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Roscas as Financial Agreements to Cope with Social Pressure

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Stefan Ambec[*] and Nicolas Treich[**]

Abstract

In developing countries, traditional social obligations often press rich individuals to share their income. In this paper, we posit a "model of social pressure" in which people can sign binding financial agreements amongst themselves, thereby forming coalitions. These financial agreements may help them to alleviate their social obligations with respect to income sharing. In the above context, we show that there exists a stable structure of coalitions in which people form rotating savings and credit associations (roscas). We therefore provide a rationale for one of the most prevalent and puzzling financial institutions.

Keywords: Roscas, Social pressure, Stability, Contract, Credit

JEL Classification: D14, G29, O17

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1 Introduction

Rotating savings and credit associations (roscas) are one of the most prevalent forms of informal financial institution in developing countries. The basic principle of roscas is almost the same everywhere.[1] A group of people gather for a series of meetings. At each meeting, everybody contributes to a common pot. The pot is given to only one member of the group. This member is then excluded from receiving the pot in future meetings, while still contributing to the pot. This process is repeated until every member receives the pot. Afterwards, the rosca is disbanded or begins another cycle. The pot may be allocated randomly *(random roscas)*, through a bidding process *(bidding roscas)* or according to pre-determined order *(deterministic roscas).* In the last case, while the original allocation order might have been chosen randomly, the order of the winners is repeated throughout the cycles.

Roscas are very specific types of agreements. They stipulate a constant contribution to be paid at regular dates and with an equal lump-sum transfer to be received randomly in the future. Despite the high degree of specificity of these financial agreements, roscas exist in most developing countries, in at least three continents (Africa, Asia, Latin America) and within very different populations. In some of these countries, they mobilize a significant proportion of the national savings.[2] Roscas' specificities thus probably respond in some way to the needs of the population living in these countries. Given the long-standing and worldwide prevalence of roscas, a natural presumption is that roscas constitute the best financial agreements for their members within the economic environment and to the social context of these countries. However, there has been no support to this presumption in the economic literature.[3]

This paper tries to fill this gap. It argues that a rosca is a suitable financial agreement in an economy where there are strong social norms for redistribution and solidarity. More precisely, we consider an economy where rich individuals are pressed to share their income, e.g. in order to support their poorer relatives. In such an economy, rich individuals may thus be willing to find a device that may help them to alleviate this form of

[1]Ardener (1964) proposed the following definition for a rosca: *"An association 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".*

[2]See, for example, Bouman (1977) for a list of countries in Africa, Asia, South America, Caribbean, where roscas exist. Bouman (1995) reports membership rates between 50% and 95% of the adult population in several African countries. In Cameroon, he mentions that roscas drives about one-half of national savings.

[3]Besley, Coate and Loury (1994) have shown that a random rosca is sometimes better than organizing a credit market. But they agree that roscas are in general inefficient, implying that people can be better-off be designing a Pareto-superior financial agreement.

social pressure. We show that a rosca then precisely provides these individuals with such a device. The basic idea is that individuals belonging to a rosca commit to give money in the future to other rosca's members. As a result, participating in a rosca reduces their future available income, and thus, reduces their future vulnerability to social pressure. In Platteau (2000, p. 231)'s words: *"[Roscas] provide a socially accepted alibi to protect people's saving against all sorts of social pressures"*.[4]

Until now, the literature has mainly investigated two other justifications for the existence of roscas. First, roscas may be viewed as a substitute to insurance, particularly in developing countries where markets for insurance either do not exist or do not function well. Yet, this interpretation applies only to bidding roscas (e.g. Calomiris and Rajaraman, 1998), in which the allocation process responds to some individual specific shocks, but not for random or deterministic roscas.[5]

Second, and most notably, roscas may facilitate the purchase of lumpy durable goods. In their seminal contribution, Besley, Coate and Loury (1993) show that, on average, roscas allow individuals to buy the desired lumpy goods sooner in their lifetime than by accumulating private savings.[6] [7]

There has been recently a renewed interest in the durable good hypothesis. Anderson and Baland (2002), relies on intra-household conflicts in consumption decisions. Participation in a rosca is a strategy a wife would employ to protect against husband's tendencies to splurge. Rosca is thus a commitment device that will permit the household to purchase the durable good. Their result relies on the assumption that the wife has control over the household revenue during the first period, and both the wife and

[4]Similarly, Belsey (1995, p.117) states that the "*anthropological literature makes clear the importance of social constraints that can make saving unattractive. Certain familial obligations can be difficult to resist, so that part of any stock of savings may be paid as a transfer.*"

[5]In addition, people that group together in a rosca generally belong to the same village and have similar occupations and revenues. For instance, Besley, Coate and Loury (1994) mention that the typical scenario is a group of individuals who work in the same office block or belong to the same community. This strong homogeneity is not really compatible with risk-sharing activities.

[6]Observe that this interpretation applies for random roscas but not for deterministic roscas whereby, at least after one full cycle, there is no randomness in receiving the pot. Indeed, the member who receives the pot last could do as well by privately accumulating savings, while not suffering from the lack of flexibility terms of his contribution. This member is thus worse-off. By backward induction, the rosca should break down.

[7]Recently, Gugerty (2000) found empirical evidences from Western Kenya against the lumpy durable good explanation. She mentions that, in her survey, *"over half of roscas participants use their rosca winning for more than one purpose, and one fifth use their winning for more than two purposes."*. Furthermore, in the same study, many roscas' participants indicate that they do not necessarily prefer to receive the pot sooner than later.

the husband share the control in all the subsequent periods. Gugerty (2000) relies on intra-personal time-inconsistency. Using a simple illustrative example, she shows, as in Anderson and Baland (2002), that participating in a rosca helps individuals to commit to the purchase of the durable good.

Summing up, the present paper displays two distinguishing features with respect to the main literature on roscas. First, our model does not include any insurance motive nor any durable good, but captures a well-documented phenomenon of social pressure. We show that this phenomenon may provide a new justification for the existence of a rosca. Second, we do not simply show that people are better-off if they save in a rosca rather than at home. We compare revenues from roscas to revenues from *any other kind of financial agreements* that can be designed among a group of people. More precisely, we allow for any random transfers to be carried out among individuals. We consider a model where individuals form coalitions. We impose the constraint that the coalition structure should be stable in the precise sense that no group of individuals has any incentives to deviate by designing and implementing another financial agreement. We then show that random or deterministic roscas (with a random first round) form a stable set of coalitions.

This result relies on two key assumptions. First, as we mentioned above, there exist social obligations imposing income sharing. People are pressed to distribute a part of their income, e.g., to assist their relatives. This assumption is supported by anthropological works which emphasize the importance of such a social norm in traditional societies. Among others, Scott (1976) highlights the strength of ethical principles like the right to subsistence, or moral values emphasizing solidarity and compassion. As argued by Fafchamps, (1995), this creates internalized moral sanctions for those who deviate from the social code and some rewards for those who comply with it.[8] In our model, this assistance will take the form of an indivisible gift donated to the community.[9]

[8]These sanctions and gratifications may be enforced through external pressure within the community. For instance, people may publicly disapprove those who accumulate wealth without sharing it within the community (see James 1979 , Platteau 1996). On the other hand, the community may reward generous donors during social events which may take the form of social prestige for instance (see Parkin, 1972, regarding the rules of ceremonies in which donors are thanked).

[9]The idea is that social pressure is exerted as long as some expected contribution is not paid. These gifts are often paid during social events (e.g. Parkin, 1972,). People can either make no gifts or make the customary gift in its entirety, suggesting that there are indivisibilities with respect to offerings. For instance, in West Africa, during the traditional muslim feast called "Tabaski", each adult male, head of a household, is supposed to sacrifice a sheep and share the meat with relatives, neighbors and poor members of the community. The individual derives social gratification from killing the "biggest sheep" in his herd and supposedly derives no gratification form offering half or a quarter of a sheep (personal

The second assumption is that the social gratification derived by the person who offers the gift has no "anticipated value". We actually model social gratification as a pure emotional response. The idea is that individuals would prefer not to give, but, when then they face social pressure, they feel guilty if they do not give. At the same time, they enjoy acknowledgements, or tokens of affections if they do so. Social gratification or social sanction gives rise to emotions such as guilt, shame or pride. Such emotions are modelled as *temporary preferences* consistently with Elster (1998).[10] Our approach is related to present-biased preferences (Akerlof, 1991, O'Donoghue and Rabin, 1999). It thus relies on time-inconsistency, as in Gugerty (2000) or Anderson and Baland (2002). Yet, the source of time-inconsistency is different in our model. It is not due to intra-personal or intra-household conflicts but to social pressures, e.g. conflicts with relatives. In other words, we assume that individuals cannot resist day-to-day social pressure. Yet, the key point is that, ex ante, they are willing to find a device to restrain future over-spending in social obligations.

The rest of the paper proceeds as follow. Section 2 presents our model of social pressure. Sections 3 and 4 characterizes the stable financial agreement in a static framework. Section 5 extends for dynamic agreements and show that roscas are stable financial agreements. Some empirical implications of our theoretical analysis are discussed in Section 6. Section 7 concludes the paper. All proofs are relegated to the Appendix.

2 The Model of Social Pressure

Consider an economy with an infinity number of individuals $i \in \mathbb{N}$ living for several periods indexed by t. In each period, individual i earns a revenue y_i and furthermore, he is asked to contribute an amount m_i to the community. For any individual, giving m_i to the community provides him with a nonpecuniary social gratification $\delta_i > 0$. The individual gets no gratification ($\delta_i = 0$) if he gives less than m_i; and no extra gratification if he gives more than m_i. Utility of pure consumption is denoted $u_i(.)$. In such a simple model, it is optimal for the individual to spend m_i if and only if[11]

$$u_i(y_i - m_i) + \delta_i > u_i(y_i). \tag{1}$$

observation).

[10] Elster writes (1998, page 70): "*Some of the remarks I made about shame and guilt suggest that emotions could be modelled as temporary preferences. The person who sees a beggar in the street and feels an urge to give him money, or the person who is in the grip of shame and feels an urge to kill himself, may be viewed as undergoing a short-term change of preferences. It is in fact an important feature of many occurrent emotions that they have relatively short duration*".

[11] Notice that δ_i can also be interpreted as a social sanction from not fulfilling traditional solidarity obligations. In this case, it appears as a negative term in the right-hand side of the inequality.

We assume that $u_i(.)$ is increasing and concave. In words, this means that poorer people attach relatively less value to social gratification with respect to immediate consumption. Let y_i be high enough so that 1 holds.

Importantly, we assume that, from an ex ante point of view, δ_i has no value. Hence, viewed from period $t-1$ and before, it will never be optimal to spend money in period t since:

$$u_i(y_i - m_i) < u_i(y_i). \tag{2}$$

However the individual anticipates that, at time t, inequality 1 will apply and it will then turn out to be optimal to spend money m_i. In other words, we consider time-inconsistent sophisticated individuals (Akerlof, 1991, O'Donoghue and Rabin, 1999). At every period, the individual cannot resist to giving m_i. Yet, he knows this in advance and would want to be able to resist to it.

Note that, under concavity, there exists a unique revenue $\underline{y}_i$ that makes an agent indifferent between giving m_i or not:

$$u_i(\underline{y}_i - m_i) + \delta_i = u_i(\underline{y}_i). \tag{3}$$

Clearly, $\underline{y}_i$ exists and is unique because the marginal gain of renouncing to δ_i, $u_i(y) - u_i(y - m_i)$, is decreasing with y. To summarize, for any $y \in \mathbb{R}^+$, one can define an agent *ex ante utility* by:

$$v_i(y) = \begin{cases} u_i(y - m_i) & if \quad y > \underline{y}_i \\ u_i(y) & if \quad y \leq \underline{y}_i \end{cases}. \tag{4}$$

This function is given by the thick line in Figure 1 shown below.

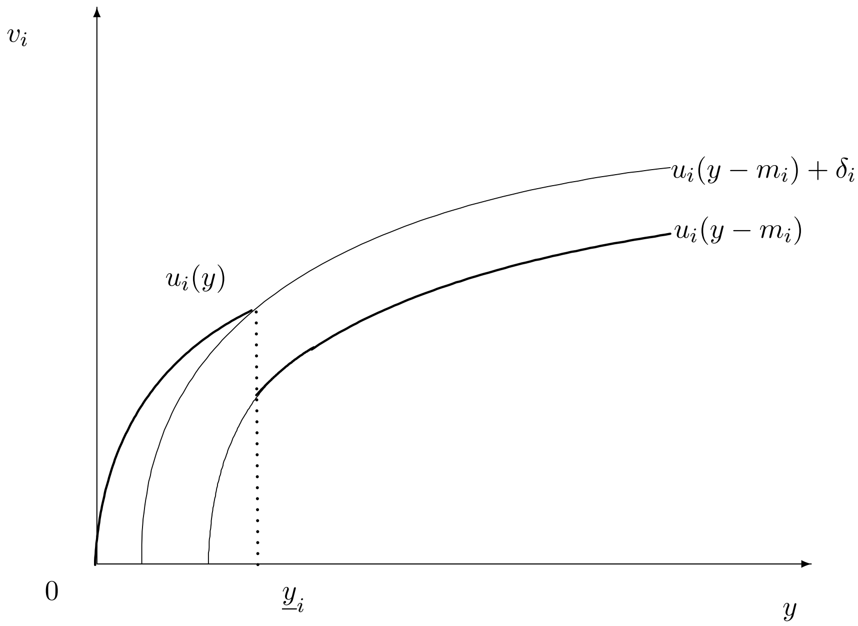

Figure 1: Ex ante utility function

Notice that there is a downward jump in the ex ante utility function, thereby generating a non-concavity. This implies that people could be better off by randomizing their revenue by playing lotteries.

3 Efficient Lotteries

In this section, we examine the lottery that an individual i would like to play. Let us first define a lottery.

Definition 1 *A lottery $\mathcal{L}_i = (K, p, T_i)$ is defined by:*

- *A set of states of nature $K = \{1, ..., k\}$.*
- *A probability measure p on K where $p(l)$ denotes the probability of state l for any $l \in K$.*
- *A set of transfers $T_i = \{t_i^l\}_{l \in K}$ where t_i^l denotes the transfer assigned in state l.*

Notice that, in this definition, we choose to map the probability measure p on states of nature rather than directly on transfers. If individual i accepts lottery $\mathcal{L}_i$, he gets (expected) payoff:

$$U_i(\mathcal{L}_i) = \sum_{l \in K} p(l) v_i(y_i + t_i^l). \tag{5}$$

Now, we need to introduce a measure for the total transfers that individual i expect to receive, or what we will call the "cost" of a lottery. The cost of a lottery is equal to the sum of the transfers associated with it.

Definition 2 *The cost x_i of a lottery $\mathcal{L}_i$ is $x_i \equiv \sum_{l \in K} p(l) t_i^l$.*

An efficient lottery then maximizes i's expected utility (as defined in 5) for a given cost x_i. In Lemma 1, we characterize the transfers of such an efficient lottery.

Lemma 1 *Any efficient lottery assigned to an individual i randomizes between two transfers $-\underline{t}_i = \underline{y}_i - y_i$ and $\bar{t}_i$ such that*

$$\frac{u_i(y_i - m_i + \bar{t}_i) - u_i(y_i - \underline{t}_i)}{\bar{t}_i + \underline{t}_i} = u_i'(y_i - m_i + \bar{t}_i). \tag{6}$$

A graphical analysis can be useful to understand the intuition leading to Lemma 1. An arbitrary lottery $\mathcal{L}_i$ is depicted in Figure 1. The outcome of any draw is an ex post revenue $y_i + t_i^l$ which translates into ex ante utility $v_i(y_i + t_i^l)$. Graphically, it is a point on v_i. The set of expected utilities that can be achieved is the convex hull of $v_i(y_i + t_i^l)$ for every $t_i^l \in T_i$. It can be represented by drawing lines linking points $(y_i + t_i^l, v_i(y_i + t_i^l))$ for every $t_i^l \in T_i$. A probability measure p defines an unique point in this set. Or, put differently, any point in this set can be achieved with the right probability measure.

The lottery $\mathcal{L}_i^*$ randomizes between transfers $-\underline{t}_i$ and $\bar{t}_i$ yielding ex post revenues $\underline{y}_i \equiv y_i - \underline{t}_i$ and $\bar{y}_i \equiv y_i + \bar{t}_i$. These two outcomes are represented by points A and B in Figure 2.[12]

[12]Notice that equation 6 states that at point B with coordinates $(\bar{y}_i, v_i(\bar{y}_i))$, the line starting from A with coordinates $(\bar{y}_i, v_i(\bar{y}_i))$ is tangent to the utility function.

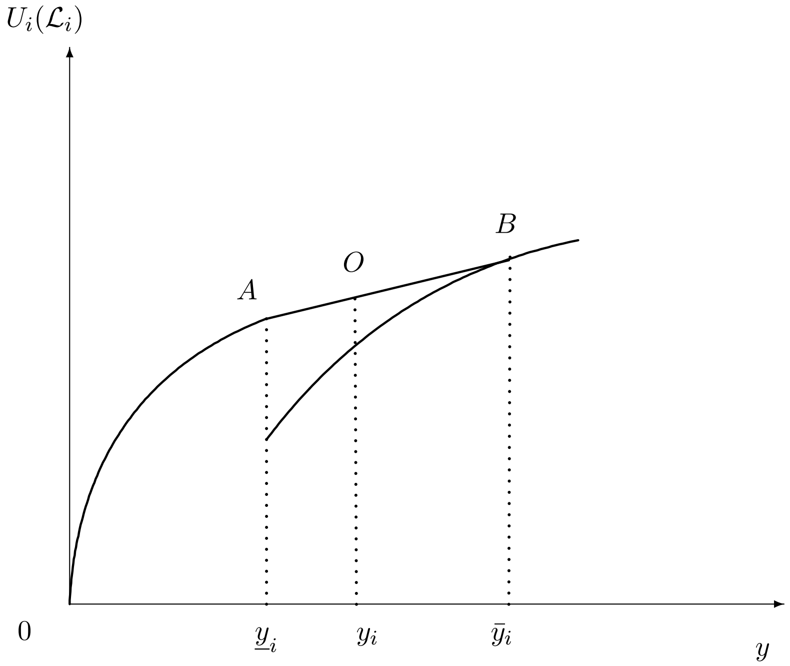

Figure 2: Upper Bound on Expected Utility Levels

Clearly, it is welfare improving for any individual whose revenue y_i lies between $\underline{y}_i$ and $\bar{y}_i$. But it also dominates any other lottery which, indeed, would yield an expected payoff strictly below the line AB. In particular, including transfers in addition to $\underline{t}_i$ and $\bar{t}_i$ yields an expected payoff strictly below AB. This remains true for any transfer other than $\underline{t}_i$ or $\bar{t}_i$. To sum-up, in Figure 2, the upper envelope of the graph represents an upper bound on agent i's expected payoff that can be achieved with lotteries. Denoting μ (resp. $1-\mu$) the probability to pay $-\underline{t}_i$ (resp. to receive $\bar{t}_i$), the efficient lottery $\mathcal{L}_i^*$ yields to individual i an expected payoff

$$U_i(\mathcal{L}_i^*) = \mu u(\underline{y}_i) + (1-\mu)u(\bar{y}_i - m_i), \tag{7}$$

located along the line AB. In the next section, we show that stability picks up a single lottery among the efficient lotteries, one point in this upper envelope.

4 Static Analysis

We now turn to the design of financial agreements. As a first step, we restrict our attention to a static framework. At the beginning of the period (say at date 0) people may sign financial agreements. After this contracting stage, an equilibrium structure of financial agreement emerges in the economy. Then agreements are carried out. Each agent performs transfers as specified in the contract and then either gives m_i or nothing, depending on his remaining wealth after transfers.

We need to introduce more definitions. First, let us first formally define what we call a "financial agreement" (FA). In short, a FA is a contract among a group of agents assigning payments among them (including random payments). It is assumed binding: people cannot default (or at infinite cost). The random procedure (if any) and payment structure are freely chosen by agents so that no restrictions are imposed on the space of contracts. Formally, a FA is defined as follows.

Definition 3 *A financial agreement $\mathcal{C}_j = (N_j, \{\mathcal{L}_i\}_{i \in N_j})$ is defined by:*

- *A set of agents $N_j \subset \mathbb{N}$*
- *A set of lotteries $\{\mathcal{L}_i\}_{i \in N_j} = \{(K_j, p_j, T_i)\}_{i \in N_j}$ with common set of states of nature $K_j = \{1, ..., k_j\}$ and probability measure p_j on K_j.*
- *Lotteries are budget-balanced state-by-state: $\sum_{i \in N_j} t_i^l \leq 0$ in each state of nature $l \in K_j$.*

In words, a financial agreement defines a group of members N_j who perform random transfers or lotteries $\{\mathcal{L}_i\}_{i \in N_j} = (K_j, p_j, T_i)$ amongst themselves, which are budget balanced in each draw.

Because transfers are budget balanced state-by-states, costs x_i must sum-up to zero within any FA:

$$\sum_{i \in N_j} x_i = \sum_{l \in K_j} p_j(l) \sum_{i \in N_j} t_i^l = 0 \tag{8}$$

We now turn to our definition of stability. Denote $\mathbf{C} = \{\mathcal{C}_j\}_{j \in \mathbb{N}}$ a structure of financial agreements (SFA). We ask it to be stable in the sense defined below.

Definition 4 *A structure of financial agreements $\mathbf{C}^* = \{\mathcal{C}_j^*\}_{j \in \mathbb{N}} = \{(N_j^*, \{\mathcal{L}_i^*\}_{i \in N_j^*})\}_{j \in \mathbb{N}}$ is <u>stable</u> if, no other FA $\mathcal{C}_j' = (S, \{\mathcal{L}_i'\}_{i \in S})$ is such that*

- *$U_i(\mathcal{L}_i') \geq U_i(\mathcal{L}_i^*)$ for every $i \in S$.*
- *$U_h(\mathcal{L}_h') > U_h(\mathcal{L}_h^*)$ for at least one $h \in S$.*

A SFA is stable if no any group of agent can be better-off by designing another FA. When it is not the case, this group would deviate and agree on their own FA. Notice that stability implies that the lotteries part of a FA are efficient. Thus, Lemma 1 which characterizes efficient lotteries applies. We examine now the implication of stability for these efficient lotteries.

Lemma 2 *A stable SFA includes only zero cost lotteries.*

Lemma 2 states that no individual subsidizes other people by playing a negative cost lottery. If it was the case, such an individual would be better off by forming another FA in which he plays a zero cost efficient lottery. Formally, Lemma 2 imposes the following restriction on the probability distribution (summarized by μ_i):

$$\mu_i \underline{t}_i = (1 - \mu_i)\bar{t}_i \tag{9}$$

We have established that the highest payoff that any arbitrary agent can achieve in a stable structure of FAs is:

$$U_i(\mathcal{L}_i^*) = \mu_i u_i(y_i - \underline{t}_i) + (1 - \mu_i)u_i(y_i - m_i + \bar{t}_i), \tag{10}$$

where $\underline{t}_i \equiv y_i - \underline{y}_i$, $\bar{t}_i$ and μ_i are defined respectively by 3, 6 and 9. This payoff can be achieved by forming a *one-period rosca* of size $n_i = \frac{1}{1-\mu_i}$ (provided that it is an integer) and contribution $\underline{t}_i$ with other people with identical needs for $\underline{t}_i$ and $\bar{t}_i$. The pot is $\bar{t}_i = \frac{\mu_i}{1-\mu_i}\underline{t}_i$. When $\frac{1}{1-\mu_i}$ is not an integer, this one-period rosca of size given by either the smallest integer larger than $\frac{1}{1-\mu_i}$, or the largest integer smaller than $\frac{1}{1-\mu_i}$ approximates this highest an expected payoff. It yields an expected utility level of

$$U_i(\mathcal{L}_i^*) = \frac{n_i - 1}{n_i} u_i(y_i - \underline{t}_i) + \frac{1}{n_i} u_i(y_i - m_i + (1 - n_i)\underline{t}_i), \tag{11}$$

located at point O in Figure 2. We now turn to the multi-period problem.

5 Multi-Period Model

This section will extend previous results to a multi-periodic framework. To simplify, we assume that every individual lives for an infinity of periods and values time according to a discount factor β. Before any transfer, preferences of individual i at date 0 are thus simply

$$\sum_{t=1}^{\infty} \beta^t v_i(y_i).$$

As before, any individual can design and sign binding financial agreements with the other individuals.

Let us now compute the intertemporal utility of an individual i who belongs to a n_i persons rosca. First, when he joins the rosca, either a random rosca or a deterministic one, he does not know in which period he will have the pot.[13] Moreover, this individual knows that if he wins the pot in some period then he will be excluded from the draw in the subsequent periods during a cycle. So, each cycle, he is sure to get the pot exactly once. There is thus a probability $\frac{1}{n_i}$ that he will have the pot at date h for each date of the cycle. In this case, his payoff will be $v_i(y_i + (n_i - 1)\underline{t}_i) = u_i(y_i - m_i + (n_i - 1)\underline{t}_i)$ in period h and $u_i(y_i - \underline{t}_i)$ in the other periods $t = 1, ..., n_i, t \neq h$. Hence, the intertemporal utility at date 0 for the first cycle of any member i of the rosca is simply,

$$\sum_{h=1}^{n_i} \frac{1}{n_i}[\sum_{t \neq h} \beta^t u_i(y_i - \underline{t}_i) + \beta^h u_i(y_i - m_i + (n_i - 1)\underline{t}_i)]. \tag{12}$$

This simplifies to

$$\sum_{t=1}^{n_i} \beta^t [\frac{n_i - 1}{n_i} u_i(y_i - \underline{t}_i) + \frac{1}{n_i} u_i(y_i - m_i + (n_i - 1)\underline{t}_i)]. \tag{13}$$

Since, viewed from date 0, the expected outcome of all cycles are identical, the extension to an infinity of periods is straightforward. The payoff at date 0 of any member of the rosca of an infinity of periods is thus equal to

$$\sum_{t=1}^{\infty} \beta^t \{\frac{n_i - 1}{n_i} u(y_i - \underline{t}_i) + \frac{1}{n_i} u(y_i - m_i + (n_i - 1)\underline{t}_i)\}. \tag{14}$$

Observe now that this last expression is the exact multi-periodic extension of the static expression 11 obtained in the previous section. Hence, any individual may get the same expected utility by forming a rosca as by playing efficient lotteries identically in each period. Nevertheless, this does not mean that a rosca is an efficient lottery over the space of all possible lotteries. Indeed, one needs to consider the space of all "dynamic lotteries", not only the space of static ones. Typically, a rosca is not a static lottery since the probability that an individual gets the pot depends on previous draws. The next theorem, formally proved in Appendix C, extends previous results for such dynamic lotteries.

Theorem *A structure of financial agreement composed by random roscas and/or deterministic roscas (with random initial ordering) is stable.*

[13]We consider deterministic roscas with random initial ordering. Observe that the only difference between random and deterministic roscas is that with deterministic rosca the order is the same in all cycles. Yet, this difference does not matter under expected utility preferences.

The above theorem establishes that roscas are stable financial contracts. The proof is similar to the one derived in the static framework. It proceeds in two steps. First, we show that Lemma 1 applies so that i' efficient lottery randomizes between only two transfers, $\underline{t}_i$ and $\bar{t}_i$, at any date t. Second, we show that any group of agent cannot improve their gain by deviating from a SFA composed by roscas.

So, why is a rosca efficient in our model? The intuition obviously rests on the existence of social pressure. We have represented an economy where an individual is tempted to give m when he is rich enough. An helpful financial agreement reduces this individual's future available income in order to make him poor enough so that he will not be anymore inclined to give m. This may be done by paying a fixed contribution t committed in advance at regular dates. However, this contribution t should not be a pure loss of course. As there are an infinite number of contributors in the economy, people with the same contributions t pool together in a group.[14] The sum of contributions of the group is then collected and redistributed to only one member of the group. Only this latter individual thus has to pay the social gift m.[15] One understands then why roscas are stable efficient agreements and thus efficient for their members.[16] Indeed a rosca minimizes in every period the social gift of the groups' members while everybody in the group will receive back at some point the total of his own contributions.

6 Simple Theoretical Predictions

This theoretical result raises the question of whether there is some empirical support for our model. Since key parameters such as the individual social gratification δ_i are unobservable, there is little hope of getting any direct empirical support to our model. An indirect way is thus to derive some theoretical implications.

To make it simple, recall Figure 2. Observe that any individual with a revenue below $\underline{y}_i$ or above $\bar{y}_i$ will not participate in a rosca. The idea is that poor individuals do

[14] The assumption that there is an infinite number of people in the economy is thus an important simplifying assumption. If it was not the case, the financial agreement would compromise to account for member's heterogeneous contributions. This may explain for instance the existence of roscas with variable contribution documented by Henry et al. (1990) in the case of Cameroon.

[15] Observe that our result does not explain why winners are excluded of the pot in the subsequent periods. So, why is it the case? Without excluding winners, observe that ex post inequality will be higher, as some individuals may receive the pot several times while other individuals may not receive the pot at all. Roscas thus minimize wealth inequality of each draw, which is a nice fairness property. This property is not captured in our expected utility framework.

[16] Recalls that the population facing social pressure constitute a sub-population of the economy. Therefore, even if Roscas are optimal within this population, there are generally not for the whole economy.

not face social pressure, thus they do not have any interest in participating to a rosca. Conversely, very rich individuals would have to pay a very high contribution in order to escape social pressure. As a result, it is too costly for them to participate in a rosca.

Moreover, notice that any individual with initial revenue $y_i \in [\underline{y}_i, \bar{y}_i]$ increases his expected utility (corresponding to point O on Figure 2) if he participates to a rosca. To do so, he must form a rosca with people who have the same needs for transfers, i.e., a rosca where the contribution is $\underline{t}_i = y_i - \underline{y}_i$ and where the received transfer is $\bar{t}_i = \bar{y}_i - y_i$. Also, the budget constraint implies that he will form a rosca with n_i persons where

$$n_i = \frac{\underline{t}_i + \bar{t}_i}{\underline{t}_i}.$$

From these observations, we can easily derive three clear-cut predictions:

- #1 Average-income individuals are more likely to belong to a rosca compared to very poor or very rich people;
- #2 Within roscas, members are homogeneous and, across roscas, the contribution increases with the revenue of members;
- #3 When the contribution is relatively larger, the size of the group is relatively lower.

Several empirical studies support these predictions. First, Anderson et al. (2002) provide some support to prediction #1. They interviewed people living in a poor slum in Kenya. They showed that roscas' participants in that slum are more likely to have a higher income, be employed as permanent workers and have lived longer in the slum under study. Intuitively, people with higher incomes, with a steady job or those who have lived longer in the area are more likely to be subject to social pressures. Hence, they are more likely to be willing to participate in a roscas. Along the same line, Levenson and Besley (1996) provide evidences that participation is higher among high-income households in Taiwan. Note that these observations are quite puzzling with respect to the durable good hypothesis. Indeed, higher income people and permanent workers within a slum should in principle have more facilities to finance a durable good by their own means. Hence, they should be less likely to rely on roscas as compared to poorer people and non-permanent workers living in the same slum.

Furthermore, Handa and Kirton's (1999) empirical results from Jamaica seem to be quite consistent with our prediction as well. Firstly, they found that there is high homogeneity among roscas' members (see #2). This finding is consistent as well with other studies such as the one on Gambia by Nagarajan, Meyer and Graham (1999).[17] Secondly, Handa and Kirton indicate that there are two main broad categories of roscas in their panel. The first and most common type is a rosca with many members and with a small contribution. The second and less frequent type of roscas has fewer and richer members, meets at longer intervals and has a larger size of contribution. These last findings are thus consistent with our prediction #3, together with the second part of #2. The underlying economic idea is that, other things equal, individuals with low (large) revenues will need a low (large) contribution to cope with social pressures, namely to reduce appropriately their available income. Besides, they need more (less) contributing members in order to get the desired pot.

7 Conclusion

Understanding the rationale underlying informal institutions in developing countries is one of the main challenges of development economics. Among these informal institutions, roscas are one of the more common and puzzling. Since the paper by Besley, Coate and Loury (1993), the economic literature has been almost exclusively developed under the durable good hypothesis. This hypothesis claims that people participate to roscas in order to facilitate the purchase of a indivisible durable good.

We believe that this hypothesis is unsatisfactory, or at least incomplete. In particular, it seems that there may exist various justifications for the existence of roscas. For instance, self-reported reasons for joining roscas (Anderson and al. 2002, Gugerty, 2000, Henry et al. 1990) often indicate that members view roscas as a mean through which they bind themselves to a particular savings rate.[18] In this paper, we have introduced an hypothesis which may explain this phenomenon. We have assumed that people face an external social pressure to share their income. Roscas may then be viewed as a commitment device that may help them to resist sharing obligations. Furthermore, the theoretical literature on roscas has never fully rationalized the existence of rosca, as it

[17]Nagarajan, Meyer and Graham (1999) study a rosca called "osusu". They indicate that: "*While three-fourths of the sampled osusus were composed of occupationally homogenous members, about two-thirds were composed of members homogenous in age or gender. About half of the sampled osusus were simultaneously homogenous in gender, age and employment type.*"

[18]Examples abound: *"You can't save alone-it is easy to misuse money"*, *"Sitting with other members helps you to save"*, *"It is difficult to keep money at home as demands are high"* (Gugerty, 2000); *"The rosca forces you to save"* (Henry et al.; 1990, our translation), *"Joining a merry-go-round* [i.e., a local rosca] *is the only way to save some money. If I leave it at home, it will disappear"* (Anderson and Baland, 2002).

has not explained why this exact form of financial contracts emerges.[19] Here, we have shown that, within a population composed of individuals facing social pressure, roscas are stable financial agreements.

To conclude, a word is maybe required on the compatibility between our hypothesis regarding social pressure and the durable good hypothesis. Interestingly, Gugerty (2000) provides evidence on both, e.g., that roscas' members can sometimes force the winner of the pot to spend his money on a durable good. Our result is obviously consistent with this finding as well since we have not made any assumption concerning the use of the pot. Moreover, it is easy to understand that people facing social pressure would probably benefit even more from joining a rosca if the pot is explicitly devoted to the purchase of a durable good. The idea is that the ex ante desirability of a lottery stems from the non-convexity of preferences created by the indivisibility of the social gift. Consequently, the additional presence of an indivisible durable would create another source of non-convexity in preferences. It will thus make probably even stronger the need for randomization in the financial agreements. Another important idea is that if the pot is used to buy a durable good, then it can not be divided among relatives. As a result, individuals can resist more easily to social pressure after they have received the pot.

[19] As recognized for instance by Besley, Coate and Loury (1994): *"Roscas do not, in general, produce efficient allocations. Their simple structure allows less flexibility in the rate of accumulation of the indivisible good than is necessary to achieve maximal gains from trade"*. This paper obtains a very contrasting result. Indeed, since roscas are stable financial agreements, they produce efficient allocations within the population facing social pressure. This population is, of course, just a sub-population of the economy.

A Proof of Lemma 1

Consider an efficient lottery $\mathcal{L}_i^* = (K^*, p^*, T_i^*)$ for a given cost x_i. Let us partition any arbitrary set of transfers $T_i = \{t_i^l\}$ into two subsets $T_{i-} = \{t_i^l \in T_i | t_i^l \leq -\underline{t}_i\}$ and $T_{i+} = \{t_i^l \in T_i | t_i^l > -\underline{t}_i\}$. The proof proceeds in four steps. First, we show that i's utility is higher when receiving a positive transfer. Second, we prove that if an agent has to give money to escape social pressure, then he will give the minimum transfer $-\underline{t}_i$. Any increase in the transfer reduces consumption smoothing. Thirdly, we establish that, due to consumption smoothing, all transfers higher than $\underline{t}_i$ must be the same, equal to $\underline{t}_i$. Putting it differently, when escaping social obligation, i prefers to receive the same amount. Lastly, we derive the first order condition defining $\bar{t}_i$.

Step 1: $u_i(y_i + t_i^{k*}) < u_i(y_i - m_i + t_i^{l*})$ for every $t_i^{k*} \in T_{i-}^*$ and $t_i^{l*} \in T_{i+}^*$.

Suppose that $u_i(y_i + t_i^{k*}) \geq u_i(y_i - m_i + t_i^{l*})$. Then suppose that, in state l, instead of assigning t_i^{l*}, the lottery assigns $t_i^{l*} + \epsilon$ with probability q and t_i^{k*} with probability $1-q$, where $q(t_i^{l*} + \epsilon) + (1-q)t_i^{k*} = t_i^{l*}$. For a q sufficiently small (but positive) and ϵ high enough, $u_i(y_i - m_i + t_i^{l*} + \epsilon) > u_i(y_i + t_i^{k*})$. This lottery dominates $\mathcal{L}_i^*$ while having same cost, which in turn, implies that $\mathcal{L}_i^*$ cannot be optimal.

Step 2: If $t_i^{l*} \in T_{i-}^*$ then $t_i^{l*} = -\underline{t}_i$.

Suppose that this is not true. Suppose that there exists $t_i^{l*} < -\underline{t}_i$. Consider any arbitrary $t_i^{k*} \in T_{i+}^*$ (Recall that efficiency implies that T_{i+}^* is no empty). Then there exists $\epsilon > 0$ and $\epsilon' > 0$ sufficiently small such that $t_i^{k*} - \epsilon \in T_{i+}^*$ and $t_i^{l*} + \epsilon' \in T_{i-}^*$ and $p(l)\epsilon + p(k)\epsilon' = 0$. The lottery $\mathcal{L}_i' = (K^*, p^*, T_i')$ with $t_l' = t_i^{l*} + \epsilon$, $t_k' = t_i^{k*} - \epsilon$, and $t_h' = t_h^*$ for every $h \neq l, k$ is as costly than $\mathcal{L}_i^*$. We show that $\mathcal{L}_i'$ dominates $\mathcal{L}^{i*}$. Note that u_i is strictly concave implies

$$u_i(y_i + t_i^{l*} + \epsilon) - u_i(y_i + t_i^{l*}) > u_i'(y_i + t_i^{l*} + \epsilon)\epsilon,$$

and,

$$u_i(y_i - m_i + t_i^{k*}) - u_i(y_i - m_i + t_i^{k*} - \epsilon') < u_i'(y_i - m_i + t_i^{k*} - \epsilon')\epsilon'.$$

Moreover,

$$U_i(\mathcal{L}') - U_i(\mathcal{L}_i^*) = p(l)\{u_i(y_i + t_i^{l*} + \epsilon) - u_i(y_i + t_i^{l*})\} + p(k)\{u_i(y_i - m_i + t_i^{k*} - \epsilon') - u_i(y_i - m_i + t_i^{k*})\}.$$

The last three equations imply:

$$U_i(\mathcal{L}'{}_i) - U_i(\mathcal{L}_i^*) > p(l)u_i'(y_i + t_i^{l*} + \epsilon)\epsilon - p(k)u_i'(y_i - m_i + t_i^{*k} - \epsilon')\epsilon'. \tag{15}$$

We have shown in Step 1 that $u(y_i - m_i + t_i^{k*} - \epsilon') > u_i(y_i - \underline{t}_i)$. Moreover, by assumption $u_i(y_i + t_i^{l*} + \epsilon) < u_i(y_i - \underline{t}_i)$ and $p(k)\epsilon = -p(l)\epsilon'$. Hence, the left-hand side of 15 is positive, which contradicts that $\mathcal{L}_i^*$ is efficient.

Step 3: If $t_i^{l*} \in T_{i+}^*$ and $t_i^{k*} \in T_{i+}^*$, then $t_i^{l*} = t_i^{k*} \equiv \bar{t}_i$.

Suppose this is not true. Suppose that there exists $t_i^{l*} \in T_{i+}^*$ and $t_i^{k*} \in T_{i+}^*$ such that $t_i^{l*} \neq t_i^{k*}$. Then $\mathcal{L}_i^*$ is dominated by the (same cost) $\mathcal{L}' = (K^*, p^*, T_i')$ defined by $t_i^{k\prime} = t_i^{l\prime} = p(k)t_i^{k*} + p(l)t_i^{l*}$, $t_i^{h\prime} = t_i^{h*}$ for every $h \neq k, l$.

Step 4: First order condition defining $\bar{t}_i$.

Let μ $(1-\mu)$ be the probability that i pays $\underline{t}_i$ (receives $\bar{t}_i$). Note that $\bar{t}_i$ solves $\max_t \mu u_i(y_i - \underline{t}_i) + (1-\mu)u_i(y_i - m_i + t)$ subject to $\mu(-\underline{t}_i) + (1-\mu)t = x_i$. Substituting μ defined in the constraint in the objective function and differentiating it with respect to t yields 6 as a first order condition.

B Proof of Lemma 2

First, we show that any SFA $\mathbf{C}^*$ including non-zero cost lotteries is not stable. Consider the FA $C_j^* = (N_j^*, \{\mathcal{L}_i^*\}_{i\in N_j}) \in \mathbf{C}^*$ randomizing between transfers $-\underline{t}$ and $\bar{t}$. Suppose that $x_f > 0$ for one agent $f \in N_j$. Equation 8 implies that $x_e < 0$ for at least another agent $e \in N_j$. Pick up any agent h of another FA, $C_k \in \mathbf{C}^*$, randomizing between same transfers $-\underline{t}$ and $\bar{t}$ in a lottery of cost $x_h \leq 0$. Design a new FA, $C_j' = (S, \{\mathcal{L}_i'\}_{i\in S})$ similar to C_j^*, except that: 1) f is replaced by h in the group S; 2) in one state of nature l in which f was previously assigned $\bar{t}$, while h had to pay $\underline{t}$, a draw assigns $\bar{t}$ to (now) h and $-\underline{t}$ to h with some probability $\gamma > 0$, and the reverse otherwise. Set this probability γ high enough such that h gives less often with this FA, C_j', than with the former FA he belonged to $\mathbf{C}^*$. Now, consider γ such that μ_h' which denotes h's probability to give $\underline{t}$ in C_j' is such that $\mu_h' < \mu_h^*$; thereby implying $U_h(\mathcal{L}_h') > U_h(\mathcal{L}_h^*)$. With C_j', e pays $\underline{t}$ less often (and gets $\bar{t}$ more often) than in C_j^*, meaning that $\mu_e' < \mu_e^*$ and, therefore $U_e(\mathcal{L}_e') > U_e(\mathcal{L}_e^*)$. Nothing changes for every other member $i \neq h$ of C_j' who gets the same expected payoff $U_i(\mathcal{L}_i') = U_i(\mathcal{L}_i^*)$. Hence, we establishes that $\mathbf{C}^*$ is not stable according to Definition 4.

Second, we prove that a SFA with only zero cost lotteries is stable. Consider $\mathbf{C}^*$ where every FA $C_j^* = (N_j^*, \{\mathcal{L}_i^*\}_{i\in N_j}) \in \mathbf{C}^*$ includes people with needs for transfers $-\underline{t}_j$ and $\bar{t}_j$ and randomize among these transfers with zero-cost lotteries. Suppose that there exists $C_j' = (S, \{\mathcal{L}_i'\}_{i\in S})$; such that $U_i(\mathcal{L}_i') \geq U_i(\mathcal{L}_i^*)$ for every $i \in S$ and $U_h(\mathcal{L}_h') > U_h(\mathcal{L}_h^*)$ for at least one $h \in S$. Obviously C_j' includes efficient lotteries $\mathcal{L}_i'$ randomizing between $-\underline{t}_j$ and $\bar{t}_j$ with respective probabilities μ_i' and $1-\mu_i'$. Hence, $U_i(\mathcal{L}_i') \geq U_i(\mathcal{L}_i^*)$ implies $\mu_i' \leq \mu_i^*$ for every $i \in S$, and $U_h(\mathcal{L}_h') > U_h(\mathcal{L}_h^*)$ implies $\mu_h' < \mu_h^*$. The last inequalities imply:

$$\sum_{i\in S}\{\mu_i'(-\underline{t}_j) + (1-\mu_i')\bar{t}_j\} > \sum_{i\in S}\{\mu_i^*(-\underline{t}_j) + (1-\mu_i^*)\bar{t}_j\}. \tag{16}$$

Since lotteries $\mathcal{L}_i^*$ are of zero cost, the right-hand side of 16 equals zero and, therefore, $\sum_{i\in S}\{\mu_i'(-\underline{t}_j) + (1-\mu_i')\bar{t}_j\} > 0$. Thus, C_j' does not satisfy 8, which contradicts that C_j' is a FA.

C Proof of the Theorem

The proof is organized in three steps. Step 1 extends the definition of a FA to a multi-period framework. Step 2 confirms that Lemma 1 still applies within the multi-period framework. Finally, step 3 shows that a SFA composed by roscas is stable.

Step 1 Extension of the definition of a FA to a multi-period framework.

A multi-period FA, $C_j = (N_j, \{\mathcal{L}_i\}_{i\in N_j})$ is still defined by a group of agents N_j. But now, each member faces a sequence of per-period lotteries. For simplicity, it is still denoted $\mathcal{L}_i$. Each per-period lottery part of this sequence might depend on previous draws. Without loss of generality, all these lotteries can be defined on a common set of states of nature K_{jt}. However, the probability measure on K_{jt} might be contingent on the previous realized states of nature.

Since the contracting choices occur only at date 0 the choices are guided by probabilities computed at date 0. Formally, denoting p_{jt} the probability at date 0 that state $l \in K_{it}$ is drawn at date t, the discounted expected utility of an arbitrary member i of the FA $C_j = (N_j, \{\mathcal{L}_i\}_{i\in N_j})$ is:

$$U_i(\mathcal{L}_i) = \sum_{t=1}^{\infty}\beta^t \sum_{l\in K_{jt}} p_{jt}(l) v_i(y_i + t_i^l), \tag{17}$$

Step 2 Lemma 1 still applies within the multi-period framework.

Any efficient sequence of lotteries $\mathcal{L}_i$ still maximizes 17 subject to a sequence of per-period costs $\{x_{it}\}_{t\in\mathbb{N}}$ (viewed at date 0) defined by $x_{it} = \sum_{l\in K_{jt}} p_{jt}(l)t_{it}^l$. Clearly, it is equivalent to maximizing per-period expected utility (viewed at date 0), namely $\sum_{l\in K_{jt}} p_{jt}(l)v_i(y_i + t_i^l)$, subject to the per-period cost x_{it} for every date t. Hence Lemma 1 applies.

Step 3 A SFA composed by roscas is stable.

Suppose that SFA composed by roscas is not stable. Then there exists a FA, $C_j' = (S, \{\mathcal{L}_i'\}_{i\in S})$ such that every member $i \in S$ is not worse off and at least one member $h \in S$ is strictly better off than with a SFA with only roscas. Then C_j' include efficient lotteries, so that i's (discounted) expected utility simplifies to:

$$U_i(\mathcal{L}_i) = \sum_{t=1}^{\infty} \beta^t \{\mu_{it}' u_i(y_i - \underline{t}_i) + (1-\mu_{it}')u_i(y_i - m_i + \bar{t}_i)\}, \tag{18}$$

where μ_{it}' $(1-\mu_{it}')$ denotes the probability at date 0 that i pays $\underline{t}_i$ (receives $\bar{t}_i$) at date t. On the other hand, 14 tells us that, to a member i, a rosca yields a (discounted) expected utility:

$$U_i(\mathcal{L}_i^*) = \sum_{t=1}^{\infty} \beta^t \{\mu_i u_i(y_i - \underline{t}_i) + (1-\mu_i)u_i(y_i - m_i + \bar{t}_i)\}, \tag{19}$$

where $\mu_i = \frac{n_i - 1}{n_i}$ (Recall that n_i denotes the optimal size of the rosca for individual i).

Now, by assumption, $U_i(\mathcal{L}_i') \geq U_i(\mathcal{L}_i^*)$ for every $i \in S$ and $U_h(\mathcal{L}_h') > U_h(\mathcal{L}_h^*)$ for at least one $h \in S$. Combining the above two inequalities with 18 and 19 implies $\sum_{t=1}^{\infty} \beta^t \mu_{it}' \leq \sum_{t=1}^{\infty} \beta^t \mu_i$ and $\sum_{t=1}^{\infty} \beta^t (1-\mu_{it}') \geq \sum_{t=1}^{\infty} \beta^t (1-\mu_i)$; with a strict inequality for at least one individual $h \in S$. These inequalities in turn imply:

$$\sum_{i\in S}\sum_{t=1}^{\infty} \beta^t \{\mu_{it}'(-\underline{t}_i) + (1-\mu_{it}')\bar{t}_i\} > \sum_{i\in S}\sum_{t=1}^{\infty} \beta^t \{\mu_i(-\underline{t}_i) + (1-\mu_i)\bar{t}_i\}.$$

In other words, $\sum_{i\in S}\sum_{t=1}^{\infty} \beta^t x_{it}' > \sum_{i\in S}\sum_{t=1}^{\infty} \beta^t x_{it}^*$, where x_{it}' and x_{it}^* are the respective costs (viewed from date 0) of the per-period lotteries played at date t. Since these costs sum-up to 0 for roscas, i.e. $x_{it}^* = 0$ for every t, at least one per-period lottery cost x_{it}' is strictly positive, which contradicts the supposition that C_j' is a FA.

References

[1] Akerlof, G. (1991) "Proscrastination and Obedience," *American Economic Review Papers and Proceedings* **81**(2), 1–19.

[2] Anderson, S. and J.M. Baland (2002) "The economics of ROSCAS and Intrahousehold Resource Allocation," *Quarterly Journal of Economics* **117**(3), 963–995.

[3] Anderson, S., J.M. Baland, and K.O. Moene (2002) "Sustainability and Organizational Design in Roscas: Some Evidence from Kenya," Manuscript, University of Namur.

[4] Ardener, S. (1964) "The Comparative Study of Rotating Credit Association," *The Journal of the Royal Anthropological Institute of Great Britain and Ireland* **94**(2), 201–229.

[5] Besley, T., S. Coate, and G. Loury (1993) "The Economic of Rotating Savings and Credit Associations," *American Economic Review* **83**(4), 792–810.

[6] ——(1994) "Rotating Savings and Credit Associations, Credit Markets and Efficiency," *Review of Economic Studies* **61**, 701–719.

[7] Bouman, F. (1977) "Indigenous Savings and Credit Societies in the Third Word: A Message," *Saving and Development* **1**(4), 181–218.

[8] ——(1995) "Rotating and Accumulating Savings and Credit Associations: A Development Perspective," *World Development* **23**(3), 371–384.

[9] Calomiris, C. W. and I. Rajaraman (1998) "The Role of ROSCAs: Lumpy Durables or Event Insurance?," *Journal of Development Economics* **56**, 207–216.

[10] Elster, J. (1998) "Emotions and Economic Theory," *Journal of Economic Literature* **36**(1), 47–74.

[11] Fafchamps, M. (1995) "The Rural Community, Mutual Assistance, and Structural Adjustment," in A. de Janvry, S. Radwan and E. Thorbecke, eds., *State, Markets, and Civil Institutions: New Theories, New Practices, and their Implications for Rural Development.* Mc Millan Press.

[12] Gugerty, M. K. (2000) "You Can't Save Alone: Testing Theories of Rotating Savings and Credit Associations," Manuscript, Harvard University.

[13] Henry, A., G.H. Tchente, and P. Guillerme (1990) "La Société des Amis : Étude des Tontines à Enchères du Cameroun," Document de travail, Caisse centrale de coopération économique, Centre d'études financières, économiques et bancaires, Université de Rennes 1.

[14] James, W. (1979) *Kwanim Pa, The Making of the Uduk People*. Clarendon Press, Oxford, United Kingdom.

[15] Levenson, A.R. and T. Besley (1996) "The Anatomy of an Informal Financial Market: Rosca Participation in Taiwan," *Journal of Development economics* **51**(1), 45–68.

[16] Nagarajan, G., R.L. Meyer, and D.H. Graham (1999) "Does Membership Homogeneity Matter for Group-Based Financial Services? Evidence from Gambia," *African Development Review* **11**(1), 87–102.

[17] O'Donoghue, T. and M. Rabin (1999) "Doing it Now or Later," *American Economic Review* **89**(1), 103–124.

[18] Parkin, D. J. (1972) *Palms, Wine, and Witnesses*. Chandler Publishing, London, United Kingdom.

[19] Platteau, J. P. (1996) "Traditional Sharing Norm as an Obstacle to Economic Growth in Tribal Societies," Cahier de recherche du CRED, Université de Namur, Belgium.

[20] ——(2000) *Institutions, Social Norms and Economics Development*. Harwood Academic Publisher, U.S.A.

[21] Scott, J. (1976) *The Moral Economy of the Peasant*. Yale University Press, Cambridge, Massachusetts, U.S.A.