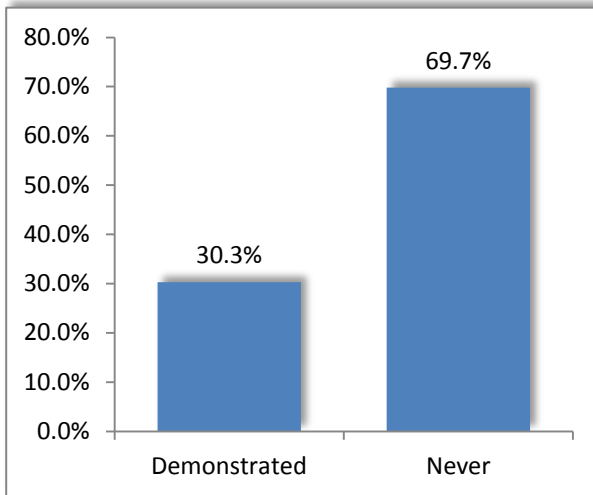
Voted in an election in the past three years.



Whether you have joined community in the last 12 months in solving community problem.



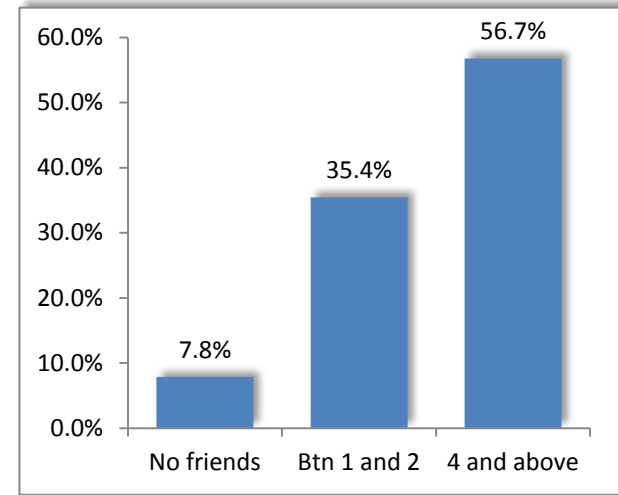
Participated in any public demonstration, whether political, social or religious.



Member of other informal savings groups such as ROSCAs and other ASCAs.



Number of friends in the group, before the groups were formed.



13.1.3 Cooperating behaviour

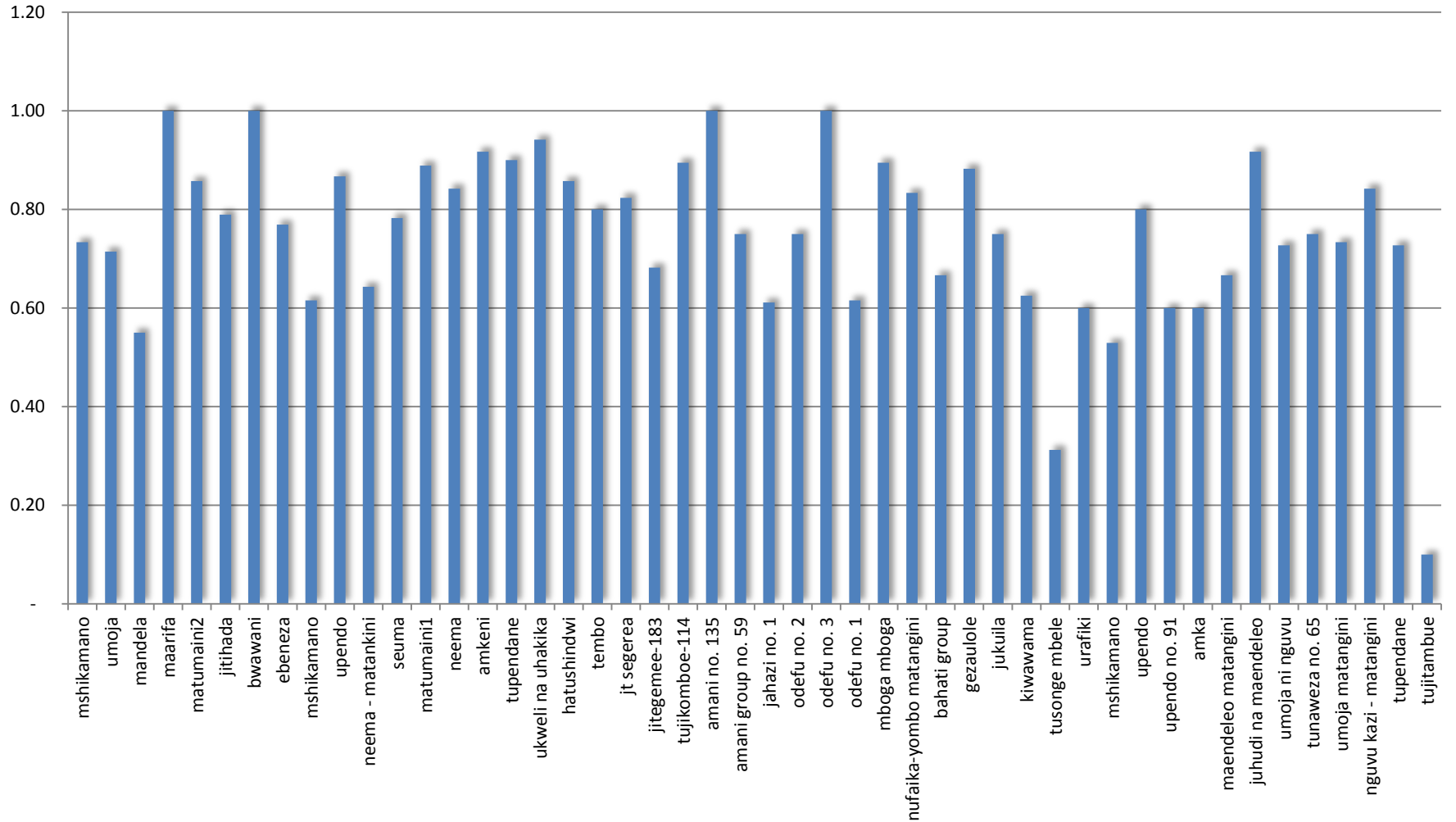
13.1.3.1 Repayment rates

Repayment rate is the proportion of group members who have repaid their loans on schedule. It stands at 76 percent compared to 24 percent who have repaid late²⁹. Women are better performers compared to men when repayment results are disaggregated by gender. Though gender is statistically insignificant in explaining repayment performance 76 percent of women who had taken loans from the groups have repaid on time compared to 73 percent of men. Figure 17 shows performance of the three indicators of cooperation i.e. repayment rates, meeting attendance and savings. Figure 16 gives the repayment rates for all the surveyed groups.

To investigate gender differences in repayment performance, I cross tabulated gender and other variables (Appendix 7). Women are found to be more active in helping their group colleagues when it comes to social events. This is found to be statistically significant at 10 percent level. Compared to men, women purchase more shares than men (p-value 0.040) and they are more into ROSCAs as well (p-value 0.003). Helping others on social events increases the bond between members making leading to women maintaining higher social ties and consequently, they feel more committed to repayment. As a result of maintaining higher social ties, female members face a higher reputational risk when it comes to repayment behavior. Lindbeck, Nyberg and Weibull (1999) argue that the more group members comply with a norm, the stronger are the potential social sanctions for a member violating the norm. Hence, in this study more women abiding to repayment norm increase the severity of social sanctions for potential women defaulters. Those purchasing high number of shares is an incentive to repay on time because of benefiting more towards the end of the financial years, in terms of the dividends. Membership in ROSCAs builds up the culture of saving and commitment to repay, and this behavior is transmitted to ASCA. Ethnographically, I witnessed men and women sorting into single-sex clusters during the weekly meetings. In these situations, gender segregation will increase the probability of women having more networks (hence high social capital) among themselves compared to men who are outnumbered in all groups.

²⁹ Higher repayment rates have also been reported in the context of Grameen type of microfinance group lending (see for instance, Morduch, 1999)

Figure 16: Mean repayment rates for all the surveyed groups



13.1.3.2 Meeting attendance and saving behaviour

The other two variables representing cooperative behavior are frequency of meeting attendance³⁰ and weekly savings through purchasing of shares³¹. Meeting attendance is high, with 88 percent having attended more than the 75 percent of the total number of meetings in. The remaining 12 percent attended less than 75 percent of the meetings. Nevertheless, meeting attendance is not significant in explaining repayment performance. Savings or contributions have been used by several studies as an indicator of cooperation (for instance Fehr and Gächter, 2000). Savings behavior of ASCA members shows high level of cooperation. Figure 17c shows that 89 percent of ASCA members do purchase large number of shares every week compared to 11 percent. Savings is found to be statistically significant in explaining variation of the repayment behavior.

Figure 17: Cooperative behavior among ASCA members

Fig. 17a: Repayment rates

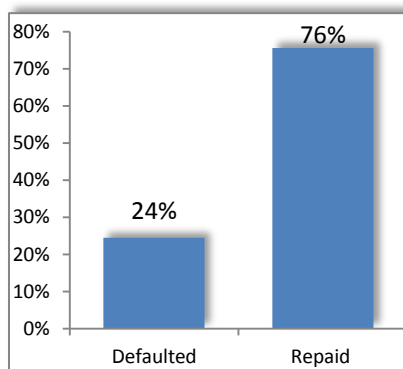


Fig. 17b: Meeting attendance

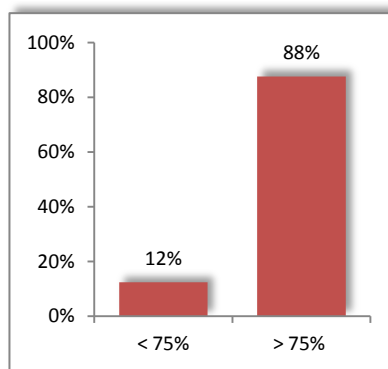
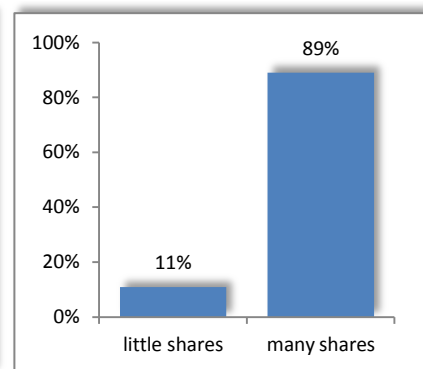


Fig. 17c: Savings behavior



Literature on shareholders behavior in corporate entities provide evidences that large shareholders have more incentives to provide more efforts in monitoring than small shareholders (see Porter, 1992 cited in Admati, Pfleiderer and Zechner, 1994). However, I did not find evidence for this hypothesis in the case of ASCA. By considering meeting attendance as a proxy for monitoring efforts, the cross-tabulation of savings and meeting attendance gives statistically insignificant result. Absence of influence of shareholding levels on monitoring is because of a) high level of trust between members; such that absentees from weekly meetings believe that

³⁰ Members are obliged to attend the weekly meetings.

³¹ On one hand, purchasing weekly shares can be as considered more of an investment decision than an indicator of cooperation. However, on the other hand, it is a collective agreement that purchasing shares every week is compulsory. It is therefore more relevant to consider it as an indicator of cooperation rather than an investment decision.

those attending meetings will safeguard collective interests b) because of living in the same neighborhood; members always interacts outside the meetings, hence absentees can easily obtain information on what transpired in the meetings.

13.1.4 Punishment behaviour

The novel idea of this study is the disaggregation of punishments taking place within ASCAs into two categories i.e. direct and other punishments as defined in the introduction. Results show that most members (80 percent) believe that the threat for punishment for defaulting is credible, with only 20 percent thinking otherwise³². The other punishment was a binary variable as well =1 if ever punished for offences not related to credit repayment and =0 otherwise. The descriptive statistics confirm that other punishments are common phenomenon in ASCAs, as 67 percent had such experiences compared to 33 percent. Frequency of punishments between groups shows some variations. . That is, about 64 percent of those who have experienced other punishments are nested into 22 of the total 48 groups sampled in this study.

13.2 Results from the statistical models

13.2.1 Justifications for adopting multilevel modelling

The estimate of β_0 from the single level logistic regression model (Model 4 in Table 6) is $\exp(-2.271) = 0.103$, while it is $\exp(-2.199) = 0.111$ from the multilevel model. By ignoring the *context* i.e. clustering of the respondents into groups, the standard logistic model has underestimated the average value of the repayment variable i.e. β_0 by around 7 percent³³. Furthermore, the multilevel model yields a between group variance of 0.326, a piece of information necessary to compute the Variance Partition Coefficient (VPC) i.e. what portion of the variation in repayment performance is explained by the group level characteristics. The VPC reflects the realities on the ground, as members' interactions and group characteristics will differ from one group to another. We would therefore, expect behavior of members in the same group to be similar than behavior of members taken from different groups.

³² Asking a direct question on whether a member has been punished for default would have reduced the sample size as would have to omit all those who have yet to take loans. Therefore, the question adopted here is a proxy for direct punishments.

³³ Recall that for the binary dependent variable β_0 is the proportion of those coded 1 (i.e. $y_{ij} = 1$ for those who have repaid on schedule and $y_{ij} = 0$ for those who have defaulted).

Another feature of the model presented in Table 6 is the decrease in the coefficient of other punishment between the baseline equation (Model 2) and the multilevel model (Model 3). The coefficient of other punishment from the baseline model is 0.72 compared to 0.63 from the multilevel model, suggesting that a portion of the observed differences in the probability of defaulting is a function of the attributes introduced in the model as controls. In particular, around 13 percent of the punishment gap in the probability of repaying on schedule is accounted by controls introduced in the model.

13.2.2 Group differences in repayment behaviour

To analyze group differences in repayment behavior, I fitted a basic null two-level VPC, a model with only an intercept and group effects (no independent variables). Two main questions are covered by this model; i) *how much variation is there in repayment behavior between groups?* and ii) *which groups have particularly low and high repayment rates?* The model estimates (Model 1) are displayed in Table 6.

To answer the question on how much variation exists between the groups, I estimated the variance of μ_{0j} , which is given as 0.477³⁴, indicating that repayment behavior somehow vary in an important way between groups. It is important to note that, this refers to unexplained variations at the group level without controlling for other factors (i.e. no explanatory variables involved in the model). However, the group variance goes down to 0.324 with respect to the RIM (Model 3). This reduction is an indication that the distribution of some of the variables varies across groups. As indicated by Leckie (2010), the between-group variances between the null and full models will differ because some groups will have higher proportions of members with, for instance, higher savings than others etc.

³⁴ Recall that in the model we are estimating σ_j^2 and not μ_{0j} .

Table 6: Results from the estimated statistical models

Dependent Variable: =1 if an ASCA's member has repaid on schedule; = 0 if he/she has defaulted.

Parameters	Random Intercept Models (RIM)			The traditional single-level logistic model: Without random effects
	Null multilevel model: Without explanatory variables i.e. VCM	Baseline multilevel (RIM) model. Model with only the principal explanatory variable	Main multilevel model with individual variables	
	Model 1	Model 2	Model 3	Model 4
Fixed effects				
β_0 (Constant)	1.230*(0.000)	0.78*(0.000)	-2.20*(0.000)	-2.27*(0.000)
Other punishments		0.72*(0.000)	0.63**(0.002)	0.62**(0.002)
Direct punishments			0.61**(0.013)	0.61**(0.008)
Income levels (ranked from 1st-7th)			0.12**(0.039)	0.13**(0.015)
Social ties – number of friends			0.50**(0.002)	0.51**(0.001)
Education in years			-0.01(0.946)	0.02(0.729)
Education squared			0.00(0.764)	0.00(0.531)
Preference on savings and credit			0.60**(0.004)	0.60**(0.002)
Savings – shares purchased			0.62**(0.045)	0.55***(0.051)
Random effects				
Variance between group intercepts	0.447	0.468	0.326	
Variance Partition Coefficient (VPC)	0.120	0.125	0.090	
Others				
Log likelihood values			-323.082	

In multilevel statistical analysis, fixed effects refer to the modeling of means, whereas random effects are used to model variances. p-values in parentheses; significance at 1, 5 and 10 percent denoted by *, ** and *** respectively. The Random Intercept Model (RIM) allows the intercepts of the group regression lines to vary randomly across groups but the slope for each regression line remains the same.

Now, which groups have particularly low and high repayment rates? The group effects i.e. μ_j are random variables under the assumption that they follow a normal distribution. Their distribution is therefore summarized by two parameters, the mean (which is fixed at zero) and a constant variance $\sigma_{\mu_j}^2$. To compare different groups I estimated μ_j for each group. This is done by fitting the model based on the estimates of the model parameters (β_0 and $\sigma_{\mu_j}^2$) and the values of the dependent variable. Figure 18 displays group residuals, with 95 percent confidence interval. There are 48 residuals, one for each group³⁵. The residuals represent group departures from the overall mean, so a group whose confidence interval does not overlap the line at zero (representing the mean log-odds of repaying on schedule across all groups) is said to differ

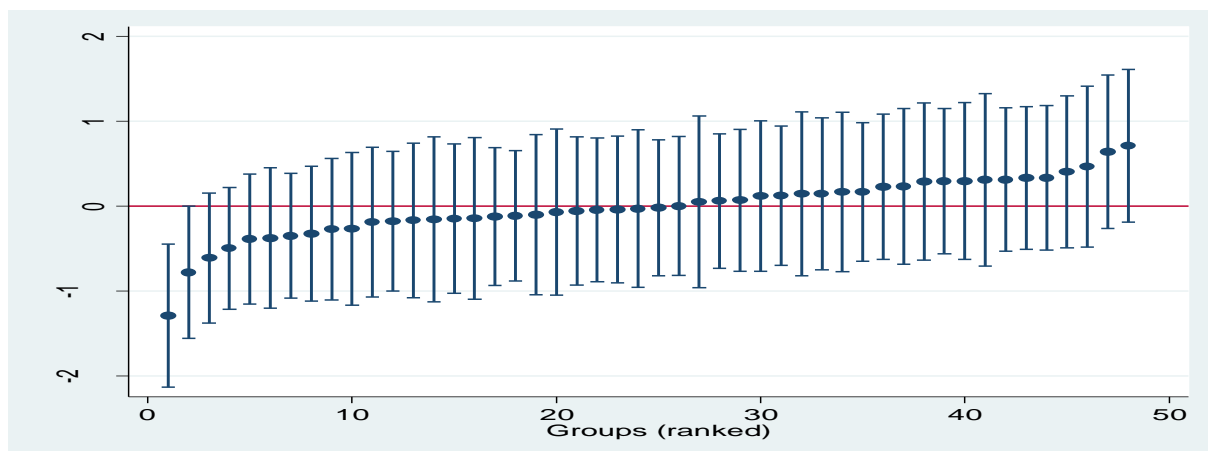
³⁵ The width of the confidence interval associated with a particular group depends on the standard error of that group's residual estimate, which is inversely related to the size of the sample (Steel, 2008). Here, confidence intervals are quite wide because the sample sizes within some groups are small, leading to larger standard errors for the estimated group residuals μ_{0j} . Note that a few groups have narrower confidence intervals; these are groups with the largest samples sizes i.e. Seuma and Jitegemee groups.

significantly from the average at the 5 percent level. The figure shows group differences in terms of the repayment behavior with two groups being on the extreme i.e. repayment rates are lower than the average; in other words, these are groups with the largest negative values of μ_j . These are found on the left hand side of the plot, meaning that the two groups are the ones with the highest probability of defaulting. However, on the right hand side, there are no groups with mean repayment rates above average at 5 percent level i.e. no group with high response probability (highest values of μ_j).

The informal discussion with CBTs provided some insights on the reasons behind *groups having a high and low performance*. First, they (i.e. CBTs) consider that differences in leadership vigilance in enforcing repayment on schedule contribute to differences in repayment behavior between groups. Some group leaders consider delays in repayment as of less concern compared to defaulting. This belief is perceived to be the main reason for large amount of loans being outstanding. The research team witnessed CBTs intervening and encouraging some groups to forcefully collect some of the overdue loans. Second, it is suspected that as some of the groups are composed of relatives (e.g. a husband and wife in the same group, a sister and brother etc) there is leniency when it comes to enforcing repayment on schedule. The survey recorded the number of relatives in each group. Although, this variable is statistically insignificant in explaining variations in repayment performance, it has a negative sign indicating an inverse relationship with repayment behavior. Third, differences in repayment performance might be explained by differences in monitoring efforts. Meeting attendance as a proxy for monitoring has positive significant influence on group repayment performance. That is, groups with higher average meeting attendance maintain better repayment performance. The research team observed limited discussions and interactions in those groups where meeting attendance was low compared to the ones with high attendance.

It is rarely for loans to be written off. It can only happen in a situation where the borrower has faced incidences such as house fire. This has happened in one out of the 48 surveyed groups. In such a case a member can even receive additional support such as another loan to repair the house or to buy necessities for few days. It is easier for groups to verify any disaster occurring to one of their members because they all live in the same area. Though these kinds of supports are not explicitly reflected in their constitutions, they reveal the importance given to the welfare responsibilities of the group.

Figure 18: Estimates of the group residuals



13.2.3 *The spillover effects and other determinants of repayment performance*

Table 6 shows the presence of the relationship between seven independent variables and the repayment behavior. The significance of direct punishment confirms both the theoretical predictions and empirical findings in several literatures (see the discussion in Section 8.1.2 and 8.2.2). As the interaction variable is statistically insignificant, each of the punishment category, direct and other punishments has an independent effect and they do not reinforce each other. Loan repayment behavior is also found to be related to income, social ties, saving levels, and preference on financial intermediation. However, loan repayment behavior is neither related to education. This insignificance reflects diversity of results from empirical studies. For instance, while education has been found to have positive influence on repayments (Bhatt and Tang, 2002; De la Huerta, 2010); other studies such as Matin (1997) demonstrates a negative impact of education on one's likelihood of repaying on schedule.

The principal result is the significance influence of other punishments on repayment behavior. That is the other punishments which are not related to an offence of defaulting leads to behavioral change when it comes to loan repayment. The significance of other punishments in explaining variations in repayment rates adds new information to the existing knowledge on repayment behaviors in informal savings groups i.e. externalities in rules enforcement from one area to another one. The effect sizes are presented in terms of odd ratios (column 3, Table 7). For those who have experienced other punishment they are 1.88 times more likely to repay their loans on schedule compared to those who have never experienced other punishments. For

those who considered direct punishment to be credible they are 1.83 times more likely to repay on time compared to those who do not consider direct punishment to be. In fact the odds ratio for other punishment is higher than the ones from other determinants of repayment performance³⁶.

13.2.4 What makes other punishment effective?

There are two possible reasons behind the spillover effects of other punishments on repayment behavior. First, other punishment works indirectly, by increasing the credibility of direct punishment. After a group is formed, members accumulate savings for 11 consecutive weeks. No loans are issued during this period implying that only other punishments take place. As a result, during these 11 weeks agents build up perceptions on the probability of being punished for defaulting when lending start from the 12th week. This spillover effects means that those who have experienced other punishments will perceive a high risk of being punished again if they “dare” to default. That is emotion of fear is created when other punishments are administered prior to the issuance of loans. A practical example is the case where a member has been instantly punished for a small offence such as phone ringing during a meeting or forgetting to bring his/her savings book. Thereafter this punishment experience will increase the probability of direct punishment when he/she decides to default strategically. Therefore, his/her risk perception on being punished for defaulting will increase and consequently he/she will not default in the future. Perceptions are based on agents' assessments of whether the group is vigilant in enforcing group rules. Intuitively, the higher the enforcement of rules through the application of other punishments, the higher the probability that defaulting will not be tolerated. Therefore, other punishment sends a signal on the extent to which a group is vigilant in enforcing rules which members agreed upon when the group was established.

Secondly, in some of the groups, the research team observed that loan application is, in some cases, linked to the past behavior of an applicant. These past behaviors were not only related to an applicant's past repayment behavior, but also to his/her adherence to other rules. That is, approval or disapproval of loans is also linked to the past non-defaulting behaviors. Two quotations were observed during two weekly meetings confirm this connection: -

³⁶ However, we cannot compare the size effects of direct and other punishment. This is because one measure is “actual” (other punishment), while the other one is “anticipated” (direct punishment).

- *“...every week you are punished for late coming, are you seriously going to repay the credit you are applying for?”*
- *“.... you have attended this meeting just because you are in need of credit; first you have to pay a fine for the last three meetings you missed....”*

While the first quotation reflects members' concerns about the risk of defaulting because an applicant could not even abide to a simple rule of promptness in weekly meetings, the second quotation indicates an intention to punish an applicant on other offences before approving his/her loan application. These behaviors mirror two theoretical predictions elaborated in Section 8.1.1. First, as indicated by Sah (1991) past experience of agents (in my case-being punished prior to obtaining a loan) is sufficient information necessary to raise agents' perceptions on the risk of being further punishment if they default and consequently repayment behavior will improve. Second, the conviction on lateness on weekly meetings creates an emotion of fear, and thereafter deter loan defaulting. It is the declaration of a person's criminality which makes other people reluctant to interact with him (see the discussion on stigma and its effects on criminal behavior in Rasmusen, 1996).

13.2.5 Does the effectiveness of other punishments differ across groups?

To test the hypothesis that the effectiveness of other punishment differs across groups, I applied a Random Slope Model (RSM) which allow for the coefficient of one of the independent variable to vary randomly across groups. Recall that the Random Intercept Model (RIM) allows only the model intercept to vary across groups, with an assumption that the effects of individual characteristics (variables in the model) are the same in each group i.e. the coefficients of all explanatory variables are fixed across groups. With RSM, the coefficient of one of the independent variables i.e. (other punishment) is allowed to vary randomly across groups. Results are presented in Table 7 (Model 5 and 6).

Table 7: Results from the Random Slope Model (RSM) and Odds ratios

Dependent Variable: =1 if a member has repaid on schedule; = 0 if he/she has defaulted.

Parameters	Random Slope Model (RSM)		Odds Ratios	
	Multilevel model: Individual variables and random slope for other punishment	Multilevel model: Individual & group level variables, random slope for other punishment	Computed from model 3	Computed from model 6
	Model 5	Model 6		
Fixed effects				
β_0 (Constant)	-2.12**(0.001)	-0.11(0.901)	0.111	0.896
Other punishments	0.56**(0.024)	0.73**(0.021)	1.878	2.072
Direct punishments	0.69**(0.032)	0.58**(0.026)	1.840	1.786
Income levels (ranked from 1st-7th)	0.14**(0.023)	0.13**(0.021)	1.127	1.139
Social ties – number of friends	0.51**(0.002)	0.53**(0.001)	1.649	1.699
Education in years	0.00(0.997)	0.02(0.835)	0.990	1.020
Education squared	0.001(0.873)	-0.00(0.962)	1.000	1.000
Preference on savings and credit	0.60**(0.006)	0.59**(0.007)	1.822	1.804
Savings – shares purchased	0.53**(0.012)	0.53(0.107)	1.859	1.699
Group level variables				
Same sex		-0.61**(0.016)		0.543
Economic inequality		-6.36**(0.005)		0.002
Ethnicity		-0.86(0.334)		0.423
Random effects				
Variance: Between group intercepts	0.767	0.402		
Variance: Other punishments	2.013	2.000		
Variance: Other punishment & intercepts	-1.006	-0.851		
Others				
Log likelihood values	-317.121	-310.701		

The Random Slope Model (RSM) allows for the coefficient of one of the independent variable to vary randomly across groups. In this case, other punishment is allowed to vary across all 48 groups.

To test whether the effect of other punishments varies across the 48 groups, I applied a likelihood ratio test. The null hypothesis is that the two new parameters i.e. variance of the variable other punishment and the one of other punishment & intercepts are simultaneously equal to zero. The likelihood ratio test statistic is calculated as two times the difference in the log likelihood values between the model with and without the random slope for other punishment. The test is given by $LR = 2(\log L_{RIM} - \log L_{RSM}) \sim \chi_{0.05}$. Hence, the difference between the two models is therefore $LR = 2(-317.121 - -323.082) = 11.92072$. The chi-squared distribution at 0.05 on 1 degree of freedom is 3.84 concluding that the effect of other punishment does indeed vary across groups. One of the reasons given by the CBTs regarding the differences in the application of other punishments is the differences in the quality of group leaderships. I tested this argument by running few individual group regressions using other punishment as the only predictor. The finding is that for a group like "Jitegemee" which is perceived to have a strong leadership, those

who have experienced other punishments are 5.3 times most likely to repay their loans on time compared to those who have not experienced other punishments. In the case of “Mandela group” which is perceived to have weak leadership, those who have experienced other punishments are only 0.10 times more likely to repay on time compared to those who are yet to receive other punishments. In these individual group regressions, other punishment is statistically significant at 10 percent level.

The above analysis confirms that other punishment differs across groups. An emerging question is what are the group characteristics predicting high levels of other punishment? To answer this question I regressed other punishments with different group characteristics. These group characteristics are generated by averaging responses from individual members nested in each group. However, due to a small number of groups (i.e. 48), I had to apply single regression per each individual characteristic. Results are demonstrated in Table 8.

Table 8: Group characteristics – individual members’ response, averaged at the group level

Group characteristics	Definition	Coefficient	t-value	p-value
Social ties***	No. of friends	0.029	1.97	0.055
SACCOs**	Membership in SACCOs	0.798	2.47	0.017
Stay***	No. of years living in the community	-0.011	-1.81	0.077
Popular**	Meeting a popular person in the last three years	0.311	2.69	0.010
Campaign**	Participated in an election campaign	0.266	2.41	0.020
Help party**	No. of times helping fellow members on social events	0.039	2.21	0.032
Help tools**	No. of times helping fellow members with a working tool	0.088	2.32	0.025
Wealth1**1		0.067	2.17	0.035

¹ No. of items owned. These include land, house, television, video, refrigerator, freezer, motor cycle, car etc. Here we count each type of asset as 1 (not the number of items per each assets i.e. even if a member owns 2 cars we only count 1 as "owning" a car rather than the number of cars he owns)
Significance at 1, 5 and 10 percent denoted by *, ** and *** respectively.

Table 8 shows that groups with large number of friends apply more other punishments and vice versa. Furthermore, having large number of members who maintain membership in SACCOs positively influences other punishments. SACCOs are semi formal financial cooperatives, with formal established structures as well as oversight mechanisms compared to ASCAs. Most of SACCOs members have received training on savings and credit management skills. With this background, one of the possible reasons behind positive influence of membership in SACCOs on the frequency of other punishment is ASCAs is the transmission of financial discipline obtained from SACCOs experience into ASCA. The financial discipline makes ASCA members less lenient on enforcing collective agreements; which in turn increase the frequency of other punishments. In short, cross learning process between SACCOs and ASCA benefit ASCAs making the informal savings groups more vigilance on loan recovery.

When social capital is measured in terms of civic engagement (participating in election campaigns and/or whether there is a tendency to interact with famous persons such as ward councilors) then groups composed of a high number of "political active" members apply other punishments frequently compared to those groups which are less political active. That is to say, civic activism induces more punishment. Positive link between civic activism and cooperation is also confirmed by Putnam, Leonardi and Nanetti (1993). Wealth also induces more punishments. One potential explanation behind wealthy groups engaging more in punishing is the higher penalty they face when defaults occur. Defaulting eats up group capital, reduces revenue, which ultimately leads to less profit. In these situations, wealthier members are more affected than poor members because of the reduced dividends. Other group characteristics with positive influence on other punishments include activeness in welfare activities (i.e. helping each other on social events and working tools). Lastly, the number of years living in the community appears to be negatively correlated with other punishments.

13.2.6 Contextual factors affecting individual repayment behaviour

The Variance Partition Coefficient (VPC) which computes the percentage of total variance in the repayment behavior attributable to group level characteristics is calculated as $0.326 / (0.326 + 3.29) = 0.090$ for Model 3 (Table 6). That is only 9 percent of the variations of the individual repayment behavior are influenced by group level characteristics. Though there is low group level effects on repayment performance. I still investigate some group level characteristics influencing individual repayment behavior. This is done by applying a RSM with added group level characteristics. The independent "context level" variables in which I am interested are measures of economic and ethnic heterogeneity among individuals within a group. In addition to heterogeneity, one of the fascinating characteristics of ASCAs in Ilala district is the domination of women in terms of numbers. That is there are groups which are entirely composed of women while others are composed of both gender. Therefore the main group characteristics to be included in the model are: -

- (i) **Economic inequality.** The survey collected information on ownership of several assets such as land, house, television, video, refrigerator, freezer, motor cycle and car. The index I use is the Gini coefficient constructed from the number of assets owned by ASCAs' members. As the research site is in the urban area, owning these assets represents a wealthier status (the same argument by Ahli and Townsend (2003)). Appendix 4 demonstrates how the Gini coefficient was computed:

- (ii) **Tribal fragmentation:** This is measured through the factorization index. In total members of the surveyed groups belong to 56 different tribes. As Ilala is located in the commercial capital, ethnic heterogeneity is expected to be high. This index represents the probability that two randomly drawn individuals from the same group belong to different tribes (the formula is in appendix 5).

- (iii) **Gender composition:** A group which is entirely composed of women is coded 1; while it is =0 for the mixed gender groups. The survey did not come across a group which is entirely composed of men.

Results are presented in Table 7 (Model 6). Two group level characteristics (economic inequality and gender composition) are significantly associated with individual repayment behavior. High economic inequality within ASCAs, leads to low repayment performance; reflecting findings by La Ferrara (2002) and Dayton-Johnson (2000), among several other literatures. Though economic inequality is statistically significant, it has small effects size as measured by odds ratio. That is, for groups in which there is high economic inequality, members are only 0.002 times more likely to repay on time compared to those in which there is more wealth equality.

On the other side, there is a high effects size for gender composition. That is, for groups which are entirely composed of female members; individual members are 0.543 times more likely to repay their loans on time compared to members who are in mixed gender groups. Though ethnicity is negatively correlated with repayment performance as suggested by existing theories and by a large number of empirical studies, it is however found to be statistically insignificant in the case of repayment performance within ASCAs. One of the possible reasons for the insignificance of ethnic heterogeneity is the long experience urban residents have on cooperating with non-co-ethnics, a common characteristic in urban environment. On average, the surveyed ASCAs members have stayed in the capital for 12 years³⁷, a period sufficiently enough for individuals to be used to cooperate with non-co-ethnics. This experience is therefore transferred to ASCAs. The high level of ethnic heterogeneity in urban areas limits the choices available to individuals on which ethnic groups (let alone co-ethnics) to cooperate with.

³⁷ With a high proportion of them having cooperated with other non-ASCA community members on resolving a community challenge (see Table Appendix 6)

13.2.7 Social ties and the probability of repayment on schedule

The odds ratios shows that those with large number of friends are 1.64 times more likely to repay on time compared to the ones with limited number of friends. This means that forces making social ties contributing positively to repayment rates cancels out the opposite force where social ties lead to deteriorating repayment performance. There are two implications resulting from the positive significance of social ties on loan repayments. First, those with large number of friends, face a higher penalty for defaulting. This means that defaulters face the risk of being regarded as unreliable and untrustworthy even in non-ASCA related activities (See Rasmusen (1996) demonstrating in his theoretical model the extent to which stigma can reduce criminal behavior).

Large number of friends also strengthen peer monitoring. Friends are aware not only of the specific income generating activity of their colleagues but also the performance of these activities. This prevents strategic defaulting, making it difficult for agents to declare bankruptcy as a reason for defaulting. The survey found some of the groups e.g. Mboga Mboga group as one of the group composed of members undertaking similar business i.e. growing and selling vegetables around the same area; while another group was composed of "Mama Ntilie"³⁸ in the same large compound. Though I have used only one indicator of social ties, the other indicators which were excluded from the model because of endogeneity also confirms strong social capital of the ASCA members (see the discussion in Section 13.1.2).

Though my statistical model confirms social ties as a facilitator of repayment behavior, there is need for a separate study to investigate the diverse and complex manner not only in the way social ties influences cooperation but also how it is built-up once groups are formed and its diverse effects thereafter. The importance of the second part is reinforced by findings from Wild, Millinga and Robinson (2008) showing that group members not only cited social component as more important than the financial gains but also considered that their social status to have improved due to their increased wealth and social interactions that group membership confers.

13.2.8 Preferences on financial intermediation.

The positive influence of preferences on financial intermediation on repayment performance is consistent with the findings by Bhatt and Tang (2002) and Anthony (2005). That is, if members

³⁸ "Mama Ntilie" is the popular local name for those engaged in selling locally prepared food.

“prefer” core group service i.e. financial intermediation, this will then help in achieving high repayment rates. In particular, those who prefer core services are 1.82 times more likely to repay their loans on time compared to those who prefer other non-core services (i.e. welfare services). Despite some group leaders emphasizing that financial intermediation is a primary group's objective, lengthy discussions with them revealed otherwise, especially so for those groups which were established by people sharing a common social challenge e.g. those infected with the Human Immunodeficiency Virus (HIV). In these groups, financial intermediation comes second to welfare function. The welfare services which are considered as priorities include, consoling and educating each other on how to remain healthy, treatment options, information about potential opportunities to get social, health or economic assistance etc. Counseling services are usually hired and are being paid out of the group fund. Supporting each other goes even further. If one of their colleagues is consistently unable to purchase shares, other members will contribute financially to support her/him in that case, to buy at least the minimum number of shares. For them it is socially undesirable to have high inequality with respect to shareholding in the group. Given overemphasis of welfare function, these groups will have limited financial profitability compared to those which prefer financial intermediation over welfare services.

Limited profitability is not the only consequence of the welfare function overriding financial intermediation. Some members who prefer financial intermediation more than welfare services have left these types of groups, leading to the loss of productive or valuable group members and reduced social ties. Savings capacity is affected, as well as loss of potential interest income resulting from potential borrowers leaving the groups. While it is not a “sin” for members to prefer welfare services, what matters for group survival is, first, if it is a financial intermediation group then a common understanding is important among members about the primary role of the group. This is because it is nearly impossible to apply a model of a profit making entity into a welfare group. Secondly, the sustainability of these groups (the ones overdoing welfare activities) will be much higher if they are completely converted into welfare groups rather than remaining as financial intermediation group.

Apart from access to finance through savings and credit, ASCA has a potential to build up and/or enhance entrepreneurship culture. This is different from savings groups like ROSCAs. Recall that, ASCA members benefit in two ways i) access to finance by savings and building up capital to facilitate availability of credit; and, ii) return on investment (as members are shareholders). This second component is the one in which members build up consciousness on

investment for a return, which in turn increase both the sense of “profit making” and financial literacy.

13.2.9 *Maintaining multiple memberships*

Though ASCA members are also members in other groups, maintaining membership in other similar informal savings groups is not found to be statistically insignificant in explaining repayment behavior. Members have devised institutions that mitigate the effects of multiple memberships. For instance, reinforcement of the rule requiring every member to save on weekly basis; not only increases the capital base of the group, but also increase the intrinsic attachment to the group. Preferences on financial intermediation are also interlinked with members maintaining multiple memberships. I noticed that people join multiple groups of the same type, while maintaining different preferences on each of the group in which they belong. For instance, an individual who is a member of two different ASCAs might highly prefer financial intermediation in one group, while at the same time she/he prefers welfare service in the other ASCA. This individual could clearly differentiate the benefits he/she can get from each of these groups. In this case, a member joins a group that is “strict” on its financial intermediation because he/she benefits from savings and credit while maintaining membership in the other one to benefit from its welfare function.

In addition to having multiple benefits by maintaining multiple memberships, individuals also join more than one group because it is impossible to purchase shares above the set maximum group limit. To test the hypothesis that wealthier individuals opt for multiple membership because they have more savings capacity than what is allowed in a single group, I cross tabulated income and other options. Results show that 81 percent of high income earners are members of more than one group compared to 74 percent of low income earners, with the results being significant at 5 percent level (Appendix 8). The key question emerging from this result is why don't wealthier members form their own groups? Informal discussion with some of group members reveals that in the case of segregation, wealthier individuals can be perceived as “ignoring” the poor. The poor might then reciprocate by boycotting any events (funeral, social events etc) associated with the wealthy. Therefore, rather than forming their own group, wealthier members are forced to spread their resources in several groups, which on the other hand increase their alternative sources of finance, as well as hedging against their bets.

14.0 Conclusion

The significance of other punishments in explaining variations in repayment rates adds two elements in the existing literature on social institutions in economic groups. First, other punishments, which are not associated with an offence of defaulting also, account for variations in repayment behaviors; hence, ignoring their effects will misinform policy initiatives on means in which economic groups can be sustained. Second, in relation to the first, is the need to disentangle punishment categories when investigating factors working for or against collective groups. It is important for the informal savings groups which do not depend on external enforcement mechanisms to focus on deterring future offences by avoiding leniency on wrongdoers. We have also seen that despite having financial intermediation as a primary function ASCAs also embrace welfare responsibilities. However, overdoing a welfare function poses a risk to the sustainability of these financial institutions. Information provided by this study reveal some interesting aspects that might be an avenue for further studies. Similar to the discussion by Nagin (1998), the response of repayment rates to a change in institutions governing ASCAs will depend on various other things. These include the context under which punishments are implemented, for instance the number and characteristics of members in the weekly meeting, the process by which people come to learn of punishments, differences among people in perceptions of punishments and rewards related to cooperative behaviors.

15.0 Limitation of the study

It is important to highlight some of the limitations when interpreting the results of this study. First, these groups are not universal. Currently there are several organizations (not only SEDIT and Care International) which are mobilizing the establishment of ASCAs in Tanzania, leading to different groups' operating methodologies which could substantially different from one another. Consequently, these operating methodologies might influence variations in repayment behavior.. Second, the selection process of individuals into the groups was considered as given; meaning that the study does not attempt to investigate the determinants of decisions not only to join, but also to borrow. In reality, members of these groups face two decisions, first, they have to decide whether to join the groups or not and secondly they have to decide whether to borrow from the collective pot or not. I therefore, take as given the selection of the peri-urban members of the society into the groups. Third, the data collected did not capture groups that collapsed because of defaulting or for any other reasons. Forth, it is a cross-sectional research

study, meaning that no causal inference can be concluded. However, the correlation results can feed into the development of intervention policies that aim at sustainability of these self help ventures. In conclusion, the said limitations can be seen as concrete possibilities for future research.

16.0 References

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17.0 Appendices

Appendix 1: Formula for computing the representative sample

The representative sample for the 4,598 individuals is computed as follows: -

Confidence interval = 5 percent

Confidence level = 95 percent

By using the Z-score table, the confidence level is converted to a Z-score of 1.96. In terms of the proportions, the expectation was 50 percent of the respondents will respond affirmatively. Hence, the sample size is: -

$$SS = \frac{Z^2 \times P(1 - P)}{I^2} = \frac{(1.96)^2 \times 0.50(1 - 0.50)}{(0.05)^2} = 348$$

Where

SS = Sample size

Z = Z - score

P = Proportion

I = Confidence interval

Appendix 2: Univariate analysis

After taking into account the system under investigation and theoretical justification of the variables, I began with univariate analysis. This is an alternative to the goodness of fit test such as Akaike's Information Criterion (AIC) which requires a series of candidate models specified a priori; meaning that if only poor models are considered, the AIC will identify the best of the poor models; even if all models are poor (Burnham and Anderson, 2002). This highlights the importance of working from the univariate statistical analysis. To identify important covariates – the ones that are at least moderately associated with the dependent variable, I fitted a standard logistic regression model with one covariate at a time and analyzed the fits. I opted for this approach rather than stepwise elimination in which the risk for residual confounding is substantial – as the model will only include regressors that are statistically significant at $p < 0.05$

(see for instance Vittinghoff et al, 2005). With the univariate analysis, I am testing the null hypothesis $H_0: \beta_1 = 0$, (i.e. the data is completely random, that there is no relationship between two variables). I computed the test statistic: -

$$z = \frac{\beta_i}{SE_{\beta_i}} \quad \text{where } SE = \text{standard error and } i = 1, \dots, 9$$

The critical z-score values when using a 95 percent confidence level are ± 1.96 standard deviations, and the p-value associated with a 95 percent confidence level is 0.05. The z-score for five variables i.e. direct punishment, other punishments, social ties, income, compulsory savings and preferences lay outside ± 1.96 , giving p-values of less than 0.05 (less than 1 in 20 chance of being wrong), hence rejecting the null hypothesis; i.e. the relationships exhibited are unlikely to be one version of a random pattern. Table 9 demonstrates the z- and p-values for each of the tested covariate. The common rule of thumb in the literature is to include all covariates whose p-value < 0.25 (McCracken, 2004)³⁹. Table 9 shows that “gender”, “marital status”, “age”, and “outside options (informal groups)”. The dummy variable to capture the differences in internal structure (groups with subgroups and those without) is found to be statistically insignificant.

Table 9: Univariate analysis

Parameter	Description	Z-values	p> z
Direct punishment	=1 if punishment for defaults is considered credible; 0 otherwise.	2.86	0.004
Other punishment	=1 if ever punished for other offences (not default); 0 otherwise.	3.76	0.000
Income	= Ranks of income levels from 1 st to 7 th .	3.28	0.001
Social ties	=1 if 0 friend; =1 between 1 & 2 friends; =3 if ≥ 3 friends.	3.46	0.001
Age	= number of years.	-0.61	0.543
Age squared	= age squared.	-0.65	0.514
Gender	=1 female; = 0 male.	0.52	0.604
Education	= number of years in school.	1.66	0.096
Education squared	= education squared.	1.73	0.083
Outside options	=1 saving in another informal group (ROSCA/Vicoba); =0 otherwise.	-0.62	0.535
Other options	=1 if save in a formal institutions (a bank and/or SACCOS); = 0 otherwise	1.87	0.061
Preferences for financial intermediation	=1 loans and savings; = 0 other services provided by the group.	3.20	0.001
Savings	=1 purchasing high no. of shares; = 0 low number of shares.	2.30	0.022
Marital status	=1 if married and widows; 0 not married.	0.65	0.516
Internal structure	= 1 if the group is made up of subgroups; =0 no subgroups within the main	0.97	0.333

Appendix 3: Diagnostics⁴⁰

Measurement error

³⁹ Several other literature such as Maldonado and Greenland (1993), Budtz-Jørgensen et al (2006), Gusti (2009) suggest that potential variables be eliminated only if $p > 0.20$, in order to protect against residual confounding.

⁴⁰ Closely following procedures outlined by Chen, et al (2012).

Compared to other variables used in the study, income and education were highly prone to measurement errors. This is because it is common for individuals to misreport incomes, in particular non-salary incomes. To address the problem, the monthly individual income data were ranked according to the ranking provided by the Finscope 2009 (FSDT, 2009) that is from 1st to 7th. With respect to education, instead of asking the number of years in school, the question was on the last class attended. The number of years schooling were then computed by the researcher. In this case, the education variable is less subject to error.

Specification error

The model has assumed the logit of the dependent variable is a linear combination of the independent variables. Other additional assumptions, include, first, the logit function (in logistic regression) is the correct choice as our link function to use. Secondly, on the right hand side of the regression equation, I have included all relevant independent variables. In this section specification error is tested to confirm whether the model has all relevant independent variables and if the dependent variable is a linear function of the predictors.

If the model is properly specified, no additional predictors will be statistically significant except by chance. Two values are used as independent variables to rebuild the model, first is the linear predicted value (\hat{y}) and secondly, the linear predicted value squared (\hat{y}^2) as the predictors to rebuild the model. The variable \hat{y} should be a statistically significant independent variable, since it is the predicted value from the model. On the other hand, if our model is properly specified, variable \hat{y}^2 shouldn't have much predictive power except by chance (UCLA ATS, 2012).

Table 10: Results of the model testing specification error

Parameter	Estimate	Z-values	p> z	Standard errors
\hat{y}	1.245	3.66	0.000	0.340
\hat{y}^2	-0.123	-1.80	0.421	0.153
β_0 (Constant)	-0.062	-0.32	0.747	0.194

The first approach was to run the normal non-multilevel logit regression⁴¹. Table 10 shows that, the variable `_hatsq` is not statistically significant while `_hat` is. The conclusion is that meaningful independent variables have been selected in the model. Secondly, since the `_hatsq` is not significant, the absence of a specification error is confirmed.

Multicollinearity

Generally in multilevel regressions standard errors for the coefficients are large as a result of limited number of respondents at level-2 (See the discussion in Steel, 2008). This is confirmed by comparing standard errors from a standard logit regression and those generated from a multilevel. Lack of collinearity will confirm that the large standard error is the results of nesting data into groups rather than collinearity between the selected independent variables. To test the collinearity among the eight independent variables used in this study, I will use both the Tolerance and Variance Inflation Factor (VIF) tests. Tolerance gives an indication of how much collinearity that a regression analysis can tolerate; while VIF indicate how much of the inflation of the standard error could be caused by collinearity. If all variables are completely uncorrelated with each other (orthogonal to each other), both the tolerance and VIF are 1. If a variable is very closely related to another variable(s), the tolerance goes to 0, and the variance inflation gets very large. Because there are eight independent variables, making each independent variable a dependent variable one at a time, I need to run eight regressions⁴², such that

$$x_1 = \varphi_2 x_2 + \varphi_3 x_3 + \dots + \varphi_{10} x_{10} + c_0 + \varepsilon$$

Where c_0 is a constant and ε is an error term. Then the tolerance and VIF for $\hat{\varphi}_i$ where $i = 1, \dots, 9$ with the following formula: -

$$Tolerance = 1 - R_i^2$$

and

⁴¹ The STATA command to test for specification error cannot generate the predicted values from the multilevel logit regression. It can only do that from the normal (non-multilevel) regression results. The same predictors which are statistically significant from the multilevel logit regression results are also significant in the normal non-multilevel regression.

⁴² Running OLS with a binary outcome variable will not be problem because multicollinearity is a property of the independent variables, not of the model.

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

Where R^2 is the coefficient of determination. As moderate multicollinearity is fairly common, a rule of thumb in the literature is that a tolerance of more than 0.1 and VIF of less than 10 is an indication of absence of multicollinearity problem between the independent variables (Chen, X, et al, 2012). The computed tolerance and VIF are given in Table 11 confirming lack of multicollinearity.

Table 11: Tolerance and VIF measures for the independent variables

Parameter	R-squared	Tolerance	VIF
Direct punishment	0.017	0.983	1.017
Other punishment	0.011	0.989	1.012
Income	0.118	0.882	1.133
Social ties	0.012	0.988	1.012
Education	0.859	0.142	7.067
Education squared	0.860	0.140	7.158
Preferences	0.010	0.990	1.010
Savings	0.024	0.976	1.025

Appendix 4: Computation of Gini Index

$$G = \frac{\sum_{i=1}^n (2i - n - 1)x_i}{n^2\mu}$$

Where

- i = individual's rank order number
- n = number of total individuals in a group
- x_i = individual i number of assets he/she owns
- μ = the average of the assets from the sample.

Appendix 5: Computation of the Tribal Factorization Index

$$F.Index_j = 1 - \sum_{i=1}^N S_{ij}^2$$

Where

- i = tribes within a group, from $i \dots \dots N$
 j = groups
 S_{ij} = share of individuals in group j who belong to tribal i

Appendix 6: Experience of ASCA members in cooperation within the community

<i>How many times in the last 12 months you have joined other people in the community (neighbors, friends, leaders etc) to find a solution to a challenge/problem facing the community</i>	No.	Percent
Never done	253	39.7
Done once	113	17.7
Few times	114	17.9
Many times	158	24.8
Total	638	100.0

Appendix 7: Cross tabulation between gender and other variables

	p-value
Helping others on social events	0.075
Saving levels	0.040
Membership in ROSCA	0.003

Appendix 8: Proportion of low and high income earners maintaining multiple memberships

	Low income members	High income members
Not a member o other groups	97 26.4%	52 19.3%
A member of more than one group	271 73.6%	218 80.7%
Total	368	270