Rosca Participation in Benin: A Commitment Issue*

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Abstract

In the light of first-hand data from a Beninese urban household survey in Cotonou, we investigate several motives aiming to explain participation in Rotating Savings and Credit Associations (ROSCAs). We provide empirical findings which lead us to think that the main reason why individuals join a ROSCA is to commit themselves against self-control problems.

Keywords: ROSCA, self-control, Benin

JEL Classification: G2, O16, O17

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1 Introduction

There have been numerous studies underlining the importance of rotating savings and credit associations (roscas) in developing countries. Roscas are commonly found in rural areas and in the poorer neighbourhoods of the cities in developing countries and drive a considerable part of individuals’ savings. Bouman (1995) refers to many African countries showing high degrees of participation and the importance of the savings concerned. In developed countries, these institutions are mainly used by migrants.

A basic description of these associations can be given as follows: A group of people gather on a regular basis for a cycle of meetings. During one meeting all members contribute a fixed amount of money to a common pot allocated to one of them. The latter is excluded from the reception of the pot in subsequent meetings but is still obliged to contribute to the pot for the rest of the cycle. This process repeats itself until each member has received the pot, a cycle is then completed. Then, the rosca may begin another cycle or decide to break up. Groups vary widely in terms of amount of contributions, number of members and frequency of meetings. In fact some groups may function on the basis of weekly or monthly compulsory meetings whereas others which do not hold meetings send a member for collecting payments. Operating modes of roscas can differ considerably. The pot can be allocated either according to a random process (random roscas), through a decision imposed by the governing body of the group (decision roscas) or through a bidding process (bidding roscas).

Rosca members are mainly poor individuals who have little access to formal savings and credit markets because of high transaction costs and incomplete markets. In the literature roscas are usually regarded as a means for poor people to save money in order to make an indivisible expense (a lumpy expenditure). Empirical analysis by Handa and Kirton (1999) and van den Brink and Chavas (1997) confirm this view. Evidence we collected from a sample of 496 households in Cotonou, Benin, supports this as well. Rosca participation implies costs. They do not provide interest rates. Moreover, members suffer from the risk of default from other members - which could eventually lead to the breakdown of the rosca - from less flexibility than saving on their own - as the rosca saving rate is likely to differ from their optimal saving rate - and, in most cases, from opportunity costs of time spent by taking part in meetings of the group. Despite

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1See among numerous references, Srinivasan (1995) and Summerfield (1995).  
2This can be done once at the beginning of a cycle (establishing the order for its entire duration) or the random draw can be repeated at the beginning of each meeting.  
3As an example, a small survey of Beninese banks showed us that conditions for opening an account in any public or private banks of Cotonou - such as a fixed guarantee deposit, the possession of an identity card (the costs of which are prohibitive) and literacy skills for the understanding of contracts - all act as strong deterrents against poor people.  
4Nevertheless our evidence shows that few members, if any, considered meeting as valuable time wasted. It rather seems that members like meeting and spending time together. Several groups organize
all these costs, these groups enjoy popularity which proves that it must be beneficial to their members, who, in need of a saving device, are ready to pay for it. This brings the question as to why individuals would decide to join a rosca instead of saving on their own.

This important question has received various answers in the literature. One formulated by Besley, Coate and Loury (1993) is that rosicas allow individuals to receive the pot earlier than through individual savings and hence to buy the desired indivisible goods before it would have been possible in autarky. This can obviously be the case for all members except the last one in the cycle. A second motive for joining a rosca is that such associations can act as substitutes for insurance, this being particularly true in developing countries where markets for insurance are absent. These two answers appear however to be unfit for the evidence we collected in Benin and we discuss why below.

Another rationale was provided by Anderson and Baland (2002) on the role that rosicas can play as a commitment device. Their work relies on intra-household conflicts in consumption decisions and on the existence of asymmetric preferences for household goods between men and women. Still this rationale does not fit our empirical findings partly because of the Beninese intra-household decision process but also for additional reasons that we will exhibit.

In the light of our evidence it appears that the fundamental reason as to why one individual would join a rosca is rather the need of commitment due to self-control problems. If people have present biased preferences or suffer from short-term temptations and are aware of their consequences, it is likely that they would prefer to limit the set of options available to them. They could then adhere to a rosca to bind themselves to their second best optimal saving rate thus securing part of their revenues against everyday temptations. Examined by Ambec and Treich (2007), this rationale was proposed by Aliber (2001) and Gugerty (2007). In their respective surveys they indicate that in the absence of alternative commitment saving strategies, people aware of their time inconsistency problem would turn to rosicas. Our paper distinguishes itself with respect to the main literature in two ways. First it provides original empirical findings in favour of the self-commitment argument. While Aliber (2001) and Gugerty (2007) provided some with their database, our allows us to complete them and provide additional evidence. Second, it documents the fact that Beninese spouses evolve in a non-cooperative framework and that the decision to join a rosca is an individual one. This brings additional light along with rare studies pertaining to the West-African intra-household decision process. Furthermore, it underlines that, contrary to a widespread belief, there does not

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5 See in particular Rutherford (1999) on this issue of costs.
seem to be any gender effect as to rosca participation in Cotonou.

We therefore intend in the following section to briefly review reasons for participation previously given in the literature. We then present in section 3 field evidence that describes how husband and wife interact with each other. Section 4 investigates the self-control commitment issue, section 5 presents conjectures and section 6 describes the survey on which our analysis is based. We then proceed by offering in section 7 empirical estimates to support our conjectures. Section 8 sets out alternative explanations for joining a rosca and section 9 concludes.

2 Explanations from the literature

2.1 Quick Financing of the Purchase of Durable Goods

As argued in Besley, Coate and Loury (1993), rosca allow individuals to receive the pot earlier than through individual savings and thus to make the desired indivisible expenses sooner than if they had saved on their own. This is of course the case for all members except the last one in the cycle. Ex-ante, rosca having a non-predetermined order, either because they are bidding or random rosca, make all members better off in expectation by saving through them. Once the indeterminacy of the entire cycle order is unraveled the last pot recipient is ex-post worse off presuming that the saving rate imposed by the rosca is not optimal for her. Observations collected in Benin do not support such an hypothesis. Out of the 183 rosca included in our dataset 50% have their entire order known before the cycle begins, before any contribution has been paid. In those cases, when the cycle starts there is no uncertainty about the timing of the pot receipt. Either the order is determined by the governing body in a decision rosca according to various reasons (pontuality, good payment records, seniority, member of the governing body, etc). Either in a random rosca the entire order is chosen randomly and known at the beginning of the cycle. Thus as the cycle starts, the median cycle length being 11.54 months, the last recipient could well decide to opt out ex-ante knowing to be worse off. Backwards induction would then predict the breakdown of the rosca.6

Another piece of evidence rendering the Besley, Coate and Loury (1993) reasoning unfit to the Beninese case is that only a minority of 24% of rosca members in our sample declared that if they could choose they would prefer to receive the pot at the beginning

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6 In our sample, 93% of all rosca change the order after each cycle is completed. The order of pot reception is therefore rarely repeated from cycle to cycle. But this does not change our argument. For half of the rosca having no uncertainty with respect to the order, members motivated by an early reception of the pot can still decide to opt out, whether or not the cycle order will be repeated. Interestingly, according to our characteristic variables there is no difference between a representative member of a rosca with or without uncertainty with respect to the order.
of the cycle while a majority of rosca members (60%) preferred the end.\textsuperscript{7} For those wishing for an early reception of the pot we do not rule out the Besley, Coate and Loury rationale but it remains that this motive is more of an exception.

2.2 Insurance

Another motive for joining a rosca is that such an association can act as a substitute for insurance. This interpretation is mainly valid for the case of bidding rosca and not for random or decision rosca. Bidding rosca is indeed the type of rosca which can combine best the allocation process and the timing of pot reception with respect to members’ specific shocks. In our sample only random (64%) and decision rosca (36%) are represented, bidding rosca being seemingly absent in Cotonou. However random and decision rosca can provide insurance to a small extent. Indeed some flexibility is provided by allowing a member in need to receive the pot at an earlier round. Of all the rosca surveyed 26% stipulated in their rules that changes in the ordering were permitted and to be agreed upon by either consensus of all members or by the governing body. Moreover 44% of all rosca allow two members to change order without knowledge of the rosca’s governing body or any other member. This opportunity seems to be used since 12% of the rosca members said there has been at least one exchange of place with another participant in their group during the last cycle.

Roscas can also provide insurance by offering loans to their members. Indeed 20% of all rosca offer this possibility in their rules. In the vast majority of those associations (94%) a loan can only be offered to a member who has not yet received the pot. On top of that, conditions are often imposed (72% of groups) as for what reasons the loan can be granted (sickness, financial problems, funerals, accidents, etc).\textsuperscript{8} Loans are regularly solicited in groups offering this opportunity: during the last six months 58% of them granted at least one loan.

Decision rosca, both those imposing an order for the entire cycle and those making meeting-to-meeting decisions often consider desires and needs of members. Of all 65 decision rosca, 53% base their decision on each individual member’s needs.\textsuperscript{9} Of course this insurance aspect is enhanced for rosca based on meeting-to-meeting decision. A

\textsuperscript{7}6% declared preferring to receive the pot at mid cycle and 12% were indifferent. Of those preferring to receive first in the cycle: 61% said that they would rapidly invest the pot and ease the payment of future contributions with the profits earned, another 25% said that they could rapidly repay debts or enjoy the benefits of having the pot. In his South African case-study, Aliber (2001) also reports a predominance of preference for being last.

\textsuperscript{8}In all cases no formal collateral (such as belongings) is required. The pot to be received by this member acts as such. Indeed the amount granted is often limited to the pot and deadline payment coincide with the time of pot reception or the end of the cycle. 58% of these loans are granted without payment of interest. Before granting a loan 72% of all rosca carry on investigations to check the truthfulness of each demand.

\textsuperscript{9}Other criteria for such a decision are: good payment records and punctuality (30%) and seniority (11%).
member to whom something unexpected happened and who has not yet received the pot can come to a meeting and formulate her demand. For roscas fixing the entire ordering before the cycle begins the insurance they can provide is limited. It can only take into account foreseen or potentially known shocks. For instance, they can take into account harsh fishing seasons and make pot reception for fishermen coincide with it.

Even though these two types of roscas have tried to incorporate some insurance aspects in their functioning, once the pot is received and a shock occurs, there is little if nothing available.\footnote{Some roscas do offer additional help called “alô jè nude ji hun enan” (24\% of the roscas in our sample). One member in need can raise her hand and tell the group which kind of problem she has to cope with. The group might give her a financial help which needs not be reimbursed. This help is closer to solidarity than insurance since its granting is uncertain and its amount widely variable.} Beninese roscas are therefore an imperfect substitute for insurance.\footnote{Contrary to our field observations, Calomiris and Rajaraman (1998) find a prevalence of bidding roscas in an Indian city and stress their insurance role. See also Klonner (2001).} Instead surveyed individuals tend to resort to indemnity funds\footnote{LeMay (2007) presents an analysis of those groups based on this Beninese household survey. These groups, called in Fon “nujè mèji gbè” (a direct translation of which would be “happiness-unhappiness funds”), offer insurance against a wide range of shocks.}, a major informal institution for insurance services.

### 2.3 Intra-household Conflicts

Anderson and Baland (2002) present a model of intra-household conflicts in consumption decisions. In their cooperative bargaining framework there are asymmetric preferences for household goods regarding men and women who share a common budget. They model a conflict within the household for an indivisible good based on those asymmetries: women having always a larger preference for the indivisible good and therefore willing to save at a higher rate than men. Members being an overwhelming majority of female\footnote{This bias towards female participation is also confirmed by other studies such as Ardener (1964) - offering several case studies located in India among others - Geertz (1962) and Tsai (2000) who respectively focus on Java and China.}, as they observed in Kenya, would join a rosca in order to render their savings out of reach of their husband (or hide them). They could then buy an indivisible good, which they prefer, whereas men would rather opt for present consumption. By joining a rosca, women thus commit the household’s income against the husband’s preferences.

This however does not seem to comply with the evidence we collected in Benin. On the one hand, our dataset shows that women seem to have a slightly smaller probability of being in a rosca than men: while they represent 51\% of all adults, women form a minority (45\%) of all rosca members. According to our sample, in Cotonou, the probability that a woman participates in a rosca is 15\%, this slightly increases to 21\% when she lives...
in a couple and 22% if she works (24% if she does both). Compared to that, men have an overall probability of 19% of participating in a rosca, 32% when they live in a couple and 31% if working (35% if both). There is also no tendency towards favouring women in group composition: 18% of all rosca surveyed were exclusively composed of women while 26% exclusively of men. For the remaining of groups composed of both genders 63% have a majority of male members. Moreover from the general groups’ typology that we can depict from this large scale survey we cannot assert that rosca are primarily oriented towards women’s needs neither do they intend to favour their membership. We met no group having clear primary objectives such as assisting women, providing for their needs or those of children or empowering women in their interactions with their husband. This is confirmed by the coefficients we obtain using the Heckman FIML displayed in Section 7. Indeed neither the ‘female’ nor ‘female * couple’ variables are significant in the first step of our regressions. This shows that gender does not seem to be a relevant variable explaining participation to rosca. Combined to that, these variables are still non significant in our second step estimates. This would tend to show that household’s members seem not to exhibit asymmetric preferences with respect to saving decisions.

On the other hand, were rosca used as a means to put money aside from the husband, membership would have to be kept secret from the husband’s knowledge. In our sample, most rosca meetings are only open to members but groups do not insist upon secrecy showing that participants are not primarily seeking to commit money against spouses. Indeed only 15% of the membership due to people living in a couple (71% of all rosca memberships) is unknown by spouse. In order to avoid potential disputes concerning mainly adultery issues, 40% of groups allowing female membership impose husband’s approval for new female members. Moreover 56% of the groups organize at the end of a cycle (or of the year) a celebration with dances and folklore where friends and neighbours are invited. Even defiles or marches precede those celebrations to attract attention from people in the neighbourhood. It can also serve to advertise the

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14 Neither did any group attempt to elaborate a strategy of expense for their members in order to favor any gender or ethnic group. In fact no group imposed spending scheme or favored goods deemed valuable to them. Latitude as to what can be bought with the pot is large: rules limiting the pot use are rarely imposed (in only 2% of all rosca).

15 It can be argued that, once a woman joins a rosca, she could use the threat of social sanctions to convince her husband to continue allowing her to participate. However, this reasoning is valid only in the course of one cycle. Once the cycle is completed, one can freely chose to quit the group, what is commonly accepted. An unwilling husband could easily pressure his wife to quit the group at the end of a cycle without incurring social sanctions. Nonetheless, in what we observe in our sample, reasons given by members for leaving a group are not related to that motive (Dagnelie, 2007).

16 Gugerty (2007) finds similar evidence. In her kenyan sample rosca have a structure that is not designed to encourage secrecy among spouses. Gugerty also presents evidence against the intra-household conflict hypothesis.
success of their association and generate new memberships.

One could still argue that roscas would be a tool for hiding revenues to one’s partner. This could be the case for a minority of members as 29% of them declare the contributed amount to the pot is unknown to their partner while 54% of them say the time of receiving the pot is not known. Although roscas could be a tool for helping secretive partner in hiding money, these figures do not suggest it would be a widespread motive for joining a rosca.

3 Secrecy and Individual Decisions within Household

During our survey, we carried out several informal meetings with residents of Vossa and Enagnon. These showed us that, regarding money matters, secrecy is the rule between spouses. An important proportion of women and men with whom we spoke declared that their spouse was unaware of the course of their occupational activities and was therefore unable to guess their income. Many said, no matter the gender or age of the respondent: "the less he/she knows about my activities, the better it is.” Or “I don’t want him/her to know my income otherwise he/she will ask me to meet the cost of such and such expenses.” Spouses are overwhelmingly secretive and it even seems that giving as little information as possible to their partner is quite natural. Hence, spouses rarely ask questions concerning their partner’s income or inquire about their activities. It is a kind of convention allowing each member of the couple to keep her income more or less secret. The result of this is that each individual has a lot of latitude in managing personal income. Thus by being secretive, spouses avoid sharing their personal earnings or making common budget and retain the sole control over their personal expenditures.

Questions related to these observations were addressed to the 587 respondants (out of 1179) who were older than 15 and in couple. To the question "Can you estimate your spouse’s revenues?" : 79% answered no, 11% yes and 10% partially. Results were similar for: "Do you think your spouse knows your revenues?": 76% answered no, 16% yes and 8% partially. This gives the impression that unions or couples are considered as business arrangements between partners who want the household needs in terms of public goods to be provided for.

Another remarkable fact is that, in Benin, social norms determine the intra-household allocation of expenses by gender. The majority of the contributions to the household’s

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17 In fact this answer was not given by a single of the 222 members in our sample to the question: “What is the fundamental reason why you joined a rosca?”.

18 LeMay (2007) substantiates this dichotomy between wife and husband finances inside couples by providing an empirical analysis of the determinants of spouses’ pattern of consumptions based on the same sample. He also gives a review of the anthropological literature pertaining to that issue in West-Africa; see notably Falen (2003).
public goods devolve on the husband who has to take care of everything related to the house (rental fees, repair costs, electricity), give money for housekeeping, pay the school fees, clothing, etc. His wife has to take care of the family, cook and pay water bills. In general, the male income is not sufficient to cover the needs of the family, so that the wife has to spend more for the household than what had been allotted to her.

As long as the basic needs of the family are fulfilled, ‘selfish’ individuals would prefer to spend more on private goods, the utility of which is superior. Each spouse therefore tries to depart from the status-quo expenses, by passing on to the other some share of their common burden. They then enter an infinitely repeated non-cooperative game in which they try to lower their contribution to the provision of the public good as it is detrimental to their own consumption of private goods.

In order to implement this strategy, both spouses hide their income and try to give their partner a blurred image of their earnings. This implies that husband and wife also hide as much as they can their expenses which could lead their partner to have a guess at their revenues. Were agents able to know their partner could spend more for the household, they would claim to pay less. Therefore, none of the spouses gets incited to reveal the true amount of their earnings.

This is not to say that spouses do not interact as to the provision of public goods. A minimum of common management is required with respect to their respective role in the couple. Still, it remains that spouses avoid disclosing information on their income and their expenditures, the latter of which seeming more difficult. However, a large fraction of couples do not interact during working hours as their work brings them in different parts of the city. It means that meal expenses, transportation or medicines, transfers for relatives or colleagues, gifts for funerals and luxury spending such as alcohol and cigarette can easily be concealed. Moreover, even larger expenses can be kept away from spouse knowledge. As we show in Table 2 almost half of the rosca members invest the pot in their small business. A woman buying stocks of provisions to store can conceal them in her shop, taxi drivers paying for regular motorcycle or car repairs or fishermen buying new equipment can easily hide their investments.

Secrecy - as strategic information transmission (Crawford and Sobel, 1982) - prevents the household from benefitting from efficiency gains usually reachable with the repetition of the game. In this case, as neither incomes nor strategies are observable, detection of fraud or deviation from a cooperative agreement is in fact rendered impossible. This can explain why agents may be stuck in a pareto-inferior equilibrium, supported by social norms. In these conditions, both spouses have no incentives to

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19 ‘Selfish’ is to be taken in the sense that the utility of one agent does not depend on any other agent’s utility.

20 The means of pressure of the partners consist mainly of threats of reputation losses: wives can complain to their parents-in-law (and then to their own parents) about their son, unable to provide decent living conditions to his family. Her husband endowed by custom with most of the burden is able to force
reveal their real income or personal expenses - which could lead to rough estimations of their earnings.

We observed that these behaviours are widespread and accepted to such an extent that few are those who try to break this tacit rule and inquire about their partner’s income. A selfish spouse will thus individually decide whether or not to join a rosca. This decision depends on their available income net of public goods expenses and on other relevant individual characteristics.

4 Commitment Device Against Self-control Problems

Two different economic theories suggest that agents might prefer to commit themselves and limit the set of options available to them. Gul and Pesendorfer (2001 and 2004) present a dynamic consistent preferences explanation of this phenomenon, namely the temptation theories. According to their theory, agents undergoing short term temptations in conflict with their long run self interest would be “unambiguously better off when ex ante undesirable temptations are no longer available” (Gul and Pesendorfer, 2001, p.1406). And even if they do not expect to succumb to the temptation in the future, individuals with self-control problems will expend resources to remove tempting alternatives from their choice sets (ibidem, p.1420). In this case, preference for commitment arises from a desire to avoid temptation rather than from a change in preference.

The second approach, well known in the literature\(^{21}\), departs from the dynamic consistent preferences hypothesis and corresponds to a reversal of the preferences when the date of decision-making approaches. It appears from psychological experiments that people tend to have present-biased preferences - the shape of which is roughly hyperbolic - and discount time at a non constant rate - higher in the very short than in the longer term\(^{22}\). An individual having self-control problems and being sophisticated - aware of the problem and its consequences - would prefer to commit herself. Her current self may want to restrict the choice set available to her future selves to overcome such time-inconsistencies.

Even if the underlying motives are slightly different according to each of the two theories presented above, their implications appear similar in terms of rosca participation. Roscas seem indeed to respond to a need of commitment against one’s time inconsistency preferences and temptations. According to Gugerty (2007), in the absence of alternative commitment savings strategies, people having self-control problems and

\[ \delta \leq 1 \text{ and } 0 < \beta < 1 \text{ in } U_t(u_t, u_{t+1}, \ldots, u_T) = \delta^t u_t + \beta \sum_{i=t+1}^T \delta^i u_i \]

his wife to provide a bigger share in the family budget. Would she refuse to make efforts she in last resort could be repudiated (which would mean the end of her social life and bearing important consequences thereof).

\(^{21}\) see among many others, Laibson (1996, 1997), O’Donoghue and Rabin (1999)

\(^{22}\) where \( \delta \leq 1 \) and \( 0 < \beta < 1 \) in \( U_t(u_t, u_{t+1}, \ldots, u_T) = \delta^t u_t + \beta \sum_{i=t+1}^T \delta^i u_i \)

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being sophisticated turn to rosca since they would indefinitely renegotiate with themselves\textsuperscript{23} if trying to save money on their own. This is supported by empirical evidence from a randomized control methodology study in the Philippines. In fact, Ashraf et al. (2004) show that women with time inconsistent preferences desire commitment savings devices. They are indeed more likely to take up the SEED product which is a pure commitment savings product (bank account with restricted access to deposits without compensation for this restriction), this leading to higher savings levels. Moreover, Ashraf et al. show that poorly educated individuals with hyperbolic preferences are more likely to join rosca.

Besides rendering the current savings illiquid and safe, rosca restrict the set of future options, as long as the end of the cycle is not reached, compelling the individual to go on saving. Unfortunately we are unable to identify if individuals in our dataset suffer from time inconsistency. Hence we cannot formally test the hypothesis according to which individuals having hyperbolic preferences are more likely to join rosca. However we have a series of empirical evidence which suggest the need of a commitment device as a motive for membership. Indeed 89\% of the rosca members (198 out of 222), answered that they joined a rosca to discipline themselves to save. “Discipline” or “the willingness to force savings” being by far the most cited answers suggest that a vast majority of members use the rosca as a mean to commit themselves to save.\textsuperscript{24} Despite the evidence we provide in Table 2, according to which all members use the pot for non durable expenses, the answer “buying an indivisible good” came short as only 22.5\% of all participants mentioned it as the reason of their membership.

Moreover the fact that 60\% of rosca members prefer to receive the pot at the end of a cycle provides an additional argument.\textsuperscript{25} Of all those who preferred being at the end 78\% said it was because they did not want to feel indebted towards the group. They consider receiving in the early turns of a cycle as a debt towards the group to be repaid by future contributions to the pot and as a situation that they would prefer to avoid (this answer was provided without any proposed list of answers). Such debt aversion certainly confirms the incentive and disciplining role of the group which is exerted through pressure from the peers towards a defaulting member. As Aliber (2001) writes: “The debtor-creditor relationships created by rosca between members are characterized by an uncomfortable sense of obligation by the former towards the latter.”

\textsuperscript{23}At each period, the current self would have present-biased preferences towards consumption and would renegotiate the savings decision made by the previous selves.

\textsuperscript{24}Multiple answers could be provided by participants to the open-ended question “why did you join a rosca?”. Even then we still find that discipline is the most cited motive representing 52\% of all answers. Aliber (2001) and Gugerty (2007) also reports that a majority of respondents in South Africa and Kenya gave similar answers highlighting the need of discipline.

\textsuperscript{25}This preference is not correlated to the duration of the group membership and therefore not likely to be related to any learning effect.
tion of the pot means that an individual faces the risk of a negative shock throughout the cycle which might make him unable to repay the effective “loan”. Moreover, in case of default, leaving prematurely the rosca can be costly. Indeed, sanctions are more severe towards a defaulting member once he has received the pot. Thus preference for late reception may simply be due to the agents’ risk aversion towards default and increased punishment and not by the need of a commitment device. With that respect, we expect that in our sample, salaried individuals, who receive a regular and certain income, are less risk averse than non salaried. However we find that both types of agents seem to have similar preferences with respect to the timing of the pot receipt. This seems to give some credit to the commitment story. Still we argue that both reasons are likely to be intertwined. Many members told us in informal interviews that apart from minimizing the threat of sanctions, receiving the pot at the end of a cycle provides in itself additional motivation to make payments and complete successfully a cycle. Fear of sanctions and credibility of threats are important factors influencing preferences on the timing of pot receipt and at the same time, they are key elements for making a rosca a good commitment device. Would members put too much value on potential sanctions they would quit the rosca and try to save on their own and we would notice high turnovers. It is however not what we observe: the average membership duration of all those who provided this answer is 47 months, and only 4.4% said that they joined the group for a fixed number of cycles (the vast majority not knowing how long they were to stay member). All this tend to demonstrate that for a substantial number of individuals, benefits from an early receipt of the pot are outweighed by a mix of risks and debt aversions and the need of commitment.

5 Conjectures

Important implications can be derived from the intra-household consumption behavior that we depicted earlier. It allows us to put forward a conjecture that we intend to confront with our empirical findings. We claim that each individual makes decision about his/her own consumption and saving. Secrecy protects individual earnings to a large extent from spouse pressure and gives husband and wife a very limited ability to bias his/her partner’s choice. In the absence of a common decision over an aggregated household budget, spouses have the latitude to make decisions about their savings as if they were single. They both have the ability to manage their income according to their respective will. We can thus formulate a conjecture that would not allow us to test of the commitment hypothesis, but rather the intra-household conflict hypothesis:

**Conjecture 1** The probability of joining a rosca does not depend on whether an individual is

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26 Further details on those sanctions can be found in Appendix 10.2.
A great deal of latitude is left to both husband and wife in terms of managing their income net of public goods expenses and deciding if they are going to join a rosca. Thus the probability of joining a rosca boils down to a function of individual characteristics: income, age, schooling, stability of one’s job and the number of dependents. Simple predictions can be made on the effects of these variables. As saving is a normal good, income will positively influence the probability of joining. However we expect that rich individuals would rather opt for a formal and less risky vehicle of savings. A bank account in either a private bank or a public institution offers more flexibility and a more secure vehicle than rosca’s informal arrangements. So for high levels of income we expect the probability of joining to fall having thus an overall inverted-U shape curve with respect to income. Age would also follow a quadratic pattern: the needs to save would be maximum for middle age individuals establishing a family or small commercial activities (petty retail, fishing, etc.) and would be expected to diminish as age increases. The number of dependents has an ambiguous effect on the probability of joining a rosca. A larger number of children would give higher incentives to parents for saving in order to face future indivisible expenses, conversely more children would involve additional expenses and reduce potential savings. Variables describing job’s stability would be positively linked to the probability of joining. More stable income entries over the past means that one individual expects to be able to commit themselves more easily to regular payments to the pot.

Should the commitment motive be valid, we would expect rosca participation and rosca contributions to raise with individual income. It is likely however that both of them are concave in income as less risky opportunities become available. A similar prediction on commitment is also proposed by Ambec et. al (2007) who theoretically investigate the formation of stable informal agreements in developing countries. However we have to admit that this would be a necessary but not sufficient condition for certifying our hypothesis. We make the point clear below that this result could also match other motivations for rosca participation. The intuition tells that as income rises agents would tend to further protect themselves against increasing temptations. Moreover, sophisticated individuals would want to overcome time-inconsistencies by restricting

---

27 LeMay (2007) empirical investigations based on the same sample tend to support this view as individuals’ savings are rising in income in a convex manner.

28 The Beninese National Post Service, the CLCAM (a National Co-op offering loans and saving accounts) are, among others, public institutions present in Cotonou.

29 Our data show that, for the first income quantiles, practically no individual has a bank account contrarily to a maximum of 26% of individuals in the highest quantile.

30 To check this, we use two binary variables: one takes value 1 if the individual keeps her job for 24 months or more and another one takes value 1 when the individual receives regular wages.
their current self facing a wider set of choices available to their future selves. This forms a second conjecture:

**Conjecture 2** At least at low levels of income, payments made to roscas by individuals in need of a commitment device will be positively linked to income.

In the next section we present the survey on which our analysis is based, then in section 7 we confront our conjectures with empirical findings.

### 6 Description of our Survey

We use data we collected during the first three months of 2004 in the two districts of Vossa and Enagnon located on the outskirts of Cotonou (a city of about 1.1 million inhabitants). They are known to the city’s authority as being the poorest. Vossa is located near an inner bay of fresh water and has a community of fishermen. Its 63 hectares are encircled by stagnating waters and swamps which represent an important vector of disease. This district has not yet been divided into plots, though a long term project has been launched during our stay. Vossa is let to itself: the authorities of Cotonou have not yet paved any of its roads even its principal axis. The recurrent and important problem of floods has not been dealt with even if it critically and annually paralyses the area during a few months. Enagnon, a dense slum located on the Atlantic Ocean shore, has also received low attention and important sanitary problems have not been tackled yet. Half of its area of 60.1 hectares has been divided into plots in 1998. Enagnon encompasses an adjacent slum called Enagnon-plage which is inhabited with a majority of fishermen living in huts on the beach. Vossa and Enagnon are near downtown Cotonou where a large part of their inhabitants work and commute everyday. No formal saving and investment institutions, either public or private, such as banks and NGOs are present in these two districts, the selection of which dates back to a first mission in 2002 that revealed that many informal groups such as insurance funds and roscas were active there.

We surveyed 496 households: 110 in Vossa and 386 in Enagnon (of which 116 are located in Enagnon-plage). Selection of each household was done randomly. The first wave of interviews aimed at creating contacts, getting housing information and obtaining information on each member: religion, activity, education, work, etc. For all members older than fifteen, we required enumerators to fill in a sheet detailing their expenses on durable goods incurred during the last six months and to carefully report their expenses on non-durable goods for the week previously ended. A second round was needed for members of informal groups. During this visit enumerators collected detailed information on the group(s) they belong to. For a maximal accuracy, all members of each household were interviewed separately throughout the successive waves
of our survey so that tricky issues related to expenses or income were only tackled pri-
vately. Particular attention was thus put on confidentiality which was strictly followed
by our enumerators. Further details on our survey methodology can be found in Ap-
pendix 10.1.

We present a table below with basic information on roscas according to their gender
composition. Roscas composed only of women or men have memberships of similar
median size. However the median durations (in months) for living male only roscas is
larger than female only roscas. Female only roscas tend to have a shorter length of
cycle and a smaller monthly contribution. Male only roscas make their payments more
frequently on a monthly basis and fewer of them were started by a group of friends or
relatives. With respect to the way the pot is allocated, either randomly or by a deci-
sion, and with ethnicity composition there is not much of a difference between female
and male roscas. It is to be noted that a large majority of roscas are not designed along
ethnic or religious patterns. About one group out of five has one alternative function.
These groups, beside organizing regular rosca activities, offer mainly insurance services
(17% of all roscas), only three roscas (1.6% of all roscas) reported holding investment or
credit activities. In all cases, these functions are clearly separated from the ones roscas
usually perform. Investment or credit services would require separate contributions
and accounts. Insurance schemes take the form of separate informal groups namely
indemnity funds. Participation to parallel indemnity funds is voluntary although often
restricted to rosca members. Those funds have distinct contributions schemes, meet-
ings, rules and organization.31

While the quick financing rationale is unfit for our data as we saw previously, saving
through roscas is done in order to make an indivisible expense. As displayed in Table
2, this appears to be the case from our investigations even though as evoked before, it
is far from being the most mentioned motive for joining a rosca.32 We proceeded by
asking all rosca members what they did with the pot during the present cycle or what
they intended to do with it if their turn was to come. Nearly all of them reported that
they bought or were willing to make an indivisible expense: 49% mentioned investment
in their small business (buying important stocks of provisions for stores, motorcycle or
car repairs for taxis, equipment for fishing, etc), 18% planned to repair or build a house,
11% reported plot purchasing, 7% paid for school tuitions 33), 5% planned to reimburse

31Some of the 183 roscas in our sample represent the secondary activity of an indemnity fund. Since
both functions clearly demark themselves we did not make any difference in our analysis as respect to this
primary/secondary role and considered all roscas on an equal basis.
32Contrary to Gugerty (2007) who finds that more than half of rosca participants in her kenyan sample
use rosca winnings for two or more purposes, offering thus evidence that roscas are not formed solely to
purchase lumpy durable goods. We observe that only 14% of rosca members intended to use the pot for
more than one purpose.
33The fact that school fees represent such a low percentage is explained by the fact that a majority of
a personal debt and 14% to buy a durable good. What is meant by "other durable good" is any type of object or commodity such as tv set, radio, mobile phone, etc.

Incidentally if we look at answers provided by women, we find that 72% of them made (or intend to) an investment in their business\textsuperscript{34}. Men’s answers are more diversified, they mainly use the pot for business, house repair or building, other durable goods and plot purchase. One can notice the significant difference between male and public schools ask for very small tuition fees. For other selective schools, flexibility is allowed by which high fees can be paid in several instalments.

\textsuperscript{34}Despite the fact that profits from these investments may eventually benefit the household, this statistic does not coincide with the notion that women would join a rosca in order to save primarily for their children or the household’s well-being.
female expenditures on small business, other durable goods and on house repair and building which is likely related to the customary expenses pattern.

Besley and Levenson (1996) tested a hypothesis according to which, controlling for income, the rosca members would possess more durable goods than non members. We ran similar tests on the durable goods possessed by the households (such as fridge, freezer, stoves, tv set, vcr, stereo system, radio, bed, clock, watch, telephone, mobile phone) but obtained no significant differences between members and non members. A look at Table 2 tells us that a large majority of pot uses do not lead to durable goods purchases for the household, for which we tested the Besley-Levenson hypothesis. Indeed durables purchases appear in the categories “other durable good” or “luxury expenses”, which represent only 19% of all pot uses. The majority of pot uses being targeted towards indivisible expenses do not translate into accumulation of such goods. One could argue that small business expenses, being the most common answer, would eventually enhance profits, improve living condition and potentially lead to durable purchases. Our tests, however, do not allow us to highlight such spill over effects.

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35The large difference between “small business” and “other durable good” with respect to men and women is likely to be exaggerated since answers provided by a proportion of men could be counted in both categories.
<table>
<thead>
<tr>
<th></th>
<th>Total Sample</th>
<th></th>
<th>Women</th>
<th></th>
<th>Men</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All</td>
<td>Rosca memb.</td>
<td>All</td>
<td>Rosca memb.</td>
<td>All</td>
<td>Rosca memb.</td>
</tr>
<tr>
<td>Participates in Rosca</td>
<td>0.17 (0.03)</td>
<td>1 (0)</td>
<td>0.15 (0.02)</td>
<td>1 (0)</td>
<td>0.19 (0.03)</td>
<td>1 (0)</td>
</tr>
<tr>
<td>Total monthly rosca contribution</td>
<td>1804 (256)</td>
<td>10492 (1452)</td>
<td>1646 (259)</td>
<td>10898 (1617)</td>
<td>1969 (274)</td>
<td>10161 (1329)</td>
</tr>
<tr>
<td>Female</td>
<td>0.51 (0.00)</td>
<td>0.45 (0.02)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>33.1 (0.25)</td>
<td>39.8 (0.97)</td>
<td>32.9 (0.49)</td>
<td>39.7 (1.09)</td>
<td>33.3 (0.05)</td>
<td>39.8 (0.87)</td>
</tr>
<tr>
<td>In couple</td>
<td>0.52 (0.04)</td>
<td>0.74 (0.07)</td>
<td>0.52 (0.04)</td>
<td>0.69 (0.09)</td>
<td>0.52 (0.04)</td>
<td>0.79 (0.06)</td>
</tr>
<tr>
<td>Primary degree</td>
<td>0.28 (0.02)</td>
<td>0.23 (0.07)</td>
<td>0.18 (0.01)</td>
<td>0.12 (0.05)</td>
<td>0.40 (0.02)</td>
<td>0.32 (0.09)</td>
</tr>
<tr>
<td>Salaried</td>
<td>0.12 (0.01)</td>
<td>0.19 (0.02)</td>
<td>0.03 (0.01)</td>
<td>0.05 (0.03)</td>
<td>0.22 (0.01)</td>
<td>0.30 (0.02)</td>
</tr>
<tr>
<td>Monthly individual income</td>
<td>48223 (2672)</td>
<td>86377 (5235)</td>
<td>40554 (1739)</td>
<td>69386 (2673)</td>
<td>56237 (3720)</td>
<td>100212 (12663)</td>
</tr>
<tr>
<td>Monthly individual expenditures</td>
<td>30789 (2912)</td>
<td>47682 (2075)</td>
<td>27671 (2711)</td>
<td>43746 (3289)</td>
<td>34049 (3124)</td>
<td>50888 (859)</td>
</tr>
<tr>
<td>Number of dependents</td>
<td>1.91 (0.19)</td>
<td>3.18 (0.30)</td>
<td>2.05 (0.12)</td>
<td>3.37 (0.11)</td>
<td>1.77 (0.27)</td>
<td>3.02 (0.48)</td>
</tr>
<tr>
<td>Number of months, same job</td>
<td>85 (2)</td>
<td>159 (19)</td>
<td>82 (2)</td>
<td>155 (16)</td>
<td>87 (5)</td>
<td>163 (22)</td>
</tr>
<tr>
<td>Number of months, same block</td>
<td>191 (15)</td>
<td>226 (12)</td>
<td>174 (19)</td>
<td>183 (12)</td>
<td>209 (11)</td>
<td>261 (11)</td>
</tr>
<tr>
<td>Native Language : Ashanti</td>
<td>0.01 (0.00)</td>
<td>0.01 (0.01)</td>
<td>0.00 (0.00)</td>
<td>0.01 (0.01)</td>
<td>0.01 (0.01)</td>
<td>0.01 (0.01)</td>
</tr>
<tr>
<td>Native Language : Fon</td>
<td>0.33 (0.14)</td>
<td>0.29 (0.13)</td>
<td>0.31 (0.12)</td>
<td>0.23 (0.07)</td>
<td>0.34 (0.16)</td>
<td>0.34 (0.18)</td>
</tr>
<tr>
<td>Native Language : Popo</td>
<td>0.35 (0.05)</td>
<td>0.43 (0.09)</td>
<td>0.37 (0.04)</td>
<td>0.48 (0.13)</td>
<td>0.33 (0.07)</td>
<td>0.38 (0.08)</td>
</tr>
<tr>
<td>Native Language : Yoruba</td>
<td>0.04 (0.01)</td>
<td>0.04 (0.01)</td>
<td>0.04 (0.02)</td>
<td>0.06 (0.02)</td>
<td>0.04 (0.01)</td>
<td>0.03 (0.01)</td>
</tr>
<tr>
<td>Native Language : Fulani</td>
<td>0.03 (0.03)</td>
<td>0.03 (0.03)</td>
<td>0.02 (0.02)</td>
<td>0.02 (0.02)</td>
<td>0.04 (0.04)</td>
<td>0.04 (0.04)</td>
</tr>
<tr>
<td>Native Language : Goun</td>
<td>0.23 (0.12)</td>
<td>0.19 (0.14)</td>
<td>0.24 (0.10)</td>
<td>0.18 (0.13)</td>
<td>0.22 (0.14)</td>
<td>0.19 (0.14)</td>
</tr>
<tr>
<td>Vossa</td>
<td>0.58 (0.38)</td>
<td>0.53 (0.37)</td>
<td>0.58 (0.38)</td>
<td>0.56 (0.37)</td>
<td>0.58 (0.38)</td>
<td>0.51 (0.38)</td>
</tr>
<tr>
<td>Enagnon</td>
<td>0.31 (0.34)</td>
<td>0.25 (0.29)</td>
<td>0.31 (0.34)</td>
<td>0.23 (0.27)</td>
<td>0.31 (0.35)</td>
<td>0.27 (0.30)</td>
</tr>
<tr>
<td>Beach</td>
<td>0.11 (0.15)</td>
<td>0.22 (0.26)</td>
<td>0.11 (0.15)</td>
<td>0.22 (0.26)</td>
<td>0.10 (0.14)</td>
<td>0.22 (0.26)</td>
</tr>
<tr>
<td>Number of observations</td>
<td>1179 222 604</td>
<td>97 575 125</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*standard errors in parentheses*

*statistics corrected with sampling weights*

Table 3: Individual characteristics with respect to rosca participation.
All the 496 households we surveyed represent 2083 individuals of which 894 are aged less than sixteen, we are thus left with a sample of 1179 individuals divided in 604 women and 575 men. We show in Table 3 relevant statistics according to gender and participation status. These are used as variables on which is based our econometric analysis. One can find a detailed description of some of these variables in Appendix 10.3. We see an important difference in terms of age: mean age of total sample is significantly (at 5%) lower than those of rosca members. Women seem less educated than men as a significantly smaller proportion of them got a primary degree. There is also a larger proportion of male salaried, this being true whatever the participation status. Differences in monthly income show that rosca members are significantly richer than non members, this remains valid in the female subsample and in the male subsample for monthly expenses. It appears as well that female rosca members are in charge of larger households than female non members.

7 Empirical Results

We check the validity of our conjectures with our data by estimating participation and contributions with a single procedure: Heckman Full Information Maximum Likelihood. As people self-select their participation to a group, the observations taken into account in the structural equation are not a random sample. In fact, we suspect unobserved individual characteristics to influence both the probability to join and the amount contributed. We have therefore to tackle the problem of selection bias, producing inconsistent estimates, induced by the correlation between the error term and the regressors. Heckman FIML addresses this problem by simultaneously estimating the selection and structural equations, allowing residuals to be correlated.

As FIML rests upon a hypothesis of independence of observations which is not guaranteed by the design of our survey carried 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. As errors within those neighbourhoods are likely not to be independent, we used cluster effects taking account of correlation between observations coming from the same environment. This produces robust standard errors which would have been wrongly estimated without this correction. Furthermore, the design of our survey was such that the probability of being selected in our sample was different in the three studied areas which could lead to in-
consistent estimates. We therefore introduced sampling weights for our estimates to be independent of the sample design. (Deaton, 1997)

The first part of Table 4 gives empirical estimates with respect to participation which is the dependent variable of the first step\(^{37}\). We regress alternatively on the whole sample and on a subset incorporating only members of a couple. The only difference between the first two columns and the last two is the addition of two regressors namely female share of household income and its square. We control for ethnic affiliation even though we think that it plays a minor role in rosca participation in Cotonou as only a minority of groups are designed along ethnic patterns. These variables can be seen as very rough proxies for social identification and networking. Neighbourhoods are also controlled for and account for all potential interactions and effects specific to Vossa and Enagnon\(^{38}\). We include additional regressors such as the number of dependents, which is a proxy for household expenses. Since this variable is not significant, none of the two contradicting interpretations presented before is confirmed. We checked whether education would have any effect: it appears not to have any as the variable ‘Primary degree’ is not significant for any regression. Stability in one’s job, which we measure by whether one has kept one’s present job for at least 24 months, affects positively and strongly the probability to join a rosca. Being salaried (not self-employed) is however not significant. The district fixed effects, Vossa and Enagnon, are strongly significant suggesting that unobserved factors specific to each neighbourhood are important. A look at all the regression results also show that ethnic identity is rarely significant which confirms our impression that native language or ethnic affiliations is not a strong determinant of rosca participation.

Most importantly, these estimates allow us to validate our first conjecture. In the first column the coefficients displayed show that neither couple nor the interaction variable between female and couple are significant. An alternative regression displayed in the third column confirms these results. Indeed it strengthened the validation of our first conjecture by showing that the variables female share of household income and its square are not significant at 10% controlling for the same individual characteristics. This certainly provides evidence in favour of our framework where the decision to join a rosca is individual and independent of marital status considerations\(^{39}\).

\(^{37}\)Although both equations are estimated simultaneously, for clarity, we will use 1st and 2nd step to refer respectively to the selection and structural equations.

\(^{38}\)Time spent in a neighbourhood could also represent a proxy for trustworthiness. However problems of convergence with FIML technique prevented us from using this variable. It is to be noted that individuals in our sample tend to have a rather long stay in their respective neighbourhoods with a mean of almost sixteen years: see variable “Number of months same block” in Table 5. Movements across neighbourhoods and migration are more of an exception than usual observation.

\(^{39}\)We also ran two tests of joint significance on the coefficients of couple and female \(*\) couple and on female share and its square. Results do not allow us to reject joint non-significance at a 10% level for both tests.
### Heckman FIML Estimates of Participation and Monthly Contribution

<table>
<thead>
<tr>
<th></th>
<th>All sample</th>
<th>In couple</th>
<th>All sample</th>
<th>In couple</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1st step: participation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>-0.195</td>
<td>-0.056</td>
<td>0.192</td>
<td>-0.054</td>
</tr>
<tr>
<td>Couple</td>
<td>0.218</td>
<td>-0.171</td>
<td>0.171</td>
<td>0.210</td>
</tr>
<tr>
<td>Female * Couple</td>
<td>-0.144</td>
<td>0.401</td>
<td>0.401</td>
<td>0.357</td>
</tr>
<tr>
<td>Individual income (1000 CFA)</td>
<td>0.008</td>
<td>0.006</td>
<td>0.008</td>
<td>0.006</td>
</tr>
<tr>
<td>(Individual income)$^2$</td>
<td>-7.34e-06**(2.14e-06)</td>
<td>-5.16e-06**(1.68e-06)</td>
<td>-7.43e-06**(2.10e-06)</td>
<td>-5.20e-06**(1.88e-06)</td>
</tr>
<tr>
<td>Female share of household income</td>
<td>-2.099 (1.518)</td>
<td>-2.407 (1.529)</td>
<td>-2.099 (1.518)</td>
<td>-2.407 (1.529)</td>
</tr>
<tr>
<td>(Female share of household income)$^2$</td>
<td>1.709 (1.228)</td>
<td>1.981 (1.249)</td>
<td>1.709 (1.228)</td>
<td>1.981 (1.249)</td>
</tr>
<tr>
<td>Age</td>
<td>0.096 ***</td>
<td>0.039 ***</td>
<td>0.098 ***</td>
<td>0.041 ***</td>
</tr>
<tr>
<td>(Age)$^2$</td>
<td>-1.03e-03***(0.20e-03)</td>
<td>-4.39e-04 ** (1.73e-04)</td>
<td>-1.05e-03***(0.21e-03)</td>
<td>-4.53e-04 ** (2.30e-04)</td>
</tr>
<tr>
<td>Number of dependents</td>
<td>0.023</td>
<td>0.020</td>
<td>0.022</td>
<td>0.019</td>
</tr>
<tr>
<td>Primary degree</td>
<td>0.163</td>
<td>0.102</td>
<td>0.160</td>
<td>0.098</td>
</tr>
<tr>
<td>Same job for at least 24 months</td>
<td>0.440</td>
<td>0.417</td>
<td>0.452 ***</td>
<td>0.426 ***</td>
</tr>
<tr>
<td>Salaried</td>
<td>0.299</td>
<td>0.275</td>
<td>0.321</td>
<td>0.317</td>
</tr>
<tr>
<td>Ashanti</td>
<td>0.304</td>
<td>0.801 ***</td>
<td>0.087</td>
<td>0.608</td>
</tr>
<tr>
<td>Fon</td>
<td>-0.160 *</td>
<td>0.140</td>
<td>-0.149</td>
<td>0.165</td>
</tr>
<tr>
<td>Goun</td>
<td>-0.099</td>
<td>0.230 *</td>
<td>-0.101</td>
<td>0.241</td>
</tr>
<tr>
<td>Fulani</td>
<td>0.343 *</td>
<td>-0.339</td>
<td>0.336 *</td>
<td>-0.333</td>
</tr>
<tr>
<td>Popo</td>
<td>0.076</td>
<td>0.416</td>
<td>0.067</td>
<td>0.412</td>
</tr>
<tr>
<td>Vossa</td>
<td>-0.512 ***</td>
<td>-0.584 ***</td>
<td>-0.534 ***</td>
<td>-0.626 ***</td>
</tr>
<tr>
<td>Enagnon</td>
<td>-0.626 ***</td>
<td>-0.784 ***</td>
<td>-0.643 ***</td>
<td>-0.824 ***</td>
</tr>
<tr>
<td>Constant</td>
<td>-3.099 ***</td>
<td>-2.013 **</td>
<td>-3.115 ***</td>
<td>-1.403 ***</td>
</tr>
</tbody>
</table>

**Notes:**
- * indicates significance at the 0.10 level.
- ** indicates significance at the 0.05 level.
- *** indicates significance at the 0.01 level.
2nd step: monthly contribution

<table>
<thead>
<tr>
<th></th>
<th>5849.2 (3734.8)</th>
<th>97.5 (748.6)</th>
<th>390.8 (10651.9)</th>
<th>31.3 (879.7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>-5410.7 (4062.8)</td>
<td>17.4 (10408.7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female * Couple</td>
<td>1429.1 (1477.6)</td>
<td>-778.4 (4855.0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Individual income (1000 CFA)</td>
<td>59.5 ** (29.1)</td>
<td>63.8 *** (22.7)</td>
<td>65.1 *** (9.6)</td>
<td>68.3 *** (6.5)</td>
</tr>
<tr>
<td>(Individual income)^2</td>
<td>-6.29e-02***(1.82e-02)</td>
<td>-6.64e-02***(1.18e-02)</td>
<td>-6.64e-02***(4.60e-03)</td>
<td>-7.01e-02***(4.63e-03)</td>
</tr>
<tr>
<td>Female share of household income</td>
<td>4763.0 (12958.1)</td>
<td>(12958.1)</td>
<td>-631.1 (11694.4)</td>
<td></td>
</tr>
<tr>
<td>(Female share of household income)^2</td>
<td>780.5 (11896.2)</td>
<td>-618.6 (811.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>-1138.2 (1000.4)</td>
<td>-561.2 (705.9)</td>
<td>-1171.3 (972.5)</td>
<td>-618.6 (811.8)</td>
</tr>
<tr>
<td>(Age)^2</td>
<td>12.5 (10.8)</td>
<td>5.8 (7.6)</td>
<td>12.8 (10.2)</td>
<td>6.3 (8.5)</td>
</tr>
<tr>
<td>Number of dependents</td>
<td>-462.2 *** (58.1)</td>
<td>-389.1 ** (187.0)</td>
<td>-486.5 *** (123.3)</td>
<td>-389.6 * (225.1)</td>
</tr>
<tr>
<td>Same job for at least 24 months</td>
<td>-2257.3 (4055.5)</td>
<td>-2487.6 (4351.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ashanti</td>
<td>-5620.0 * (3194.1)</td>
<td>-7835.7 (6395.3)</td>
<td>-3445.8 *** (1027.3)</td>
<td>-6425.5 (4486.3)</td>
</tr>
<tr>
<td>Fon</td>
<td>543.4 (2345.3)</td>
<td>-3000.5 (4248.4)</td>
<td>644.4 (2260.0)</td>
<td>-2680.1 (4148.9)</td>
</tr>
<tr>
<td>Goun</td>
<td>540.2 (3512.1)</td>
<td>-1737.9 (2732.2)</td>
<td>664.5 (3326.2)</td>
<td>-1454.1 (3036.4)</td>
</tr>
<tr>
<td>Fulani</td>
<td>-4663.6 * (2469.4)</td>
<td>2249.3 (6071.5)</td>
<td>-4441.3 ** (2263.2)</td>
<td>3172.3 (6944.7)</td>
</tr>
<tr>
<td>Popo</td>
<td>-1062.4 (2151.0)</td>
<td>-2328.3 (5616.7)</td>
<td>-790.7 (1851.3)</td>
<td>-1843.6 (5151.7)</td>
</tr>
<tr>
<td>Vossa</td>
<td>7550.5 * (4319.5)</td>
<td>7374.1 * (4464.9)</td>
<td>7822.5 * (4632.1)</td>
<td>7645.3 (5060.2)</td>
</tr>
<tr>
<td>Enagnon</td>
<td>4669.8 (4839.6)</td>
<td>4488.0 (4944.3)</td>
<td>4820.1 (5065.3)</td>
<td>4671.9 (5394.1)</td>
</tr>
<tr>
<td>Constant</td>
<td>34408.7 (35056.6)</td>
<td>22467.4 (28108.6)</td>
<td>35114.8 (33722.2)</td>
<td>22680.5 (25633.7)</td>
</tr>
</tbody>
</table>

standard errors in parentheses,
*** significant at 1%, ** significant at 5%, * significant at 10%

Table 4: Heckman FIML.
As anticipated, rosca participation is quadratic in income. However the maximum is reached at a very high level of income indicating that for most of our sample the probability increases in income. Indeed only five individuals out of 1179 have a larger income than the maximum of this quadratic function. The income variable used in all our regressions is a measure of individual earned income including transfers. Our inverted-U shape prediction concerning age is also verified, the relationship begins to decrease after 46 years of age. This tends to confirm that demand for indivisible expenditures is increasing among young agents and decreases as they get older. The second part of Table 4 displays estimates with respect to monthly contributions. The dependent variable is the monthly equivalent of the total amount of CFA francs given to all the rosca in which a member participates. Regressors such as ethnic dummies and district fixed effect are overall non significant. Other personal characteristics: gender, age, job stability and female share of household income have no significant effect on contributions. Clearly from our four different regressions only three variables account for rosca contributions: income, income square and the number of dependents. These results are all intuitive knowing that both decisions of joining and contributing are independent as we show below. Once an individual has decided to join a group based on her characteristics, she will decide the amount to contribute according only to economic variables. Higher income would potentially lead an agent to save more and thus make larger contributions whereas a very wealthy agent would at some point turn to formal banking and reduce her rosca contribution. Conversely having more dependents will reduce savings for a given income and thus reduce payments made to rosca. Rosca contributions are quadratic in income, but the maximum value of its inverted-U shaped curve is this time larger than the highest income value of all rosca members. Income has thus an exclusively positive effect on contribution in our sample and this confirms our second conjecture. As income increases one individual in need of commitment will raise the total amount of her contribution. This result provides thus one additional argument in our advocacy of the need for commitment. However it does not allow us to discriminate between the different reasons underlying the need of a commitment device. Even if descriptive statistics and field evidence tend to show that individuals want to commit themselves to deal with self-control problems, we cannot rule out two alternative motives for committing: protection of savings against social pressure and risk of theft. We present these motives in details in the next section. Another simple explanation of this result could be that agents prefer different kinds of

\[\text{Note that 2005 estimates for the life expectancy at birth in Benin is 55 years. (Worldbank, 2007).}\]

\[\text{Monthly contributions will vary from one individual to another. They often have the choice among several rosca to choose from, each requiring a different contribution. Moreover individuals can decide to belong to several rosca, which is the case for only 6\% of all rosca members in our sample. Additionally a member can give multiple contributions in one rosca and thus receive the pot more than once during the same cycle. This is allowed in 25\% of the rosca in our sample.}\]
durable goods at different levels of income. However, with the exception of plot pur-
chase and house repair or building, there does not seem to be a clear income pattern
in the expenses made with the pot. Moreover, in general, across all the range of income,
people do not claim to have joined a rosca for buying specific durable goods.

Empirical results are in accordance with our rationale: secrecy and non-cooperation
allow spouses to make individual decisions concerning their expenditures net of public
good spending and hence to commit themselves according to their available revenues.
The decisions to join as well as to how much to contribute are undoubtedly individual.

On top of the FIML estimations we ran a test on the independence of residuals be-
tween both equations (the first and second step). The hypothesis that both equations
residuals are independent is not rejected with a p-value of 55% for the corresponding
statistic. This suggests that the decision to join a rosca and the amount one will con-
tribute in such a device are independent. This may be due to the definition of our
variable "monthly contribution" which is a monthly extrapolation of the sum of all the
contributions to rosicas. We believe that individuals have the choice among a few rosicas
in their neighbourhood and others known through colleagues, friends or relatives. After
this filter, the selection in this small set is likely to be made with respect to the amount
contributed. The optimal saved amount can then be reached by having several 'hands’
- paying several contributions - in the rosca or by joining other rosicas. Being familiar
with other members seems to be the predominant criterion in group selection. In our
sample, 68% of all rosca members indeed said that they had selected the group they are
in because they knew or had links with other members. The second most cited answer
to “why did you choose this specific rosca?” is because its president was known for well
managing the group (14%). Following in importance are answers related to the amount
of contribution (12%) and the strictness of the rules (10%). Once individuals have iden-
tified groups in which they are familiar with some or all members and likely to trust
them, they will join the one(s) more suitable to their saving preferences.

It can be argued that rosca participation can influence one’s income, not directly
since savings placed in a rosca bear no interest but indirectly through social connections
or others beneficial side effects and through returns on investment made with the pot.
About 26% of all 222 members answer that they experienced some extra economical
advantages by participating in a rosca: 18% say that fellow members prefer to buy at
their shop or doing business with them and 6% say that they have met their employer

\[^{42}\]Even if descriptive statistics do not allow us to capture this effect, we cannot exclude that agents buy-
ing a plot or building/repairing a house are in general wealthier than the rest of the members. In some
specifications of a multinomial logit with the pot uses as dependent variable, the income coefficient is
positive and significant for those making theses expenses. These estimates are however to be taken with
a pinch of salt given the possibility of multiple pot uses per member and the recoding of the dependent
variable. Actually, we had to aggregate in a single category the items rarely cited. Those who chose the
latter category are likely to be poorer than most of the members.
These answers tend to confirm that rosicas provide social connectedness and that they can bring additional advantages. However, measuring the importance of these side effects is practically impossible. To account for such potential benefits on income and thus endogeneity with respect to the probability of joining a group, we have carried out the same regressions as in Table 4 by replacing income with expenses on non-durable goods (mainly food and other weekly expenses such as gas for cooking, transportation, etc.). This way we proxy income by a variable which can be considered as independent of such extra benefits. Results from these regressions are similar to the ones we obtain and also confirm our two conjectures.

8 Alternative Explanations for Joining a Rosca

From the secrecy framework depicted before, one could imagine that rosicas are simply used to help spouses reduce their contribution to the provision of public goods. Once put in a rosca, money would not be available for the household’s needs. In this case, we would expect the probability of joining to increase with the expenses on public goods that the household has to face. The variable number of dependents is a good proxy for such public good expenses. This rationale is however not supported since this variable is never significant in all the regressions. Moreover, the variable ‘in couple’ is neither significant and therefore does not seem to drive the participation in rosicas. We do not entirely discard this motive for rosca participation but would rather think that people use this commitment device against self-control problems.

A significant proportion of members we interviewed, declared that it was impossible to save money if they were to leave it home (see also Anderson and Baland (2002)). Indeed, it would disappear in various expenses. Savings would quickly evaporate due to all sorts of social pressures and demands coming from the entire family, friends and neighbours. Ranging from financial help for a friend, payment for medicines for an uncle, to unexpected claims by children, financial help can be requested on a regular basis. Demands could as well come from the spouse and rosicas would help agents to commit against those claims, but the household budget structure and secrecy are such that this kind of claims is greatly reduced. By opting for a rosca, one opts for a socially accepted alibi to protect one’s savings against all types of social pressures (see Platteau 2000). In our sample, 20% of members mentioned that they joined a rosca for protecting their savings. That can mean two things that can not be discriminated: on the one hand, protection against potential income sharing and social pressure from relatives. But on the other hand, it can also mean protection against risks of theft, fire or other catastrophies which were also evoked during informal interviews. To reduce risks people would prefer not to save at home and put money out of reach in a rosca which would serve as a means to protect earnings against such adversity. Far from being the most
important answer explaining members’ participation, the fact that one out of five members emphasizes protection certainly gives credit to this alternative rationale. Moreover protection of savings is a motive for participation which also satisfies our second conjecture. Indeed, an individual facing a fixed probability of theft and an increasing demand from relatives in income can be strictly better off by joining a rosca at higher levels of income (Anderson et al. 2002).

Although our evidence leads us to think that people join a rosca to commit themselves to deal with self-control problems, we cannot rule out that their participation may be driven by the need to protect savings from social obligations or other hazards - theft, fire, etc.

9 Conclusion

Our empirical evidence shows that rosca participation is not a gender issue in Cotonou. Given secrecy and the household budget structure, each spouse retains the control over his/her spendings and therefore decides individually to join a rosca. This feature, probably pervasive in West Africa, should be taken into account before implementing policies designed to favour any gender participation.

Recent studies have emphasized that roscas can be used as a commitment device against two categories of potential threats. Individuals could indeed join roscas to protect themselves against external threats such as pressure from their spouse stemming from asymmetric preferences (Anderson and Baland, 2002) or social pressure (assistance to relatives or friends). Alternatively, agents could like to secure their income against internal threats such as temptation and present-biased preferences, both hindering their saving. Our investigations lead us to think that, in Cotonou, individuals participate in roscas to discipline themselves to save. Although no direct question diagnosing time inconsistent preferences was included in our survey, our body of evidence suggests that self-control problems are widespread and that people, living in the poor districts covered by our survey, value savings commitment mechanisms such as roscas. The willingness to discipline savings was indeed the most expressed motive for joining a rosca among members. Projects favouring the establishment of formal saving and commitment vehicles in Vossa and Enagnon, and certainly in other poor districts of Cotonou, would therefore most probably meet with success.
10 Appendix

10.1 Survey Methodology

We selected households according to a random process. In Enagnon we succeeded in obtaining a map of the city and performed a simple selection of a parcel according to an implemented random process. In these two districts it often happens that many households live on the same lot in semi-detached rooms. Enumerators selected one room on a lot according to a clock-wise selection 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 according to a specific direction was picked and then room selections were done in a similar fashion as in Enagnon. Overall only 3 households categorically refused to be surveyed and were replaced by other randomly selected households. Enumerators were asked to pass several times and at different moments of the day, until contacts were established in such a way that none of the selected household was 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. Other than that we analysed every completed questionnaire closely. Several appointments were held with each team of enumerators and in case of incoherence or lack of answers we regularly sent them back on the field. Questionnaires often needed successive rounds of checks until final approval. As mentioned above we emphasized the fact that the interview with every single household member had to be carried in his/her sole presence in order to get as precise and reliable information as possible. Fear of divulging information in front of other members would have led individuals to lie or to refuse to answer. On average our four teams of two enumerators completed two questionnaires a day. The taking account of intra-household secrecy greatly lengthened the survey by requiring specific appointments with each adult member. Another time consuming factor was the detailed part of our questionnaire concerning groups: we often needed more than an hour for a single group. We compensated every household for their precious time by donating 1500 francs CFA. Finally, with two previous missions, in 2002 and 2003, we carried out about eighty group interviews. We attended regular meetings or met members of their governing body in order to get a better understanding of their functioning.

10.2 Groups Functionings

Groups have different ways of coping with payment problems depending on if the member in default has received or not the pot already. Before reception one default on contribution would lead to the following sanctions: fine (40% of groups) and deduc-
tion of contribution from the pot upon reception (28%). Several defaulting payments before pot reception mean more important sanctions: 35% of groups would expel member with full reimbursement of contributions, 23% would charge him a fine and 16% would not allow the member to receive the pot and reimburse contributions at the end of the cycle. Once the pot is received sanctions are more stringent. For one defaulting payment: 47% of group charge a fine, 23% give an additional delay after public warnings and 17% seize a good of equivalent worth to the pot’s value. Several defaults after pot reception lead to: seizure (34%), call for police of chief of district (20%) or additional fine (16%). By comparing rules we found that 60% of all groups have more severe sanctions on members who had received the pot. We only gave here the most important means of sanctions and it is to be noted that a significant proportion of groups use more than one of those in combination. Sanctions do not only have a financial impact: a defaulting member will often feel ashamed by facing public warning or reprimands. This information will spread rapidly in the neighborhood and may prevent him from joining other groups in the district. Indeed, before accepting a new member, 82% of all groups carry an investigation on applicant’s social behavior (theft, act of violence, etc) and on previous memberships. Sanctions such as warnings and fines made publicly can thus have long lasting “social” impact by giving applicant a bad reputation. Moreover to prevent defaults three groups out of four require the applicant to be sponsored by a member. The sponsor being financially responsible for the new member if he were to default in the first cycle. Rules in 60% of groups impose that applicants must be known by at least one member to be accepted. The decision process varies and depends heavily on rosca’s structure: either the president decides alone (28%), the governing body (42%) or all members (30%). In order to check their trustworthiness and provide greater insurance against potential defaults, 20% of rosca place new members at the end of the cycle.

10.3 Definitions of Key Variables

*Live in couple:* Individual having a partner (married or not) who is member of the household. Those who were engaged in a couple for whom the spouse was not living in the household and for whom we did not have any data were not considered to live in couple.

*Salaried:* Individual is salaried if he/she receives a salary on a regular basis (either daily, weekly, bi-weekly, monthly, bi-monthly, etc) in the formal or informal sector. Only 12% of all individuals are salaried and there is an important gender difference: 22% of men are salaried and only 3% of women. Women are massively self-employed in our sample.

*Individual income:* Monthly sum for each individual of all income-generating activities including those from formal and informal sectors and those from self-employed
activities. It also included earnings from interest on loans made, rents on house or apartment and received transfers. In our overall sample only 10% work in the formal sector, being either employed privately or by the state.

Number of dependents: Total number of people within the household depending financially on either member of the head couple. It is thus the sum of children (aged less than sixteen years), young adults having no revenues or any other depending relatives. For example a member of the extended family moving in the household and relying on its members for a living is counted as such.

Job length: Indicates that one individual has had his/her present principal income generating activity for at least twenty four months.

Primary degree: Indicates that one individual has completed primary school.

Individual share in couple income: Each individual’s income divided by the sum of both spouses’income.

Expenditures: Monthly extrapolations from the sum of all expenditures made on non durable goods during one week. It includes 1) all expenditures on food (including expenses on heating and cooking such as coal or gas) and 2) luxury expenditures such as cigarettes, alcohol, eating and drinking in hotels and restaurants.

References


