

Life and Death of Roscas: Leadership, Election and Screening *

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Abstract

In this research, we shed new light on the factors influencing the duration of informal savings groups and their risks of failure using an original data set containing information on living and dead roscas from Cotonou, Benin. A survival analysis highlights the role of the leadership structure, the influence of democracy inside the group and the importance of the screening process before accepting new members on the probability of failure. We also put forward how incentives can be decisive as to the success of such groups.

1 Introduction

A Rotating and Savings Credit Association is an informal savings group consisting of members whose fixed contributions are gathered at every meeting. The total amount of the money collected, known as the pot, is then given to one of the members according to a predefined rule: lottery draw, decision by the ruling body or bidding process. Each member has to keep contributing until every one has received the pot, which marks the end of the cycle. One can therefore expect members to try getting hold of the pot at the very beginning of the cycle and then stop contributing. This creates important incentive problems. Thus the challenge in such groups is to make everyone pay their share until the end of the cycle. Should it not be the case, the group would be very likely to collapse.

In this research, the idea is to underline the factors influencing the survival of roscas. We investigate which leadership structure and which set of rules and incentives are more likely to

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ensure the survival of a rosca. We mainly focus on the role of the president and on the criteria by which she is chosen, on the screening of new members and on incentive schemes designed for members and leaders (mostly financial).

A number of tasks have to be performed in order for a group to function properly. Several of them are of primary importance and pertain to the core of the rosca business. Others are secondary but can help strengthen cohesion inside the group or constitute services which add up to the value of a particular rosca. The ruling body of a rosca has to set the rules for the group, collect the contributions, fix the order of pot reception (decision, random), take sanctions (reprimands, fines, complaints to the local head of administration, seizure of goods, exclusion of members) in case of bad behaviour and settle in case of conflict. It is also in charge of taking in new members, organizing meetings, keeping track of the bookkeeping and securing the cashbox (containing fines or money of the group)¹. In some cases, the financial leftovers of the cycle are redistributed, loans are attributed and meals, celebrations or other activities are organized.

Defaulting members is a problem of key importance in the context of rosca and is often acknowledged in the literature. In this respect, several papers study the role of the rosca leader (president of the group) regarding sustainability. Kurtz (1973) mentions that when the president receives the first payment², she must pay off³ the members of the group if something goes wrong and is often the only one to lose money. This is also brought up by Bouman (1995) who claims that in many countries the organizer is paid because running a rosca has almost become a profession. Since the role of the president is to minimize the risk of default, according to van den Brink and Chavas (1997), the best incentive scheme is to have her receive the last pot rendering her the residual claimant. Handa and Kirton (1999) provide a detailed analysis of the rosca leader in which they consider the 'banker' to be the internal governance structure minimizing transaction costs. They confirm her role of risk minimizer as lender of last resort, since either she receives the pot at the end of the cycle or she keeps the pot to cover a potential default. They claim that a sole individual making decisions for the group is more efficient than trying to reach a consensus among the whole group. It is indeed likely that groups run by their founder (founder groups) are well managed due to invested time, effort, reputation, etc. by a president only too anxious to see her group flourish. Our fear however is that, in the absence of the right incentives, there might be a trade-off between the efficiency gains from having only one decider and the losses due to the misuse of power, mismanagement or underinvestment in monitoring efforts. We believe that, with the exception of groups founded by the president, an intermediary solution such as a committee of rulers sharing responsibilities is probably more efficient. One of Handa and Kirton's most important results is that paying the president for running the rosca diminishes the risk of experiencing problems⁴ in the group, thereby enhancing sustainability⁵. Although in our sample rewarding the ruling body does not seem to influence the occurrence

¹Contrarily to common beliefs, many rosca keep money in a cashbox. This is the case for 95.9% of the groups of our sample - coming from fines, deposits, shares of the pot required for operating costs, etc. This money is mostly used to give loans, organize parties and / or pay the wages of the group manager.

²In 36.4% of the rosca from our sample, the time of pot reception for the ruling body is stated in the rules. In 97.7% of these cases, the leaders receive the pot at the very beginning of the cycle.

³Failing to fulfill her obligations would tarnish her reputation and prevent her from further leadership in a rosca.

⁴10% of the members in their sample experienced problems in their group while 26% did in our sample. Interestingly, only 1.5% of the members of their sample reported a delinquent president whereas there were 3.3% in our case.

⁵If we admit that 'experiencing problems' seems to be a good proxy of the non sustainability of a rosca, the way the group tackles problems is also likely to be an important factor influencing the duration of the group. The latter is probably related to the organizational design of the group.

of problems, since these features have a correlation coefficient of 0.06, by focusing on president groups we observe that it diminishes the likelihood of group failure.

Handa and Kirton also raise the issue of randomness of rank allocation and confirm that it diminishes the probability of experiencing problems in roscas. In fact, random roscas have the advantage of being fair and immune to subjectivity or favouritism regarding rank allocation, regularly leading to conflicts inside the group. As Anderson, Baland and Moene (2004) put it, this method of allocation is favored by a majority of members since each one stands the same chance of receiving the pot early in the cycle⁶. It has, however, the drawback of not optimally granting the pot to the most in need and, according to Anderson et al., of exacerbating the incentives to default. This implies that agents taking part in such groups have to be more vulnerable to social sanctions for the rosca to be sustainable⁷. As regards group survival, our empirical analysis shows that there is no robust and significant relationship between randomness and the probability of group failure.

As to the complete falling apart of roscas, references are quite rare. Bouman (1995) quotes the paper of Wu (1974) bringing up the case of organizers of *Huis* disappearing with the money in Papua New Guinea at the time of independence while Anderson, Baland and Moene (2004) touch on the problems of cheating and the lack of money to contribute. These papers are however of little help regarding the question we are interested in as they do not deal with the specific topic of group failure and the factors reducing or enhancing the duration of roscas.

Recent advances in the literature deal with the sustainability and stability of the agreement between members of such groups. Anderson et al. (2004) make clear that without social sanctions and contracts, roscas are bound to fail because the first member to receive the pot has no incentive preventing her from leaving the group. As for Ambec and Treich (2007), they point out that if people suffer from self-control problems and that contracts are binding,⁸ roscas are stable financial agreements. Basu's plausible assumption (2006) of rosca members being hyperbolic discounters⁹, proves that even in the absence of social sanctions and contracting, roscas can be effective commitment savings devices.

Beyond the differences related to the order fixing process, the amount of the contribution, or the number of members, what is striking is the extent to which groups can differ due to the ruling structure of the group. From our field observations, we distinguish two kinds of groups: those run by a president alone (president groups) and those led by a committee consisting at least of a president, treasurer and secretary (committee groups). The former case mainly refers to a group whose sole function is to render a financial service. It is run either by the founder who decided to set up an association hoping it would provide her a means of saving and living (founder groups) either by a non-founder president (non-founder groups).¹⁰ In the case of committee groups, since most of the time they turn to election, becoming a committee member depends on the members' will. It is considered to be an honour which does not bring much advantage beyond social esteem. This kind of group fulfills different functions: it primarily

⁶They also prove that multiplicative discounting implies that the majority of members strictly prefer the allocation of ranks to be random.

⁷Our sample however does not confirm this point.

⁸The latter implies that defaulting is not possible (or at infinite cost), which might be regarded as a strong hypothesis in such an environment. There is therefore no need for social sanctions in this framework.

⁹Recent papers on participation to rosca tend to suggest that it is frequently one of the possible reasons to join. See Gugerty (2007), Ashraf, Karlan and Yin (2006) and Dagnelie and LeMay-Boucher (2008) among others.

¹⁰Even if most of them are rewarded for managing the group, these earnings are not sufficient to cover their daily needs.

serves as a savings vehicle but also provides with opportunities for socializing. These roscas are more cohesive as demonstrated by tests of proportions difference on the sharing of leftover funds, compulsory attendance, the prerequisites before joining a committee group and on the proportion of groups having other activities (indemnity funds, dancing and chanting, meals, etc.).

During the course of our survey, we noticed that ex-members of groups run by a president alone often complained about their past experiences in such roscas. Moreover, they tended to have lost money in the ending process of the group. In this paper, we investigate the role of the group structure and membership in the disbandment of roscas.

This paper has the following structure. We begin by providing a brief description of our survey in section 2. Section 3 deals with the typology of groups and addresses the question of differences in terms of functioning and regulation. Mindful of selection issues, we investigate in Section 4 the kind of people who are attracted to the different rosca organizational designs. In Section 5 we present a survival analysis on the groups which fell apart without complete consensus of the membership. Section 6 concludes that, with the exception of associations run by their founder, president groups seem more likely to experience an inefficiency stopping. We also put forward incentive, election and screening issues and emphasize their positive part in rosca survival.

2 Description of our Survey

The data we use was collected in 2004 in the two districts of Vossa and Enagnon located on the outskirts of Cotonou (about 1.1 million of inhabitants). These areas are known to the city's authorities to be the poorest. Vossa borders an inner bay of fresh water and accommodates a community of fishermen whereas Enagnon encompasses an adjacent slum called Enagnon-Plage which is inhabited by a majority of fishermen living in huts on the beach. Vossa and Enagnon are near downtown Cotonou where a majority of inhabitants work and commute everyday. No formal savings and investment institutions, neither public nor private, such as banks and NGOs are present in these two districts.

During the first three months of 2004 we surveyed 497 households: 110 in Vossa and 387 in Enagnon, of which 114 are located in Enagnon-Plage. The selection of the households was conducted randomly. The first wave of interviews aimed at creating contacts, acquiring housing characteristics and obtaining information on each member: religion, activity, education, income, expenses, savings, etc. As a second round was required for members of informal groups, enumerators set out to collect detailed information on all the current and former group(s) they belonged to. To ensure a maximal accuracy, all members of a household were interviewed separately throughout the successive waves of our survey so as to make certain that tricky issues related to expenses or income were only tackled privately. Particular attention was thus put on confidentiality which our enumerators strictly observed.

All of the 497 households we surveyed represent 2083 individuals, 894 of which are under sixteen. This means we are left with a sample of 1179 individuals divided into 604 women and 575 men. We gathered information on 270 members of 242 distinct roscas among which 192 were alive and 50 dead¹¹.

¹¹We cross checked data collected on groups from different members to ensure that each rosca was uniquely identified.

We have data pertaining to the interrogated individuals and the groups they joined (structure, functioning, problems encountered, etc.) but lack information regarding the president and other members of the group who were not interviewed. Since the individuals were only interrogated once on their participation in groups which may no longer exist, these are retrospective flow sampling data¹².

3 A Typology of Groups

Field observations led us to observe that ex-members of president roscas tended to complain about their past experiences. This brought us to objectivize those impressions in terms of undesired mortality of groups and to investigate their organizational structure. Figure 1 plotting the smoothed hazard rates split according to the ruling structure of the association (setting aside covariates) suggests that president groups and particularly non-founder groups have a lower survival probability since they exhibit, throughout the whole period, a higher hazard rate than committee groups. Moreover tests on differences of proportions reveal that committee and president groups appear to function very differently.

Tables 2 and 1 present descriptive statistics and tests of difference of proportions for the most relevant variables. They enable us to provide a general description of an average committee group. Typically, these groups have a larger membership than president groups which is probably rendered possible in terms of management due to responsibility distribution between the ruling members. These roscas appear to have adopted the most democratic group structure seeing as they elect their leaders, have written rules, share the financial leftovers of the cycle and exhibit an open decision process. Our guess is that written rules clarify the respective roles of members and leaders who can more easily be made accountable. They also reduce uncertainty in case of conflict. Election and participatory democracy empower the members who have their say in the important events of their group. Sharing the financial leftovers between all members emphasizes the fact that leaders are not paid and increases cohesion since in most cases these funds are used to organize celebrations at the end of the cycle. Other features of this type of roscas improve cohesion among members: almost one fifth organize an activity of indemnity fund¹³, attendance at meetings is often compulsory and in some of these roscas meals are served during the meeting.

President groups seem more focused on delivering pure financial services which would justify payments and also tend to exhibit an anticipated power concentration. The distinction between founder and non-founder roscas brings, however, nuances as to the nature of these groups.

Tests on differences of proportions in Table 1 also show that it is possible to rank the different ruling structures according to the concentration of decisional power (see tests 6, 8 and 9).

¹²We collected data in 2004 on groups which were created at different times - the first ones starting in the 1960's. This could have produced a biased sample if old roscas were significantly different from younger ones. The flaws of such a sampling method are given consideration in the survival analysis. We introduced dummies for starting dates and did robustness checks removing these control variables and obtained similar results. In our opinion this validates our sample.

¹³Indemnity funds are groups combining savings and insurance aspects: members get a lump sum in case of happy or unhappy events. Lemay-Boucher (2008) analyzes such groups in detail using data collected during the same survey.

In president groups¹⁴, all decisions related to taking in or excluding members, and changing the order of pot reception tend to be made by the president whereas in committee groups the ruling body or indeed all of the members would be allowed to take part in the decision process. This concentration of power may bear important consequences as the group is more vulnerable to problems encountered or caused by the president if he is dealing alone. The latter may indeed fall ill, steal the contributions or mismanage the group or even die, all of which can prove detrimental to the group.

In addition to being formally paid more frequently than committee members, the president alone being the only residual claimant of the leftover funds of the rosca, has the ability to grant herself some financial advantage¹⁵. These pieces of information confirm the impression that the ruling position is only honorary for committee members while it can offer financial benefits to presidents running the rosca alone. Paying the ruling body suggests that attending group meetings is not compulsory. This being the case, the president is in charge of collecting the members' contributions, some of which having not been paid during the meeting. This indicates that the associations that pay their leader(s) are less cohesive and less dedicated to social functions and more oriented towards pure financial services. Furthermore, Table 1 suggests that non-founder groups provide their members with additional economic advantages¹⁶. This can explain why people join these particular groups despite their poor performance in terms of sustainability which will be elaborated further. A further explanation probably lies in the size of the monthly contribution¹⁷ which is significantly lower in non-founder groups. Poor people could indeed self-select into groups where the savings requirement is low.

Important sanctions¹⁸ defined as having recourse to seizure of goods, a formal complaint to the local head of the administration or exclusion from the group are least used by founder groups followed by committee groups and non-founder groups. The latter also more frequently resort to heavier sanctions if the misbehaving member has already been given the pot. We believe that this is due to the quality of the membership composing this kind of group. Their selection process being less rigorous, it is likely they adopt more severe sanctions to discipline their members.

Given that the available variables were all categorical, in order to observe which group characteristics go together we turned to multiple correspondence analysis¹⁹ (MCA) on a limited

¹⁴Note that founder presidents seem to be more powerful than their non-founder counterpart. In that respect, the former have the least recourse to a random allocation of ranks.

¹⁵The few following statistics give a clear description of this phenomenon : 87% of the presidents in committee groups are not paid while there is 42% in president groups. 72% of the committee groups share the leftover funds at the end of the cycle against 20% of the president groups. If we cross those two pieces of information, we notice that only 12% of the presidents alone neither get a wage nor the leftover funds of the cycle whereas 64% of their counterparts in committee groups are in the same case.

¹⁶Economic advantages refer to cases where members would prefer to purchase goods (whether on credit or not) at one of their fellow members' stores, to do business with them or cases in which they claim to have met their employer (past or present) during a group meeting.

¹⁷Note that even if the monthly contribution is higher in founder groups, the largest pot is to be found in committee groups due to their more extensive membership.

¹⁸Other tests demonstrate that seizure appears to be more prevalent in ethnically homogenous groups while no exclusion occurred in this kind of rosca, which relates to Anderson and Francois (2008). Indeed, they posit that in those very cohesive groups, it is costlier for everyone to dismiss one member. This will lead the group to resort to formalism and penalties in order to prevent people from defaulting.

¹⁹While conventional factor analysis determines which variables cluster, multiple correspondence analysis determines which category values are close to one another.

number of key variables. Figure 2 visually confirms that committee groups share the financial leftovers of the cycle, do not pay their leaders, run inquiries prior to taking in new members and elect their president. We also note that non-founder groups are the most likely to not make inquiries and that the groups least resorting to elections are founder groups.

These facts lead us to conclude that committee groups not only get their members involved in the management of the rosca but are also more participation-oriented and hence more cohesive. As to president groups, they seem to offer mainly financial services and leave the decisional power at the hands of their president. We must however turn to a duration analysis to verify the impact of these organizational features on the risk of group failure.

As mentioned previously, the president embodies all the responsibilities if she is the only one to manage the group whereas when a committee is in charge, each one of its members takes part in running the rosca. Assuming that all rosca members are identical (and that their number hardly varies from one group to another²⁰), one can expect the level of effort provided by every ruling individual towards managing the group to be lower in committee groups. In this respect, there should be no difference between non-founder and founder groups. On the other hand, the incentives to make efforts differ according to the ruling structure of the rosca. Since committee members are not paid, we can assume that they are less willing to put in efforts compared to non-founder presidents who are generally remunerated. The latter are also likely to put in less efforts than founder presidents who, in addition to being rewarded, are probably the most involved in a group that they themselves created. Hence, in the absence of self-selection of members (and despite economies of scale in the effort production), we might expect non-founder groups to be more likely to collapse than founder groups. Without additional assumptions it is hard to tell whether president groups are more inclined to die than committee groups. Even so, unless the willingness to exert efforts is very elastic with respect to being paid, committee groups stand better chances of survival than president groups.

The following section puts forward the way people select into groups and how this influences the predictions as to the sustainability of roscas conveyed above.

4 Selection into groups

Although they are probably constrained by the set of roscas they know of and by the screening process in place within the different existing groups, there clearly is a choice factor regarding the rosca people join. Whether and to what extent they are more attracted by the social interactions or only the financial services, whether they have a low or high social capital, whether they participate simultaneously in several roscas, is expected to influence the kind of roscas people will eventually become a member of.

In this section, our aim is to address these questions presenting results of probit regressions with sample selection of the group features on members' characteristics, run on the whole sample and selecting on current participation in roscas ($P_i > 1$). In order for the identification of the model to not solely rely on the non linearity of the functional form, we control for ethnic affiliations and the number of dependents in the selection equation. For six different dependent variables²¹ (subscript j), we estimate both equations simultaneously by maximum likelihood.

²⁰For this to be true, we need the ratio of the number of members on the number of leaders to be lower for committee groups.

²¹These are six dummy variables taking a value of one when the group is run by a committee, when there is an

$$P_i^* = \alpha + \beta X_i + \delta \text{dependents}_i + \sum_{e=1}^{E-1} \lambda_e \text{ethnicity}_{ei} + \varepsilon_i \text{ where } P_i = I(P_i^* > 0)$$

$$Y_{ji}^* = \sigma_j + \gamma_j X_i + \nu_{ji}, \text{ where } Y_j = I(Y_{ji}^* > 0) \text{ if } P_i > 1 \text{ and is missing otherwise.}$$

Since our survey was carried out in three different areas, we introduced fixed effects removing the area-specific component from the residuals and eliminating the endogeneity caused by unmeasured area characteristics. Furthermore, the design of our survey was such that the probability of households being selected in our sample was different in the three studied areas which could lead to inconsistent estimates. We thus introduced sampling weights for our estimates to be independent of the sample design. Because errors within households, our sampling unit, are likely not to be independent, we clustered our standard errors to take account of the correlation between observations coming from the same environment. This produced robust standard errors which would have been underestimated without this correction.

Table 4 presents the second-stage results of these six estimations. From the first regression, we learn that members of committee groups are different from those of other roscas. On average, they are older and wealthier²² and a greater proportion have kept the same job for at least two years. Regarding the distinction between members of founder and non-founder groups, a similar estimation (not presented) on the sample of all currently active members, selecting on participation in president groups, does not highlight any difference between them.²³ Committee group members seem to share a similar profile (with the exception of their age) to those who had to pass an inquiry before joining their rosca, as put forward by the results of the second regression. One can assume that this inquiry phase is a filter aiming to find members with desirable characteristics. One can therefore infer that the observed quality of committee group members (or members of groups which conducted inquiries) is higher than that of the other group members. Since the fifth regression seems to reflect the opposite of regression [1], this table also confirms that leaders are not paid in committee groups and that the members who remunerate their leaders might actually be compensating them for running the risk of taking them in. Column [3] shows that, in many respects, members of random roscas do not differ much from those of decision roscas (with the exception of job stability). As to simultaneous membership in several groups, it seems to be independent of the explaining variables as displayed by column [4]. The last regression ([6]) exhibits that only 'age' and 'same job for at least 24 months' are significant in explaining the occurrence of problems in a rosca, these features having a negative coefficient.

Selection into groups, be it a self- or group-based selection, indisputably seems to be an issue and certainly influences group survival. We can indeed claim that the poorer the individuals the more likely they are to join president groups because they are probably more vulnerable to negative economic shocks and are thus more likely to default. Furthermore, their cost of defaulting is lower in terms of reputation than in the case of committee group members. The latter, having passed the inquiry, are indeed faced with stronger incentives which will enable

inquiry prior to accepting a new member, when the leader receives wages, when the allocation of ranks is random, when members simultaneously participate in other group(s) and if problems occurred in the group.

²²Only two rosca members have an income greater than the maximum of the quadratic function of income.

²³A model of multinomial probit of participation for all three group categories (committee, founder, non-founder) with sample selection, estimated using simulated maximum likelihood, did not converge.

them to refrain from renegeing on their obligations towards the group. The public attracted to president groups is therefore likely to be more hazardous. The predictions formulated at the end of the previous section thus appear to be reinforced. In fact one could expect president groups (and particularly non-founder groups) to perform poorly in terms of sustainability.

5 Survival Analysis

Before turning to the duration analysis, we review the reasons given for group stopping in order to restrict our sample of roscas to those which underwent an inefficiency stopping.

5.1 Reasons Given for Group Stopping

A glimpse at the first reason stated in Table 3 tells us that a collective decision was made before the group ended. The members had agreed to stop the association once everybody had a motorbike or after a fixed number of cycles. In the same table, it later appears that 11 groups disbanded following the departure of several of their members who moved to another part of Benin or to another job. This is apparently totally exogenous to the organizational structure or functioning of the roscas. The 13 associations in question can therefore be removed from the sample of dead groups to study since we are interested in inefficiency stoppings attributable to the structure of the group. The next two reasons refer to a decision made by the ruling body to stop or interrupt²⁴ the association. It is likely that some of the members were displeased with this since the groups ceased their activities without consensus of the whole membership. However, as in all of the previously mentioned cases, no member of these organizations seems to have experienced financial loss.

Not a single dead rosca and only four living groups made mention of the duration of group activity in their rules. Moreover, only 7.4 % of the 242 roscas include at least one member who had already decided how many cycles she wanted to take part in before joining. As a very large majority of members probably did not want the rosca to stop, it seems reasonable to consider all the 37 dead groups to have undergone an inefficiency stopping.

Furthermore, a close look at Table 3 reveals that 13 roscas run by a president alone and 7 by a committee caused a financial setback to at least one of their members, meaning that 20 out of the 37 (54.1%) group failures implied a loss of money for at least one of their members. The difference of proportion is significant²⁵ at 5%.

As anticipated, one can note that the consequences of a ruling member's death have greater implications when the president rules the rosca on her own. Money problems constitute a vast majority of the causes attributed to group failure. These refer to different cases which may be considered minor: irregular payments leading to unequal pots, pots in several instalments²⁶ or wrong timing of the pot reception. These concerns also relate to more serious cases where

²⁴These roscas were interrupted and did not begin a new cycle since. All of them is considered dead by the interrogated member.

²⁵The significance of the difference remains on a subsample of ex-members of rosca - i.e. members whose rosca died or who left before the group stopped functioning. Eight cases of money loss occurred in founder groups and five in non-founder groups. This difference however is not significant.

²⁶This can be highly undesirable if rosca members suffer from self-control problems and therefore use the group as a means to discipline themselves to save.

members leave the group and stop contributing after receiving the pot and where presidents make off with the members' contributions.

Even if these reasons cannot be taken for granted, it seems plausible that the roscas looked at in the subsample of 37 groups did not end well and brought about welfare losses to their members.

5.2 Cox proportional hazard model with grouped data in discrete time

In order to identify the factors which could reduce or enhance the risk of a group dying, we have to turn to a survival analysis. Cox proportional hazard model, being in continuous time, allows to capture the influence of covariates on the risk of dying. Since we used retrospective flow sampling and asked about duration in months, it seems more appropriate to work with grouped data in discrete time. As put forward by Jenkins (2004) this implies that we have to use a complementary log-log transformation of Cox model²⁷, represented by the following formula:

$$\log(-\log(1 - F(t|x))) = x'\beta + \log \Lambda(t) \quad (1)$$

We obtain a complementary log-log regression in which the baseline hazard, $\log \Lambda(t)$, is designed to be fully non parametric with a binary variable for each interval of constant hazard (Jenkins, 2004). As most of the groups of our sample are still alive, we have censored data which we take into account. Seeing as the groups have different starting dates, we introduced dummy variables grouping several points in time when the roscas were created.

With this technique, and controlling for a set of characteristics, we test the impact of the organizational structure and rules of the group on the survival probability of beninese roscas. However, two sources of endogeneity are identified : non-randomness of the group rules and membership. As people choose the groups they will join, though some individuals may be constrained in their choice, we are in the presence of self-selection. Because members are not randomly distributed among groups, differences of public could (and most likely do) influence roscas' sustainability. The same principle applies to the non-randomness of rules. Since people decide which rules and sanctions are to be followed in the group and we cannot identify this effect, we are not able to isolate pure marginal effects. In order to partially deal with the selection issue and capture part of the selection bias, we introduced in the regression six variables related to the kind of membership the group attracts.²⁸

We also included in our specifications area fixed effects and control variables which describe what kind of relationship existed between the people who joined the group at its creation (neighbours, relatives, workmates, etc.). We again introduced sampling weights for our estimates to be independent of the sample design and consistent.

The results of our regressions are presented as coefficients of a complementary log-log regression (and not as hazard ratios). A negative sign must therefore be interpreted as the detrimental influence of a variable on the risk of dying and therefore enhances the group's probability of survival. In regression [1] of Table 5, three variables are particularly significant and interesting. The positive sign of 'Run by a president alone' implies that, controlling for all the other

²⁷See Appendix B for further details.

²⁸Note that none of these were significant in our survival analysis and that our very robust results do not depend on the presence of these variables. These variables are: group proportion of members in couple, of salaried members, of house owners and group mean of members' age, of members' income and of members' duration of residence in the area.

variables, such a group is more likely to know an inefficiency stopping. Whereas the negative sign of the variables 'Election' and 'Inquiry' signifies that groups in which the leader is elected and in which an inquiry is prior to any new membership are less likely to die. These three variables seem to be the most important factors influencing group failure. This does not mean, however, that president groups are necessarily bound to fail and that this kind of leadership is deficient. Regression [2] indeed shows that groups run by a president alone, who was not elected and is the founder of the group, are not necessarily more likely to die compared to committee groups. Introducing this variable hardly alters most of the remaining coefficients with the exception of 'President alone' and 'Election'. In both cases, the magnitude of the coefficient increases as the positive effect of being a non-elected president is captured in the 'Founder president' variable. This tells us that incentives have a role to play in the management of groups. Moreover, this is confirmed in regression [3] where the leadership variable is interacted with a dummy taking a value of one when the ruling body is paid. One can observe that rewarding the ruling body increases the survival probability of president groups, while it hardly influences committee groups as revealed by a Wald test of difference on these coefficients. This technique also shows that when paid a committee group is less likely to die than a rosca run by a president alone (whether paid or not). Columns [4] and [5] of Table 5 present interacted terms of the three variables of interest. In column [4], the reference (the omitted dummy variable) is a group run by a president who was neither elected nor is the rosca founder. It clearly appears that this kind of group represents the worst case scenario as all the dummy coefficients exhibit a negative sign, a large majority of them being significant. Wald tests allow us to point out the best²⁹ possible structure in terms of survival probability, namely a committee group electing its president and inquiring about potential new members before accepting them in. This is confirmed by regression [5] where such a group serves as a reference. All the other dummies are significantly positive which leads us to realize that all the other groups are more liable to failure. The worst group structure underlined in this regression and Wald tests is a non-elected president refraining from making inquiries before taking in a new member. Even if founder presidents seem to manage their groups well, other president groups perform less satisfactorily than committee groups in terms of survival probability. This phenomenon is exacerbated by not electing the ruling body and failing to inquire before accepting new members.

Two other noticeable pieces of information are worthwhile mentioning. Imposing important sanctions seems to be an efficient deterrent of bad behavior as this variable is robustly negative throughout the regressions. Male-only groups appear to constitute a higher risk in terms of survival probability as the coefficients of mixed and female-only groups exhibit a negative sign and are often significant.

A look at hazard rates (computed without covariates) and at the baseline hazard of regression [5]³⁰ on Figure 3 reveals that the death probability of a rosca increases and reaches its peak after a certain time, approximately two years, and then declines. This supports the idea that once these informal groups have completed more than two cycles, the most difficult times seem to be behind them.

²⁹One can also state that an elected committee conducting no inquiry seems less likely to die than a group run by its founder.

³⁰The same exercise was run on regression [5] after removing the controls for starting dates. Baseline hazard estimates follow the same pattern.

5.3 Robustness Checks

Our results are robust whatever the specification of the regressions. In addition to changing the specifications presented in Table 5, in other regressions based on columns [1],[2] and [5], we removed the different controls for areas, starting dates, selection effects and relationships between first members of the group. In all cases, the effects emphasized previously are significant. By way of further robustness checks, we also simultaneously removed all controls and / or sampling weights; this leading to no reverse conclusion. We also ran cox regressions in continuous time obtaining similar results.

As a final check, we introduced normally distributed unobserved heterogeneity by running complementary log-log panel regressions. Once again, the risk-increasing nature of a non-elected leader working on her own (with the exception of founder presidents) making no inquiries is confirmed.

All this tends to demonstrate the quality and robustness of our results which appear not to depend on a particular specification.

6 Conclusion

Our empirical evidence shows that, among the different kinds of groups observed in Cotonou, roscas run by a president alone are more inclined to fail. This is all the more true if they are not run by their founder. These associations are characterized by a lesser participatory functioning, little cohesion and a more concentrated decision process which could influence the group sustainability.

The duration analysis confirms the importance of incentives, screening, leadership and democracy inside the group. It is not surprising to notice that incentives have an impact on the survival of roscas. Whether they are elected, paid or the founder of the association, it is in the leaders' best interest to manage the group efficiently. Since elected leaders depend on the welfare of their electors, it would only be logical for them to do their best to keep their members satisfied with their management. If presidents are remunerated, in most cases, they are expected to try to keep their source of income. For those who founded their rosca, not only are they paid on a regular basis, they also have a reputation to care for. Regarding the non-elected and non-founder presidents, we assume that they are the members who most benefit from the rosca. In this case, their incentives to manage the rosca well may be too feeble to ensure sustainability. From another point of view, one can also consider that a democratic management of the group, involving members in its operation, provides the latter with the right incentives and improves cohesion. As to the screening issue, one expects caution when taking in new members to reduce the probability of group failure. This happens through at least two channels. Firstly, if the screening process is successful, only members meeting the criteria imposed by the rosca can join it, which implies that their presumed quality is higher. Secondly, once affiliated with such groups, individuals face a higher cost of defaulting in terms of reputation and, considering the probability of group failure, in terms of expected savings as well. One can therefore suppose that they will do their best not to renege their obligations towards the group.

If some individuals are systematically denied access to the groups safer in terms of survival because of their low social capital or lack of financial resources - which we suspect -, this constitutes an additional reason for their expected savings to be scarce. In the presence of such

segmentation, interventions by NGO's or public authorities would be justified to improve the savings conditions of these doubly disadvantaged people, for instance, by providing safe and cheap savings vehicles.

APPENDIX

A Description of our Survey

A.1 Geographical Description

Vossa's 63 hectares are surrounded by stagnating waters and swamps which represent an important vector of disease. The district has not yet been divided into plots, though a long-term project was launched during our stay. Vossa is left to itself: the authorities of Cotonou have not yet paved any of its roads nor even its principal axis. The recurrent and important problem of floods has not been dealt with although it critically paralyses the area for a few months every year. Enagnon, a dense slum located on the Atlantic Ocean shore, has also received little attention and important sanitary issues have not been tackled yet. Half of its superficies of 60.1 hectares was divided into plots in 1998.

A.2 Survey Methodology

We selected households according to a random process. In Enagnon we succeeded in obtaining a map of the area and performed a simple selection of lots according to an implemented random process. In these two districts, many households live on the same lot in semi-detached rooms. Enumerators selected one room per lot according to a clock-wise rule varying from lot to lot: for the first lot of the day they selected the first room clock-wise, for the second one the second room clock-wise and so on. In Enagnon-plage and Vossa we used a pseudo-random process by which every tenth lot was picked according to a specific direction. Room selections were carried out in a similar fashion to Enagnon. Overall only 3 households categorically refused to be surveyed and were replaced by other randomly selected households. Enumerators were asked to visit several times and at different moments of the day, until contacts were established in such a way that none of the selected households were skipped. The most qualified of our enumerators also acted as a supervisor and visited many households already interviewed in order to check the accuracy of the responses. On top of that we analyzed every completed questionnaire in detail. Several appointments were held with every team of enumerators and in case of incoherence or answers missing we would send them back on the field. Questionnaires often needed successive rounds of checks until final approval. As mentioned above we stressed that the interview with every single household member should be carried out in his/her sole presence in order to get as precise and reliable information as possible. Fear of divulging information in front of other family members would have led individuals to lie or to refuse answering. On average our four teams of two enumerators completed two questionnaires a day. By taking into account intra-household secrecy, the survey was considerably lengthened since this required specific appointments with each adult member. Another time consuming factor was the detailed part of our questionnaire on groups: we often devoted more than an hour for a single group. We compensated every household for their time by donating 1500 CFA francs. Finally,

with two previous missions, in 2002 and 2003, about eighty group interviews were conducted. We attended regular meetings or met with members of their governing body in order to acquire a better understanding of their functioning.

B Complementary log-log regression

Cox's proportional hazard model is of the form:

$$\lambda(t|x) = \lambda_0(t)e^{x'\beta} \quad (2)$$

where $\lambda(t|x)$ is the hazard rate at time t conditional on a vector x of covariates.

As we want to take into consideration the discrete nature of our survey data, we need to transform the continuous time Cox model as showed below.

Taking a cumulative version of the proportional hazard model (where $\Lambda(t|x)$ is the integrated hazard function at time t depending on covariates x), we get:

$$\Lambda(t|x) = \Lambda(t)e^{x'\beta} \quad (3)$$

By definition,

$$\Lambda(t|x) = -\log(1 - F(t|x)) \quad (4)$$

which simplifies to (1):

$$\log(-\log(1 - F(t|x))) = x'\beta + \log \Lambda(t)$$

The baseline hazard, $\log \Lambda(t)$, is designed to be fully non parametric with a binary variable for each interval of constant hazard.

References

- [1] Ambec, S., Treich, N., 2007. Roscas as financial agreements to cope with self-control problems. *Journal of Development Economics*, 82(1), 120–137.
- [2] Anderson, S., Baland, J.-M., Moene, K.-O., 2004. Sustainability and organizational design in informal groups, with some evidence from Kenyan Roscas. Forthcoming in the *Journal of Development Economics*.
- [3] Anderson, S., Francois, P., 2008. Formalizing Informal Institutions: Theory and Evidence From a Kenyan Slum, in: Helpman E. (Ed.), *Institutions and Economic Growth*. November 2008, Harvard University Press.
- [4] Ashraf, N., Karlan, D., Yin, W., 2006. Tying Odysseus to the Mast: Evidence from a Commitment Savings Product in the Philippines. *Quarterly Journal of Economics* 121, 635–672.
- [5] Basu K., 2006. Hyperbolic Discounting and the Sustainability of Rotational Savings Arrangements. mimeo.
- [6] Bouman, F., 1995. Rotating and Accumulating Savings and Credit Associations: A Development Perspective. *World Development* 23, 371–384.

- [7] van den Brink, R., Chavas, J.-P., 1997. The Microeconomics of an Indigenous African Institution: The Rotating Savings and Credit Association. *Economic Development and Cultural Change* 45, 745–772.
- [8] Dagnelie O., Lemay-Boucher, P., 2008. Rosca Participation in Benin: A Commitment Issue. mimeo, UFAE-IAE working paper.
- [9] Gugerty, M. K., 2007. You Can't Save Alone: Commitment in Rotating Savings and Credit Associations in Kenya. *Economic Development and Cultural Change* 55, 251-282.
- [10] Handa, S., Kirton, C. 1999. The Economics of Rotating Savings and Credit Associations: Evidence from the Jamaican 'Partner'. *Journal of Development Economics* 60, 173–194.
- [11] Jenkins, S., 2004. Survival Analysis. Draft book manuscript.
- [12] Jenkins, S., 2004. Introduction to the Analysis of Spell Duration Data. ISER, University of Essex.
- [13] Kurtz, D. V., 1973. The Rotating Credit Association: An Adaption to Poverty. *Human Organisation* 32, 49–58.
- [14] Lemay-Boucher, P., 2008. Insurance for the Poor: the Case of Informal Insurance Groups in Benin. mimeo, CRED, University of Namur.
- [15] Pitt, M.M., Khandker, S.R., McKernan, S.-M., Abdul Latif, M., 1999. Credit Programs for the Poor and Reproductive Behavior in Low Income Countries: Are the Reported Causal Relationships the Result of Heterogeneity Bias ?. *Demography* 36, 1–21.
- [16] Wu, D. Y. H., 1974. To kill three birds with one stone: The rotating credit associations of the Papua New Guinea Chinese. *American Ethnologist* 1, 565–583.

Smoothed hazard estimates

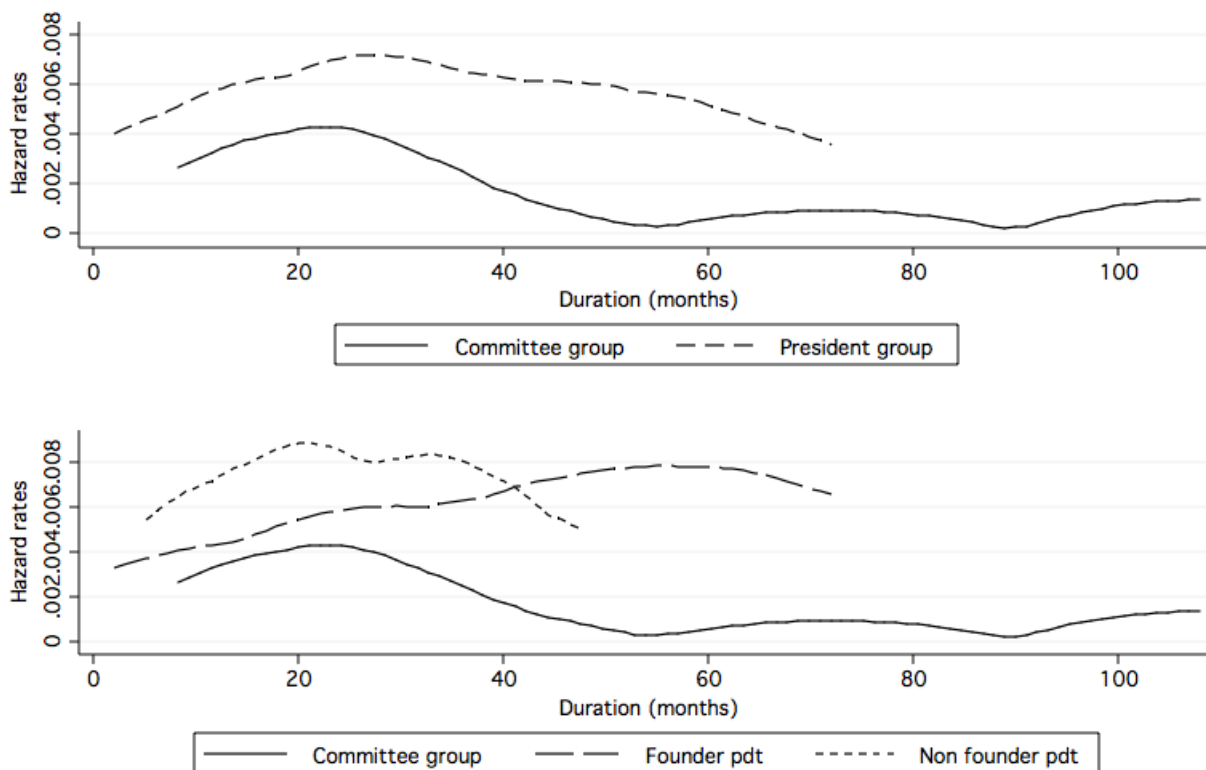
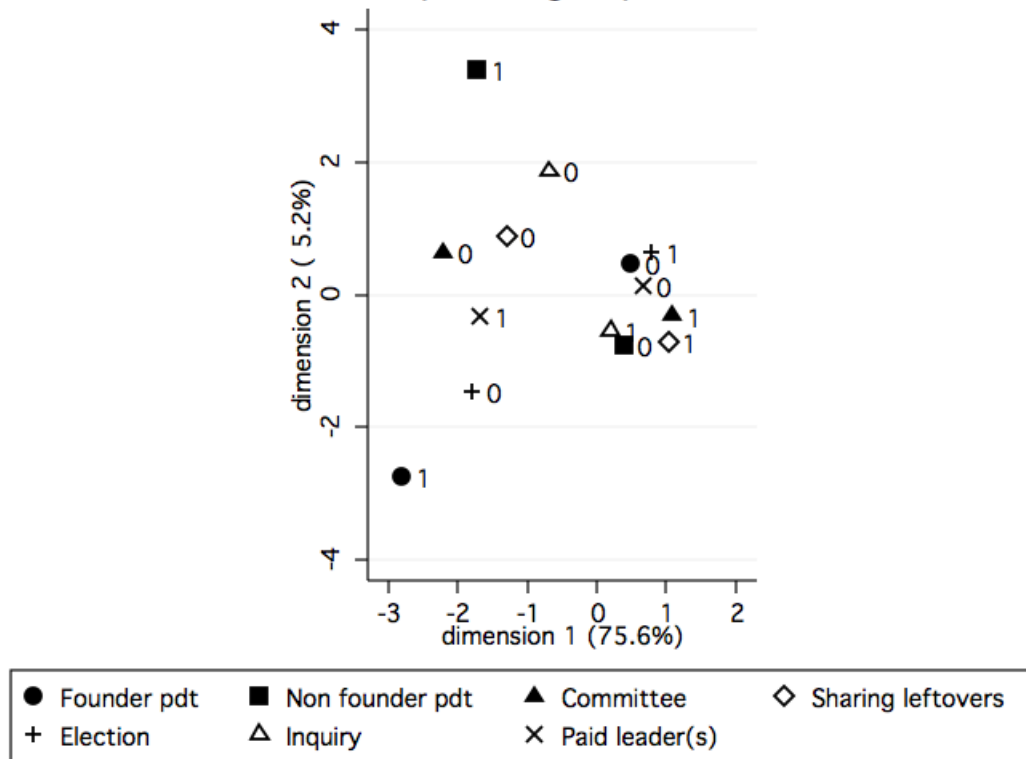


Figure 1: Smoothed hazard rate by ruling structure.

MCA coordinate plot of group characteristics



coordinates in standard normalization

Figure 2: Multiple Correspondence Analysis of group characteristics.

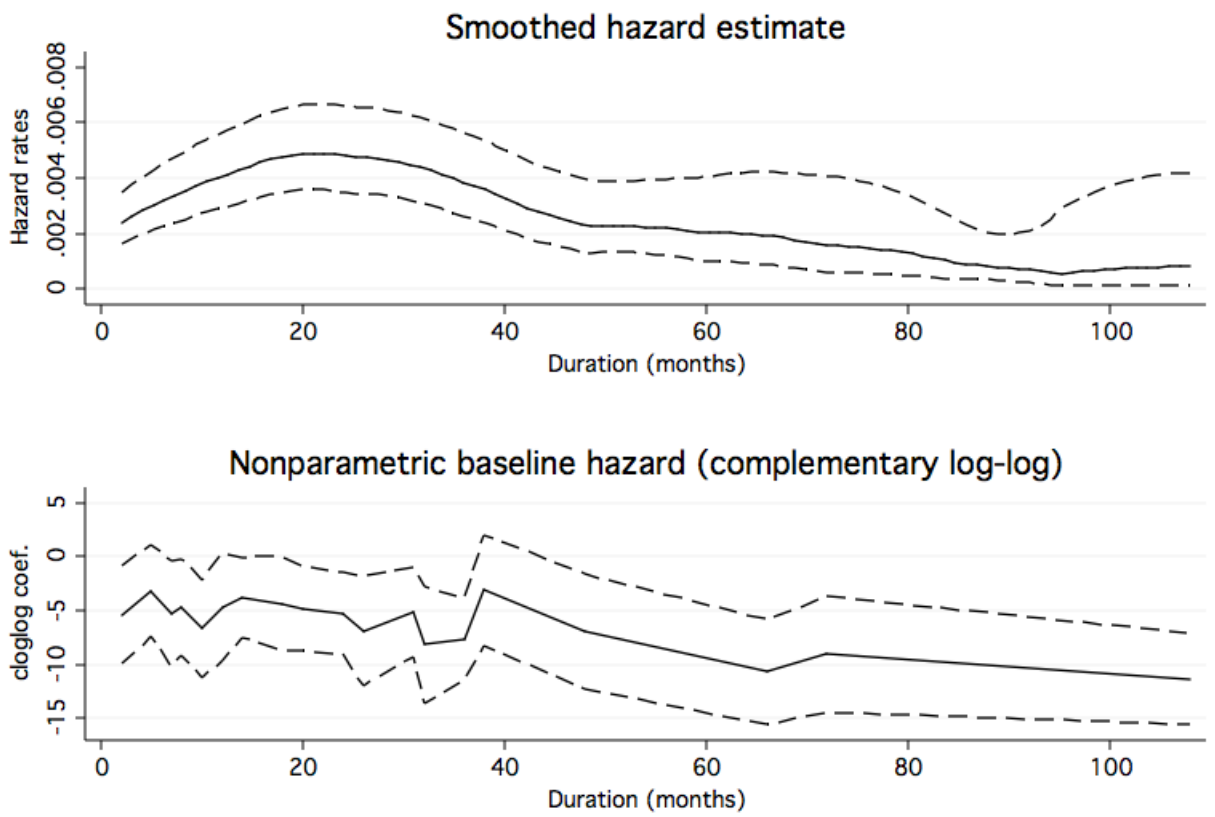


Figure 3: Smoothed hazard rate and nonparametric baseline hazard.

| | | N | Mean | S.E. | Difference | S.E. | | N | Mean | S.E. | Difference | S.E. |
|---|-----|-----|-------|---------|--------------------|--|-----|-------|---------|--------------------|-------------|------|
| (1) Election of the leader(s) (mean = 0.591 - s.e. = 0.042) | | | | | | | | | | | | |
| Committee group | [1] | 161 | 0.770 | (0.047) | [1] - [2] = 0.770 | (0.047) *** | | | | | | |
| Founder president | [2] | 35 | 0.000 | (0.000) | [1] - [3] = 0.357 | (0.096) *** | | | | | | |
| Non-founder president | [3] | 46 | 0.414 | (0.084) | [2] - [3] = -0.414 | (0.084) *** | | | | | | |
| (2) Inquiry before accepting a new member (mean = 0.806 - s.e. = 0.030) | | | | | | (3) Sponsorship for membership (mean = 0.703 - s.e. = 0.037) | | | | | | |
| Committee group | [1] | 160 | 0.833 | (0.035) | [1] - [2] = -0.004 | (0.065) | 161 | 0.772 | (0.040) | [1] - [2] = 0.045 | (0.102) | |
| Founder president | [2] | 35 | 0.836 | (0.055) | [1] - [3] = 0.153 | (0.096) | 35 | 0.727 | (0.094) | [1] - [3] = 0.354 | (0.098) *** | |
| Non-founder president | [3] | 46 | 0.679 | (0.090) | [2] - [3] = 0.157 | (0.106) | 46 | 0.418 | (0.089) | [2] - [3] = 0.309 | (0.130) ** | |
| (4) Membership fee (mean = 0.153 - s.e. = 0.033) | | | | | | (5) Paid ruling body (mean = 0.333 - s.e. = 0.040) | | | | | | |
| Committee group | [1] | 161 | 0.192 | (0.044) | [1] - [2] = 0.192 | (0.044) *** | 161 | 0.171 | (0.041) | [1] - [2] = -0.572 | (0.093) *** | |
| Founder president | [2] | 35 | 0.000 | (0.000) | [1] - [3] = 0.060 | (0.088) | 35 | 0.743 | (0.084) | [1] - [3] = -0.426 | (0.098) *** | |
| Non-founder president | [3] | 46 | 0.132 | (0.077) | [2] - [3] = -0.132 | (0.077) * | 46 | 0.598 | (0.088) | [2] - [3] = 0.146 | (0.122) | |
| (6) Pdt. decides to change the order of reception (mean = 0.177 - s.e. = 0.030) | | | | | | (7) Random rosca (mean = 0.693 - s.e. = 0.036) | | | | | | |
| Committee group | [1] | 161 | 0.048 | (0.019) | [1] - [2] = -0.503 | (0.108) *** | 161 | 0.730 | (0.042) | [1] - [2] = 0.288 | (0.116) ** | |
| Founder president | [2] | 35 | 0.551 | (0.106) | [1] - [3] = -0.302 | (0.088) *** | 35 | 0.442 | (0.108) | [1] - [3] = -0.035 | (0.083) | |
| Non-founder president | [3] | 46 | 0.351 | (0.086) | [2] - [3] = 0.200 | (0.136) | 46 | 0.766 | (0.071) | [2] - [3] = -0.324 | (0.129) ** | |
| (8) President decides to accept new members (mean = 0.339 - s.e. = 0.040) | | | | | | (9) Pdt. decides to exclude members (mean = 0.277 - s.e. = 0.038) | | | | | | |
| Committee group | [1] | 161 | 0.093 | (0.033) | [1] - [2] = -0.821 | (0.052) *** | 161 | 0.109 | (0.036) | [1] - [2] = -0.666 | (0.099) *** | |
| Founder president | [2] | 35 | 0.914 | (0.040) | [1] - [3] = -0.688 | (0.078) *** | 35 | 0.775 | (0.092) | [1] - [3] = -0.382 | (0.100) *** | |
| Non-founder president | [3] | 46 | 0.782 | (0.070) | [2] - [3] = 0.132 | (0.081) | 46 | 0.491 | (0.094) | [2] - [3] = 0.284 | (0.131) ** | |
| (10) Contributions paid during the meeting (mean = 0.721 - s.e. = 0.037) | | | | | | (11) Economic advantage (mean = 0.116 - s.e. = 0.026) | | | | | | |
| Committee group | [1] | 161 | 0.810 | (0.041) | [1] - [2] = 0.471 | (0.106) *** | 161 | 0.062 | (0.020) | [1] - [2] = -0.040 | (0.072) | |
| Founder president | [2] | 35 | 0.338 | (0.098) | [1] - [3] = 0.104 | (0.087) | 35 | 0.102 | (0.069) | [1] - [3] = -0.265 | (0.097) *** | |
| Non-founder president | [3] | 46 | 0.706 | (0.076) | [2] - [3] = -0.367 | (0.124) *** | 46 | 0.328 | (0.095) | [2] - [3] = -0.225 | (0.117) * | |
| (12) Monthly contribution (1000 CFA) (mean = 11.40 - s.e. = 0.847) | | | | | | (13) Size of the pot (1000 CFA) (mean = 163.9 - s.e. = 24.65) | | | | | | |
| Committee group | [1] | 161 | 11.46 | (1.026) | [1] - [2] = -2.571 | (3.082) | 160 | 184.8 | (34.84) | [1] - [2] = 23.48 | (51.44) | |
| Founder president | [2] | 35 | 14.03 | (2.906) | [1] - [3] = 2.496 | (1.422) * | 35 | 161.3 | (37.84) | [1] - [3] = 98.47 | (39.30) ** | |
| Non-founder president | [3] | 46 | 8.967 | (0.985) | [2] - [3] = 5.068 | (3.069) * | 45 | 86.3 | (18.18) | [2] - [3] = 74.99 | (41.98) * | |
| (14) Important sanctions (mean = 0.616 - s.e. = 0.041) | | | | | | (15) Heavier sanctions after pot reception (mean = 0.554 - s.e. = 0.041) | | | | | | |
| Committee group | [1] | 160 | 0.608 | (0.050) | [1] - [2] = 0.209 | (0.113) * | 160 | 0.537 | (0.050) | [1] - [2] = 0.114 | (0.116) | |
| Founder president | [2] | 35 | 0.398 | (0.101) | [1] - [3] = -0.246 | (0.070) *** | 35 | 0.423 | (0.105) | [1] - [3] = -0.207 | (0.083) ** | |
| Non-founder president | [3] | 43 | 0.854 | (0.048) | [2] - [3] = -0.455 | (0.112) *** | 43 | 0.744 | (0.066) | [2] - [3] = -0.321 | (0.124) ** | |

Standard errors in parentheses, correction for sampling weights

*** significant at 1%, ** significant at 5%, * significant at 10%

Source: Data collected by the author

Table 1: Tests of difference of proportions over the rulers' characteristics.

| | N | Mean | S.E. | Committee | President | Difference | |
|---|-----|------|--------|-------------|-------------|--------------|-----|
| Existence of written rules | 242 | 0.64 | (0.04) | 0.76 (0.04) | 0.41 (0.07) | 0.34 (0.08) | *** |
| Compulsory attendance | 242 | 0.45 | (0.04) | 0.56 (0.05) | 0.23 (0.05) | 0.34 (0.07) | *** |
| Sharing of the leftover funds | 242 | 0.58 | (0.04) | 0.78 (0.04) | 0.17 (0.05) | 0.61 (0.06) | *** |
| Member must be known before joining | 242 | 0.59 | (0.04) | 0.67 (0.05) | 0.44 (0.07) | 0.23 (0.08) | *** |
| Member must have their spouse's consent | 241 | 0.38 | (0.04) | 0.44 (0.05) | 0.26 (0.07) | 0.18 (0.08) | ** |
| Last number of members | 240 | 28.5 | (1.74) | 32.3 (2.40) | 20.7 (1.46) | 11.6 (2.81) | *** |
| Same ethnical group | 242 | 0.14 | (0.02) | 0.10 (0.02) | 0.23 (0.06) | -0.13 (0.06) | ** |
| Composed of women | 242 | 0.12 | (0.02) | 0.08 (0.02) | 0.22 (0.04) | -0.14 (0.05) | *** |
| Composed of women and men | 242 | 0.63 | (0.04) | 0.64 (0.05) | 0.62 (0.06) | 0.01 (0.08) | |
| Expenses for hosting meetings | 242 | 0.10 | (0.03) | 0.14 (0.04) | 0.01 (0.01) | 0.12 (0.04) | *** |
| Activity of indemnity fund | 242 | 0.13 | (0.03) | 0.17 (0.04) | 0.04 (0.02) | 0.13 (0.04) | *** |
| Occurrence of problems | 242 | 0.34 | (0.04) | 0.35 (0.05) | 0.31 (0.07) | 0.03 (0.08) | |
| Loss of money | 50 | 0.36 | (0.08) | 0.23 (0.10) | 0.59 (0.13) | -0.36 (0.16) | ** |

Standard errors in parentheses, correction for sampling weights

**** significant at 1%, ** significant at 5%, * significant at 10%*

Source: Data collected by the author

Table 2: Tests of difference of proportions over the ruling design.

| | Total | President Alone | | Committee | |
|----------------------------|-------|-----------------|------|---------------|------|
| | | Loss of Money | | Loss of Money | |
| Consensus stopping | 0.04 | 0 | 0 | 0.04 | 0 |
| Members' departure | 0.22 | 0.06 | 0 | 0.16 | 0 |
| Non consensus stopping | 0.10 | 0.04 | 0 | 0.06 | 0 |
| Death of committee members | 0.08 | 0.06 | 0.04 | 0.02 | 0 |
| Problems related to money | 0.54 | 0.30 | 0.22 | 0.24 | 0.14 |
| No respect of the rules | 0.02 | 0 | 0 | 0.02 | 0 |
| Sum | 1 | 0.46 | 0.26 | 0.54 | 0.14 |
| Observations | 50 | 23 | 13 | 27 | 7 |

Source: Data collected by the author

Table 3: Given Reasons for Group Stopping.

| | Committee | | Inquiry | | Random | | Simultaneous Participations | | Paid leader(s) | | Problems | |
|----------------------------------|-------------|-----------|-------------|-----------|----------|----------|-----------------------------|---------|----------------|-----------|----------|-----------|
| | [1] | | [2] | | [3] | | [4] | | [5] | | [6] | |
| | Coef. | S.E. | Coef. | S.E. | Coef. | S.E. | Coef. | S.E. | Coef. | S.E. | Coef. | S.E. |
| Female | .17 | (.309) | .519 | (.698) | -.0654 | (.274) | -1.91 | (1.53) | .109 | (.217) | -.231 | (.422) |
| Couple | .564 | (.369) | .176 | (.213) | -.154 | (.254) | -.378 | (.408) | .00161 | (.225) | .0799 | (.271) |
| Female * Couple | -.407 | (.391) | -.192 | (.406) | .319 | (.337) | 2.21 | (1.68) | .0507 | (.255) | .264 | (.459) |
| Individual income (1000 CFA) | .009 *** | (.003) | .01 *** | (.0038) | 2e-05 | (.003) | .002 | (.007) | -.0054 * | (.0029) | 1.2e-05 | (.005) |
| (Individual income) ² | -1.2e-05*** | (4.3e-06) | -8.5e-06 ** | (4.1e-06) | 3e-07 | (3e-06) | -5e-06 | (1e-05) | 6.6e-06 ** | (3.1e-06) | -1.2e-06 | (5.6e-06) |
| Age | .0187 ** | (.00894) | .0172 | (.0133) | .00763 | (.00751) | .00368 | (.014) | -.0137 * | (.00713) | -.0212 * | (.0111) |
| House owner | .299 | (.241) | -.055 | (.231) | -.233 | (.23) | .0459 | (.263) | .0357 | (.181) | .4 | (.301) |
| Salaried | .441 | (.282) | .341 | (.315) | .106 | (.244) | .162 | (.362) | -.316 | (.214) | -.227 | (.228) |
| Same job \geq 24 months | .552 *** | (.18) | .536 ** | (.218) | -.335 * | (.193) | -.414 | (.286) | -.452 *** | (.164) | -.554 * | (.296) |
| Same area \geq 24 months | .123 | (.204) | .0741 | (.195) | .267 | (.217) | .00971 | (.178) | -.228 | (.192) | .139 | (.263) |
| Vossa | -.531 ** | (.208) | -.403 | (.306) | -.123 | (.213) | .345 | (.214) | .614 *** | (.176) | .838 *** | (.215) |
| Enagnon | -.447 * | (.239) | -.77 *** | (.196) | -.13 | (.242) | .559 ** | (.229) | .321 | (.201) | .582 ** | (.238) |
| Constant | -2.78 *** | (.366) | -2.13 *** | (.417) | 1.55 *** | (.331) | .174 | (1.48) | 1.9 *** | (.334) | 1.02 | (.996) |
| Number of observations | 1179 | | 1178 | | 1179 | | 1179 | | 1179 | | 1179 | |
| Nb. of censored obs. | 957 | | 957 | | 957 | | 957 | | 957 | | 957 | |
| Nb. of uncensored obs. | 222 | | 221 | | 222 | | 222 | | 222 | | 222 | |

Standard errors in parentheses, correction for sampling weights

**** significant at 1%, ** significant at 5%, * significant at 10%*

Source: Data collected by the author

Table 4: Regressions of group features on members' characteristics - Probit with sample selection

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| | Group disbandment [1] | | Group disbandment [2] | | Group disbandment [3] | | Group disbandment [4] | | Group disbandment [5] | |
|--|-----------------------|---------|-----------------------|----------|-----------------------|----------|-----------------------|----------|-----------------------|----------|
| | Coef. | S.E. | Coef. | S.E. | Coef. | S.E. | Coef. | S.E. | Coef. | S.E. |
| Composed of women | -1.63 * | (.948) | -1.67 | (1.09) | -1.63 * | (.968) | -1.33 | (.859) | -2.01 | (1.31) |
| Composed of women and men | -1.35 ** | (.583) | -1.35 ** | (.617) | -1.23 ** | (.596) | -1.28 ** | (.546) | -1.74 ** | (.746) |
| Same ethnical group | -.941 | (1.17) | -1.24 | (1.13) | -1.01 | (1.17) | -.825 | (.954) | -1.33 | (1.39) |
| Run by a president alone | 1.93 ** | (.806) | 2.46 *** | (.821) | | | | | | |
| President: founder of the group | | | -1.21 | (.946) | | | -1.58 * | (.919) | | |
| President * Paid | | | | | -1.26 * | (.7) | | | | |
| Committee * Paid | | | | | -2.74 *** | (1.03) | | | | |
| Committee * No paid | | | | | -2.43 ** | (.983) | | | | |
| President * Election * Inquiry | | | | | | | -2.65 *** | (.981) | 2.36 * | (1.41) |
| President * Election * No inquiry | | | | | | | -1.02 | (.948) | 3.79 ** | (1.76) |
| President * No election * Inquiry | | | | | | | | | 2.77 * | (1.55) |
| President * No election * No inquiry | | | | | | | | | 5.83 *** | (1.81) |
| Committee * Election * Inquiry | | | | | | | -4.97 *** | (1.3) | | |
| Committee * Election * No inquiry | | | | | | | -3.68 *** | (1.01) | 1.3 * | (.776) |
| Committee * No election * Inquiry | | | | | | | -2.99 *** | (.991) | 2.08 ** | (.934) |
| Committee * No election * No inquiry | | | | | | | -1.98 * | (1.12) | 3.05 ** | (1.36) |
| Election of the ruling member | -1.35 *** | (.48) | -1.73 *** | (.494) | -1.12 ** | (.435) | | | | |
| Existence of written rules | -.184 | (.7) | -.0333 | (.71) | -.0727 | (.718) | -.0797 | (.732) | -.000121 | (.803) |
| Compulsory attendance | .776 | (.573) | .958 * | (.576) | .845 | (.589) | .814 | (.589) | .799 | (.745) |
| Inquiry before accepting members | -1.56 *** | (.598) | -1.53 ** | (.634) | -1.61 *** | (.597) | | | | |
| Member must be known before joining | .558 | (.589) | .413 | (.568) | .436 | (.56) | .23 | (.54) | .559 | (.6) |
| Paid ruling body | -.84 | (.596) | -.693 | (.541) | | | -.705 | (.638) | -.698 | (.746) |
| ln(monthly contribution) | -.159 | (.193) | -.15 | (.202) | -.161 | (.188) | -.159 | (.253) | -.0505 | (.255) |
| Last number of members | .00397 | (.0105) | .0053 | (.00921) | .00394 | (.00936) | .00639 | (.00972) | .00997 | (.00999) |
| Important sanctions | -1.33 * | (.679) | -1.21 * | (.701) | -1.17 * | (.635) | -1.13 | (.754) | -1.38 ** | (.657) |
| Heavier sanctions after pot reception | -.683 | (.565) | -.52 | (.561) | -.748 | (.548) | -.676 | (.614) | -.347 | (.649) |
| Random rosca | .969 | (.593) | .8 | (.549) | .788 | (.602) | 1.08 * | (.61) | .701 | (.674) |
| Area fixed effects | yes | | yes | | yes | | yes | | yes | |
| Control for group starting date | yes | | yes | | yes | | yes | | yes | |
| Control for starting mbs' relationship | yes | | yes | | yes | | yes | | yes | |
| Control for selection effect | yes | | yes | | yes | | yes | | yes | |
| Number of dead groups | 37 | | 37 | | 37 | | 37 | | 37 | |

Robust standard errors in parentheses, correction for sampling weights

*** significant at 1%, ** significant at 5%, * significant at 10%

Source: Data collected by the author

Table 5: Complementary log-log regressions with dummies for baseline hazard control - Cox duration model for discrete time.