

Collective Action and Informal Financial Institutions: An Empirical Analysis of Rotating and Savings Credit Associations (ROSCAs) in Senegal

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Abstract

This study analyzes how rotating savings and credit associations (ROSCAs) in Senegal were able to overcome the collective action dilemma, maintain institutional performance, and remain sustainable over time. This study models cooperation among members as well as the performance and sustainability of associations using data collected from field research conducted in Dakar, Senegal in 2001. The results show that factors such as homogeneity of individuals within an association, how long the association has existed, how defaults are covered, and rules such as residency requirements, individual contributions, and rotation order are to various degree critical to the performance and sustainability of ROSCAs and to the fostering of cooperation among members of these associations.

Introduction

The credit shortage in many less-developing countries has been the subject of debate in the economic development literature. In Sub-Saharan Africa (SSA), many economies have deteriorated over time severely affecting the emergence of strong formal financial institutions. As a result, a dual system, where both formal and informal institutions coexist, characterizes the financial markets in these countries. The formal financial sector that emerged during the colonial period grew to include central banks, commercial, development, saving banks, and insurance companies. These institutions, however, are not well suited to serving the needs of the poor for several reasons. They are less accessible to the poor because they require collateral, do not recognize the importance of household savings, and may require some literacy and credit history. Banks in these countries are often reluctant to finance small projects such as micro-enterprises and are less likely to offer credit to low-income clientele such as women.

This has offered a tremendous opportunity for informal financial institutions to fill the demand for credit in many countries. The poor often use individual and household savings for most investments such as micro-enterprises, other business ventures in the informal sector, or for personal uses such as children's education. Often these resources are insufficient, so the poor must also rely on informal credit sources available through individuals such as pawnbrokers, moneylenders, or extended family members. Another important source of informal savings and credit are rotating savings and credit associations (ROSCAs). These sources of credit usually are not regulated and operate independently of governmental controls. These informal sources have provided desperately needed credit when no other credit alternatives are available through formal financial institutions.

A rotating savings and credit association (ROSCA) is an “[a]ssociation formed upon a core of participants who agree to make regular contributions to a fund which is given, in whole or in part, to each contributor in rotation” (Ardener 1964, p.201). Rotating savings and credit associations (ROSCAs) are a classic example of a traditional type of mutual aid or solidarity associations and provide an intriguing context to understand collective action. In these organizations, members cooperate to provide collective benefits that each participant receives in turn (Lewis; March and Taqqu; Putnam; Smale and Ruttan). Thus, a participant may become a lender or a borrower during a cycle depending on at which stage he or she takes the pot.

Some scholars predicted that these types of informal "middle rung" institutions would eventually wither away as countries achieved economic development (Geertz; Schrader). However, rather than fading away, informal financial institutions such as ROSCAs have emerged to fill an existing credit gap and continue to play a greater role in the lives of poor people all over the world. These institutions are embedded with values, norms, and customs of societies such as self-help, mutual aid and interdependence, and decentralized decision-making and provide not only economic but social benefits as well (Germidis, Kessler, and Meghir; Narayan). Remarkably, these associations are able to overcome the collective action dilemma and institutions are designed to provide incentives for members to cooperate (Putnam).

There has been a lot of debate on the role and importance of informal institutions in economic development, especially, in building economic and social capital in developing countries. However, empirical studies on ROSCAs in Senegal are currently limited and there is still much that is not known about how these institutions organize and operate, how they have survived over time, and how they apply different mechanisms to achieve cooperation among their members. Many ROSCAs in Senegal have been sustainable for an entire round and often

continue to repeat rounds for several years. So then, what are the underlying reasons that can explain how or why the participants join and continue to cooperate? If the logic of collective action assumes that members will behave rationally in ways that are not beneficial to the group as a whole, then why does default and free riding occur less often than expected? How have individuals designed self-governing institutions to maximize cooperation among members as well as improve the sustainability and performance of their institutions? This study is particularly interested in discovering the answers to these questions.

Informal Financial Institutions and Collective Action

Numerous have looked at issues such as local governance, public good dilemmas, and institutional management in a variety of situations and have addressed how individuals were able to cooperate and enforce rules. Ostrom (1990) and in her collaborative work Ostrom, Gardner, and Walker try to understand the general conditions which explain why some self-organized institutions have been successful while others have not. Based on case studies of common-pool resources (CPRs) in various countries, she examines the institutional designs and individual incentives to try to identify both the internal and external factors that can facilitate or hinder self-governance. She concludes "successful collective action is dependent upon how these organizations cope with free-riding, solve commitment problems, arrange for the supply of new institutions, and monitor individual compliance with sets of rules" (Ostrom 1990). This is particularly important in the context of this study as it may help to understand how individual women have been able to create self-governing institutions such as ROSCAs that have been sustainable for several years.

Olson's seminal work, *The Logic of Collective Action* has sparked a heated and contentious debate since its publication. Although, his works concentrate primarily on interests groups, the power of his theory on collective action is its wide applicability in a variety of situations. Most relevant for this study is the ongoing debate over Olson's conclusions about the effect of group size and an organization's ability to mobilize for collective action. Olson hypothesized that increases in group size would hinder collective action because there is a greater opportunity for freeriding.

Marwell and Ames question Olson's conclusions and highlight interest heterogeneity and resource distribution within groups rather than just group size as important factors in groups' ability in providing a public good. In an experimental study, the authors do not support Olson's argument about the relationship between group size and collective action. Their conclusions are further refined in Oliver, Marwell, and Teixeira in their theory on the role of a "critical mass" of individuals needed for collective action. Finally, Marwell and Oliver reiterate the role of a critical mass that has the possibility to create a "snowball effect" to help commit others to greater effort as well as stress the importance social ties from Oliver, Marwell, and Teixeira.

Ostrom (1999) also challenges Olson's conclusions and points out several contradictory collective action examples that highlight the importance of looking at the context of the collective action dilemma. She notes there are several ideas to keep in mind such as the type of collective action, the individuals involved, as well as group attributes such as group size and rules-in-use. Most important for this paper is her discussion on group size and she criticizes others for concluding increased transaction costs for larger groups prevents collective action because the effect of group size relies on several other variables. She offers the idea that larger groups are better able to provide collective goods because they have more resources available.

Olson assumed smaller groups could overcome the collective action dilemma because individual contributions would become more important. In these groups, members are more willing to carry the burden provision because they know they will have a larger benefit, transaction costs to coordinate and organize members were fewer, and social incentives are more effective compared to larger groups. Udéhn argues Olson conflates the idea that small (large) groups are always privileged groups and an inverse relationship between individual benefits from collective goods and group size exists. He highlights several important studies that undermine Olson's theory demonstrating cooperation in large groups is possible and criticizes the theory for failing to consider the role of the individual.

Udéhn argues that transaction costs do not increase, but decrease as a function of group size and reaffirms the necessity of a critical mass, and social ties, or networks in order for collective action to succeed. Frohlich and Oppenheimer also conclude the idea that larger groups have a greater problem with free riding is incorrect and point out important variables not considered such as differences in individuals' value of the good, supply costs, and the type of good.

ROSCAs have been able to avoid many of the high transaction costs associated with formal financial institutions. For example, ROSCAs through various monitoring and sanctioning mechanisms can minimize the costs of screening new borrowers by capitalizing on local information about individuals' past behavior. In addition, reputations and the self-selection of members help these institutions reduce adverse selection and moral hazard problems. High rates of interaction, proximity and effective mechanisms such as first, second, and third-party enforcement make it easier for mutual monitoring among members to occur and helps ensure that the benefits of cooperating minimize the temptation to default. Social capital such as shared

norms, networks of relationships, and trust are important factors that explain how these institutions have been able to remain sustainable. With respect to the impact of group size on collective action, a critical mass of individuals and how associations affect social capital requires further investigation to offer solid conclusions.

Empirical Analysis

Data Considerations

The data used in this study is based on field research conducted in Dakar, Senegal between February and August 2001. The information was collected following a stratified cluster sampling method. First, a random selection of ten suburbs in the Dakar region was drawn using a city map provided by the Ministry of Urbanism and Housing. Second, random samples of unequal sizes were drawn from each of the ten pre-selected suburbs to provide background information on participants and their associations. A total of 153 individuals belonging to different ROSCAs were interviewed and 118 were retained for the analysis.

For the purpose of this study, which focuses on the associations, information about the type of organization, size, membership criteria, operation of the association, contributions, utilization of receipts, and mechanisms used within the associations to handle disputes and facilitate cooperation among members are retained. A detailed description of the variables is provided in table 1. Data transformations such as generating dummy variables from the categorical variables were conducted on these data as needed in the analysis.

Summary Statistics of the Variables Used in the Study

Descriptive analysis using central tendency and frequency distributions were conducted to generate a typology of ROSCAs in Senegal. On average, a ROSCA in Senegal has a total of 53 members and has operated for approximately 56 months. The average monthly pot and contribution level of approximately was 312,801 fcfa and 6,624 fcfa, respectively. As expected, the default rate among ROSCAs is relatively low at 2.4 percent. As in other countries, the results showed women are the primary participants in ROSCAs in Senegal with 93 percent of all participants. In instances where male participants are found, there are more likely to belong to mixed gender associations.

Although there is strong belief especially among Senegalese men that women use the money they win to finance lavish ceremonies such as weddings, less than 2 percent of the ROSCAs were created specifically for these or other types of ceremonies and only 11 percent of the respondents used their money for ceremonial purposes. ROSCAs are commonly savings, mutual aid, or a combination of these two types. The vast majority of associations found in periurban Senegal were combination associations. Their purpose was to provide mutual aid as well as an opportunity for members to accumulate savings.

In 84 percent of the cases studied, members stated in their associations, individuals made equal contributions. Nearly half (45 percent) of the ROSCAs required members to contribute their share on a monthly basis, with the next popular option was either weekly (25 percent) or bi-monthly contributions (14 percent). Fifty-seven percent of members were allowed to share a hand whereas the other 42 percent of the ROSCAs did not allow two or more members to share a hand.

Winners were chosen by lottery 73 percent of the time. However, when asked which position they preferred in a rotation, an overwhelmingly number of members (40 percent) stated

they wanted to be the last person to receive the pot. Only 10 percent wanted to be in the first position and half of the respondents interviewed wanted to be in the middle position. This is an unexpected finding because most theoretical studies have argued the best position is the *first* position because the person in essence receives an interest-free loan. Those in the last position are in the least favorable position because this position makes the individual a lender for the entire length of the cycle.

If a member failed to make their contribution and/or did not make their payment on time, they were considered in “default”. Oftentimes this meant the winner would go home with an incomplete pot. Nearly 40 percent of the associations had no known mechanism to cover these missing funds. Twenty-eight percent of the time, missing contributions were supposed to be covered with the funds the association collected from fines or group funds. In another 20 percent of the times, the gestionnaire or president was required to cover missing contributions with their own money. As predicted, associations experienced less default than expected. Close to 70 percent of the associations successfully avoided defaults. Out of those that did experience defaults, the majority of these defaults (18 percent) were with members who had already received the pot and failed to contribute thereafter.

Multivariate Analysis

This section models the cooperation, performance, and sustainability of ROSCAs in Senegal with a set of variables that reflects group size, group heterogeneity, norms, and other various institutional designs. Cooperation among members is measured by the absence of default at any given time. The probabilistic nature of default led to the use of a logistic regression to model cooperation among members. The independent variables group size (STONT) is specified in a

quadratic format to reflect the notion of critical mass discussed in the previous section. A similar specification is used for duration (DURAT) to capture the behavior of cooperation among members as the cycle length increases. That is, cooperation may suffer as cycle length increases; however, members who were able to cooperate successfully during a cycle were more likely to cooperate in future rounds. Group homogeneity was a critical factor for cooperation as discussed earlier. The indicators of homogeneity were the gender composition of the association illustrated by DGEND to indicate whether an association is of mixed gender or otherwise, the age disparity between participating members (AGECOMP), and whether the participating members were required to be from the same locality such as from the same village of origin (DLOCALE2), or the same neighborhood (DLOCALE3). Norms and rules of ROSCAs are illustrated by variables indicating whether members were allowed to share a hand (SHAND), and whether the rotation order is arranged or random (RORDER). Institutional design illustrated by whether defaults were covered (DCOV) and the required contribution level to participate (CLEVEL). The same variables are used to estimate the performance and sustainability of the ROSCAs.

The results of the logistic regression are summarized in table 2. The results indicate the duration, size, age composition, and whether members were allowed to share a hand were critical determinants of cooperation among members. There are clear indications defaults were more likely to occur as the duration of the ROSCAs increased, however the fact that the coefficient on the squared of duration (SDURAT) is significant and negative shows that individuals who were able to cooperate after a certain time are more likely to cooperate in future rounds. Consequently, defaults were less likely to occur for ROSCAs that existed for some time. The variable SHAND presents some interesting features. This variable is an indicator of cooperation between two members who decided to share a hand in order to participate because they could not individually

afford the contribution level set by the association. The results suggest defaults are more likely to occur when individuals were allowed to share a hand. The variables STONT and SSTONT were both significant. The fact that the coefficient of STONT was negative, while SSTONT was positive illustrates there is an optimal group size or critical mass above which cooperation among members is likely to suffer. Lastly, the results indicate there is no indication those participants in associations that require members to be from the same neighborhood or share a hometown were more likely to cooperate than those who participated in associations without the same requirements. Similarly, there is no indication members of associations that devised strategies to cover defaults were more likely to cooperate compared to those who were members of associations without such mechanisms. There is no difference in terms of membership cooperation between associations that proceed by lottery to allocate funds and those operating with an arranged rotation order.

Regarding ROSCAs performance, a log-linear regression with default rate as an indicator of performance was used. The higher the default rate, the less effective was the association. Thus, any variable had a positive and direct relationship with default rate was considered to affect ROSCAs performance. The results in table 3 suggest that duration (DURAT), the availability of coverage (DCOV), and the size of the ROSCA (STONT) all contribute to increases in the default rate. If the length of the rotation increased by one additional month, then the default rate increased by 0.58 percent. Furthermore, the default rate increased by 0.41 percent for each additional member if the other variables were held constant. Finally, associations without any coverage for defaults had a 0.24 percent higher default rate than those with some type of coverage available. Meanwhile, default rates were lower for same gender

associations, associations with higher contribution levels, and those that allowed members to share a hand.

In the past, scholars have debated the sustainability of rotating savings and credit associations. The sustainability of ROSCAs in Senegal is modeled using the number of cycles as indicator. It is important to point out the number of cycles is considered as a continuous variable rather than count variable and is estimated using a semi-log model. The results in table 4 suggest neighborhood and hometown ROSCAs were less likely to continue in future rounds compared to those that did not require members to be from a specific locality as a requirement in order to participate. Moreover, the higher the age disparity between participating members, the less likely the association would proceed in the future for repeated rounds. Meanwhile, ROSCAs that operated with an arranged rotation were more likely to repeat rounds in the future and thus more sustainable than those that operated through a lottery allocation.

Conclusion

This analysis shows that certain factors such as group homogeneity, rules about individuals' contributions and residency, and certain association characteristics such as the length of existence and association size were important variables that enhanced cooperation and reduced the likelihood that default would occur. The length of existence of an association, whether coverage was available to cover default, and the association size all worked to erode institutional performance while the member homogeneity, individual contribution levels, and whether sharing a hand was allowed appear to enhance performance. Finally, those institutions that did not have a residency requirement to belong to an association, members who are closer in age to each other, and arranged rotation orders were more likely to be sustainable over time.

References

- Ardener, S. "The Comparative Study of Rotating Credit Associations." *Journal of the Royal Anthropological Institute*. XCIV (2) (1964): 201-229.
- Ardener, S. and S. Burman. *Money-Go-Rounds: the Importance of Rotating Savings and Credit Associations for Women*. Oxford: Berg Publishers, 1995.
- Frohlich, N. and J.A. Oppenheimer. "I Get By with a Little Help from My Friends." *World Politics* Volume 23(1970):105-120.
- Geertz, C. "The Rotating Credit Association: a "Middle-Rung" in Development", *Economic Development and Cultural Change* 1(3) (1962):259-269.
- Germidis, D., D. Kessler, and R. Meghir. *Financial Systems and Development: What Role for the Formal and Informal Financial Sectors?* Paris: OECD, 1991.
- Lewis, B. C. "The Limitations of Group Action among Entrepreneurs: the Market Women in Abidjan, Ivory Coast" in *Women in Africa* edited by Nancy Hafkin and Edna Bay, 1976.
- Liao, T. F. *Interpreting Probability Models: Logit, Probit, and Other Generalized Linear Models*. Newbury Park, CA: SAGE Publications, 1994.
- March, K. S. and R.L. Taqu. *Women's Informal Associations in Developing Countries: Catalysts for Change?* Boulder: Westview Press, 1986.
- Marwell, G. and R. E. Ames. Experiments on the Provision of Public Goods I: Resources, Interest, Group Size, and the Free-Rider Problem. *American Journal of Sociology* 84 (1979): 1335-1360.
- Narayan, D. *Bonds and Bridges: Social Capital and Poverty*. Policy Research Working Paper No. 2167. Washington, D.C.: World Bank, 1999.

- Oliver, P., G. Marwell, and R. A. Teixeira. "A Theory of the Critical Mass: Interdependence, Group Heterogeneity, and the Production of Collective Action," *American Journal of Sociology* 91 (1985): 522-556.
- Olson, M. *The Logic of Collective Action*. Cambridge: Cambridge University Press, 1965.
- Ostrom, E. *Governing the Commons: the Evolution of Institutions for Collective Action*. Cambridge: Cambridge University Press, 1990.
- Ostrom, E., R. Gardner, and J. Walker. *Rules, Games, and Common-Pool Resources*. Ann Arbor: University of Michigan Press, 1994.
- Ostrom, E. Context and Collective Action: Four Interactive Building Blocks for a Family of Explanatory Theories. Paper presented at the Workshop on Political Theory and Policy Analysis, Indiana University, 1999.
- Putnam, R., R. Leonardi, and R. Nanetti. *Making Democracy Work: Civic Traditions in Modern Italy*. Princeton: Princeton University Press, 1993.
- Schrader, H. "Rotating Savings and Credit Associations- Institution in the "Middle Rung" of Development?" *Southeast Asia Programme Working Paper No. 148*. University of Bielefeld: Federal Republic of Germany, 1991.
- Smale, M. and V. Ruttan. "Social Capital and Technical Change: The *Groupements Naam* of Burkina Faso" in *Institutions and Economic Development: Growth and Governance in Less-Developed and Post-Socialist Countries*, edited by Christopher Clague. Baltimore: The Johns Hopkins University Press, 1997.

Udéhn, L. "Twenty-Five Years with *The Logic of Collective Action*." *Acta Sociologica* 36
(1993): 239-261.

Table 1. Description of the Variables Used in the Analysis.

Variables	Definition
AGECOMP	Indicates the age dispersion between participants within ROSCAs
APOT	Size of the pot in fcfa
DURAT	Indicates how long the association has existed (months)
STONT	Indicates the size of the association
CLEVEL	Amount of money contributed each month by individual members
DEFEXIST	Dichotomous variable indicating whether any members defaulted in the past (yes = 1, no =0)
DEFRATE	Ratio of number of defaults to size of the association in percent
COVDEV	Categorical variable that indicates how defaults are covered (0 = emergency funds, 1 = association funds, 2 = collected fines, 3 = president of the association, 4 = other volunteers, 5 = no coverage available) used to create DCOV (0 = no coverage and 1 = coverage)
REDEF	Reason for default (0 = no default, 1 = financial winning the pot, 2 = financial after winning the pot, 3 = other reason)

Table 1. Description of the Variables Used in the Analysis.

Variables	Definition
TTYPE	Type of ROSCAs (0 = saving, 1 = mutual aid, 2 = ceremonies, 3 = credit, 4 = combination of two or more from above)
LOCALE	Residency requirement to participate (0 = no residency requirement, 1 = member must reside in the neighborhood, 2 = member must be from the same hometown) used to create two dummy variables DLOCALE2 for neighborhood ROSCAs and DLOCALE3 for hometown ROSCAs
GENCOMP	The gender composition of the association (0 = female only, 1 = male only, 2 = mixed gender)
CONTP	Type of contribution allowed (0 = money, 1 = combination of money and goods)
ECONT	Indicates if contribution levels are equal (0 = unequal, 1 = equal)
SHAND	Indicates whether participants are allowed to share hand (0 = no, 1 = yes)
FRECONT	Frequency of contributions (0 = weekly, 1 = biweekly, 2 = monthly, 3 = daily, 5 = other)
RORDER	Rotation order (0 = arranged, 1 = lottery)

Table 2. Logistic Regression for Cooperation among ROSCAs' Members.

Variables	Label	Coefficients	Std Error	Significance
DURAT	Duration	2.858	1.362	0.036
SDURAT	Squared duration	-0.336	0.187	0.072
DLOCALE2	Neighborhood ROSCA	-0.596	0.685	0.385
DLOCALE3	Hometown ROSCA	-0.124	0.668	0.852
DGEND	Same gender ROSCA	-0.497	0.505	0.324
AGECOMP	Age dispersion	0.637	0.397	0.109
DCOV	Coverage available	-0.748	0.474	0.115
SHAND	Share hand allowed	1.110	0.520	0.033
STONT	Size of ROSCA	-3.928	1.448	0.007
SSTONT	Square of size of ROSCA	0.516	0.200	0.010
RORDER	Arranged rotation order	0.199	0.536	0.711
CLEVEL	Contribution level	-0.122	0.205	0.553

Notes: The dependent variable is whether a default has ever occurred in the association for which yes = 1 and no = 0. The probability for default to occur is an indicator of cooperation among members. Any variables for which the significance is less than 0.10 is considered to have an impact on the dependent variable.

Table 3. Linear Regression for ROSCAs' Performance.

Variables	Label	Coefficients	Std Error	Significance
CONSTANT	Intercept	-0.292	0.849	0.732
DURAT	Duration	0.582	0.237	0.016
DGEND	Same gender ROSCA	-0.065	0.039	0.093
AGECOMP	Age dispersion	-0.054	0.179	0.764
DCOV	Coverage available	0.240	0.129	0.066
SHAND	Share hand allowed	-0.348	0.175	0.049
STONT	Size of ROSCA	0.411	0.176	0.022
CLEVEL	Contribution level	-0.349	0.114	0.003

Notes: The dependent variable measures the default rate which is an indicator of performance.

Any variables for which the significance is less than 0.10 is considered to have an impact
ROSCAs' performance. $R^2 = 0.21$

Table 4. Linear Regression for ROSCAs' Sustainability.

Variables	Label	Coefficients	Std Error	Significance
CONSTANT	Intercept	2.456	2.127	0.251
DLOCALE2	Neighborhood ROSCA	-1.821	0.681	0.009
DLOCALE3	Hometown ROSCA	-1.533	0.683	0.027
DGEND	Same gender ROSCA	-0.055	0.509	0.914
AGECOMP	Age dispersion	-1.196	0.348	0.001
DCOV	Coverage available	0.412	0.472	0.384
SHAND	Share hand allowed	-0.221	0.511	0.666
SSTONT	Square of size of ROSCA	-0.264	0.535	0.623
RORDER	Arranged rotation order	0.546	0.224	0.016
CLEVEL	Contribution level	2.456	2.127	0.251

Notes: The dependent variable measures the number of cycles which is an indicator of sustainability. Any variables for which the significance is less than 0.10 is considered to have an impact ROSCAs' sustainability. $R^2 = 0.22$.