Participation in Rotating Savings and Credit Associations in Indonesia: New Empirical Evidence on Social Capital

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Abstract

Indonesia has a rich historical tradition of mutual cooperation at the community level. This study argues that rotating savings and credit associations (ROSCAs) constitute successful experiences of collective action within the informal financial sector. Therefore, using data from Indonesia Family Life Surveys, it explores the relationship between social capital and ROSCA participation and extends existing models from individual- to community-level determinants. The endowment of social capital at the village level correlates positively with individual ROSCA participation, because community social capital provides individual members with the resources needed to overcome self-selection and foster coordination -two main characteristics of ROSCAs. These results provide new evidence on the role of social capital for fostering collective action and offer new insights about community-driven development.

I. Introduction

Rotating savings and credit associations (ROSCAs), which are among the oldest and most prevalent saving institutions in the world, can be defined as associations 'of men and women who meet at regular intervals … and distribute [] a lump sum of money to one of its members,' using funds 'made up of the variable or fixed contributions of each member of the association' (van den Brink and Chavas, p. 746-7). To understand the importance of ROSCAs, we must recognize that most economic activity in developing countries, where ROSCAs are most prevalent, occurs among small firms, farmers, or poor households that operate in informal sectors. The financial services they need thus fall outside the range of offerings by commercial banks. By providing credit to these economic actors, ROSCAs play a prominent role in developing countries for borrowers looking for informal solutions.

Participating in a ROSCA entails various costs too. They generally do not provide interest, as in formal credit markets, and they are less flexible than individual savings. Moreover, members must suffer the risk of default by other participants, as well as pay opportunity costs to spend time taking part in group meetings. Yet ROSCAs remain very popular, and economic literature confirms the efficiency of the borrowing and saving solutions they provide (Anderson and Baland 2002; Besley, Coate and Loury 1993; Klonner 2003; van den Brink and Chavas 1997). Their structure relies on self-selection of members and mutual monitoring, which help reduce the risk of defection and increase repayment rates through social cohesion pressures (Zeller 1998). Anggraeni (2009) also describes three main functions of ROSCAs: security or insurance, financial, and social. On the basis of both anthropological and economic literature, we thus reframe ROSCA success and argue that they represent a traditional form of collective action (Ardener 1964; Callier 1990) that can attain efficient social *equilibria*, based on respect for cooperative norms mediated by social sanctions.

Some previous research has noted the role of ROSCAs in developing countries and investigated individual determinants of participation. With these empirical studies as a reference point, we enlarge existing models by shifting from individual- to community-level determinants, and we consider Indonesia as our case setting. This country is especially noteworthy considering its historical tradition of cooperation at the community level. Moreover, contextual factors, as religion, play an important role in the individual engagement in civil society activities. These considerations support our understanding of ROSCAs as non-market institutions, the function of which is governed by collective action rules and social norms more than borrowing needs and remuneration interests.

Our principal aim is to explore the role of community social capital in the individual decision to participate in ROSCAs, according to two main theoretical channels. First, we examine the relationship between social capital and credit access. Second, we consider the role of social capital in fostering collective action. We also expand on an Indonesian study that indicates a positive correlation between social capital and credit access at the household level (Okten and Osili 2004) by focusing only on access to ROSCAs and using an alternative measure of social capital. Our measure of social capital addresses the village level instead of the individual endowment, such that we investigate the context in which ROSCAs members live, not just their personal characteristics and behaviors. This alternative measure encompasses how ROSCAs function as traditional forms of collective action. Taking into account self-selection into groups, social sanctions, and high trust levels, members benefit from community social capital in the form of durable networks with mutual knowledge, so they join ROSCAs. Such community social capital stems from participation at the village level in community activities (Miller et al. 2006; Narayan and Pritchett 1999) and the presence of public spaces. We test and confirm our hypothesis using the nationally representative Indonesia Family Life Survey (IFLS).

4

Our empirical analysis also reveals interesting findings that are largely consistent with previous literature (Anggraeni 2009; Varadharajan 2004). In particular, we find that *ceteris paribus* in Indonesia, ROSCAs are neither complements nor substitutes for formal credit and finance facilities. Combined with the positive correlation between household expenditures and education, this result offers support for recent findings that reject poor and credit constrained assumptions (van den Brink and Chavas 1997; Varadharajan 2004). We test for robustness by controlling for other individual and community variables and address endogeneity concerns.

We thus contribute to previous research into access to informal finance by proposing an empirical model that includes new determinants of participation, based on an interpretation of ROSCAs as traditional forms of collective action. The empirical findings reveal several community factors that influence decisions to join ROSCAs; in particular, we find a role of community social capital that has not been examined previously. In Sections 2 and 3, we therefore provide a review of relevant literature and illustrate our hypothesis. Section 4 contains the data and variables, and Section 5 provides a discussion of the empirical results. Finally, we conclude with Section 6.

II. ROSCAs and Collective Action Theory

Rotating savings and credit associations describe a wide variety of traditional financial institutions, spread all over the world. In a general ROSCA structure, groups of community members meet regularly and contribute savings to a group fund that is distributed at the end of each meeting to one of the participants (van den Brink and Chavas 1997).The core concept relies on the stable interaction of a self-selected group of people. Regular meetings allow

members to pay shares, receive some portion of money,[1] and monitor others' conduct. The amount received can be applied to various needs: consumer goods (Summerfield 1995), durable goods (Handa and Kirton 1999), personal savings accumulation (Anderson and Baland 2002; Dagnelie and Lemay-Boucher 2011), funding for small economic activities (Hope 2001), travel, or emigration (Besson 1995).

The anthropologists who first described ROSCAs outlined their key underlying concepts, including the important roles of reputation and trust, membership, and social sanctioning (Ardener and Burman 1995). According to Geertz (1962), ROSCAs represent a 'middle rung' for development that would ultimately be replaced by more formalized financial institutions as the local economy continued to develop. More recent economic literature has provided extensive evidence that they are not just intermediate steps but also can be efficient solutions to market failures, with unique and positive economic outcomes. For example, the overwhelming majority of members are women, so economists have investigated if participation in a ROSCA increases women's welfare. The findings show that ROSCAs enable women to deal with a wide variety of needs, including household savings and financing of economic activities (Anderson and Baland 2002; Hospes 1995). Besley, Coate and Loury (1993) also demonstrate that ROSCAs are more efficient than autarchic saving and improve the individual welfare of those excluded by formal credit markets. In a follow-up study (Besley, Coate and Loury 1994),they compare random ROSCAs against formal credit market solutions; the ROSCAs were more efficient for the criterion of ex-ante expected

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[1] Funds may be distributed randomly, such that participants organize a lottery at the end of each meeting; by auction, in which the price paid by the winner gets redistributed to others; or by collective decision, in which case participants vote to decide who receives the money or establish an order following standard procedures.

utility.[2] In addition, Klonner (2003) calls bidding ROSCAs more efficient than formal credit market, which is hindered by information asymmetries, income uncertainty, and risk aversion. Van den Brik and Chavas (1997) explain ROSCAs' success by context: In developing countries characterized by dense networks, people prefer the unconditional contracts ROSCAs offer (individual-community) over the conditional contract of alternative solutions (individual-individual). Finally, ROSCAs appear egalitarian, because distributed funds usually are spent or reinvested within the community. Thus ROSCAs succeed not only because they are more accessible but because they provide efficient borrowing, saving and social solutions.

In this study we support the idea that the structure and performance of ROSCAs are noteworthy because they represent successful experiences of collective action, an efficient solution for the coordination and interdependence problems that characterize market failures (Ostrom 1990).[3] We therefore move away from the logic of the market toward the logic of collective action (Callier 1990) to reframe these positive outcomes. That is, we suggest that ROSCAs provide rewards and address market incompleteness through two main characteristics that are typical of collective action: complementarities and coordination. Positive complementarities in a ROSCA mean more money is available to participants, because greater individual effort produces greater collective benefits. Coordination also is fundamental, because each member renounces part of his or her freedom (i.e., not managing

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[2] A random ROSCA has no established or known order for allocating funds among members; a bidding ROSCA assigns the order by auction. For a deeper description, see Besley et al (1994).

[3] Collective action refers to behavior by agents who decide to coordinate their actions instead of acting individually; see Ostrom (1990).

money) to achieve a common objective that offers long-term benefits for all participants. Moreover ROSCAs can discourage free-riding through group self-selection and mutual monitoring. Unlike formal credit markets, social sanctions, rather than economic ones, play the main role in preventing defection (Ardener 1964).

Our interest in gaining insights into the factors that enhance participation in this form of collective action reflects two main motivations. First, we hope to gain a better understanding of those factors that increase coordination and cooperation at the community level. Second, the positive role played by ROSCAs in developing countries likely is linked to access to financial institutions and the empowerment of women.

III. Theoretical Channels to Explain ROSCA Participation

A person chooses to enter a ROSCA to obtain specific gains in response to individual and community characteristics. To outline these characteristics, theoretical models focused on determining which factors enhance ROSCA participation. Most resulting investigations of the determinants of participation address individual characteristics. Thus the most likely participant is a married woman, of middle age, who has earned at least basic education and is not below the poverty threshold (Besson 1995; Dagnelie and Lemay-Boucher 2011; Handa and Kirton 1999; Weinberger and Jutting 2001). This stream of literature also features two controversial assumptions related to credit constraints (Anderson and Baland 2002; Rutherford 1998; Vetrivel and Chandrakumaramangalan 2010) and poverty (Besley, Coate and Loury 1993; Besley and Levenson 1996; Kurtz 1973). Specifically, hypotheses suggest that poor or credit-constrained people are banned from the formal credit market because they lack a minimum starting budget, so they should be more motivated to participate in ROSCAs

than wealthier people[4]. However, recent studies reject these assumptions, because the very poor appear less motivated to participate than people with more resources, because they have been marginalized by society and lack a minimum starting budget to contribute to the ROSCA (Kimuyu 1999; Varadharajan 2004).

Although researchers also offer rich descriptions of community contexts for ROSCAs, no empirical study has taken socio-economic factors other than individual characteristics into account. To help fill this gap, we investigate social capital as a potential determinant of ROSCA participation. Social capital in a community is critical for building networks of reciprocity and a culture of cooperation. Because ROSCAs are a form of collective action, they should benefit from the presence of social capital, defined as 'the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance and recognition—or in other words, to membership in a group' (Bourdieu 1986, p.248).

Social capital should influence ROSCA participation, according to both financial and collective action dimensions. Informal financial institutions rely on social networks (Miguel, Gertler and Levine 2006), and social capital fosters credit access by mitigating the adverse selection and information flow problems between creditors and borrowers (Narayan and Pritchett 1999; Van Bastelaer 2000). In Indonesia for example, participation in local associations correlates positively with household access to credit (Grootaert 1999; Okten and Osili 2004), though the causal relationship also might work in reverse. Thus microfinance projects often encourage other community activities to flourish (Ito 2003). Although social capital can be both a cause and a consequence of financial projects, we focus on its ability to

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[4]According to these assumptions, microfinance projects linked to development policies would naturally be a privileged instrument of the poorest classes.

solve collective action problems (Scholz, Berardo and Brad 2008; Uphoff and Wijayaratna 2000), because people accumulate social capital, in the form of durable networks based on mutual knowledge, to join ROSCAs. Such social capital creates trust, which is fundamental for joining and being accepted in a group (Haddad and Maluccio 2003). Although prior literature has indicated a positive correlation between social capital and credit access (Okten and Osili 2004), it considered all forms of credit access (formal and informal) and used a measure of social capital linked solely to individual participation in community activities. We propose to focus instead on access to ROSCAs and consider social capital at the community level.

Social capital is a multidimensional concept that reflects the complex system of formal and informal organizations in any society. When investigating social capital, it thus is necessary to indicate which dimension (organizations) and level (individual, family, and village) provides the reference category. We measure community social capital, or the amount of resources available to the population through networking activities in a village. The endowment of social capital at the community level reflects the intensity of social interactions that reduce , if not suppress, free-riding (Hayami 2009).We focus on the dimension of local associations and community projects at the village level, in line with empirical studies that use similar measures to investigate relationships between social capital and health (Miller et al. 2006) and between social capital and household expenditures (Narayan and Pritchett 1999). By using community, instead of individual, social capital, we can measure the influence of the context –the level of networking activities in the community- instead of just personal characteristics and behaviors, with interesting implications for development policies. We hypothesize:

   H1: The endowment of community social capital in a village is positively associated with
         individual ROSCA participation.

The measurement at the community level should also mitigate problems linked to inequality in the distribution of social capital and thus the risk of elite capture. Endowment of social capital is in fact always mediated by some previous social structure (Bourdieu 1986; Brata 2004), so it cannot be equally distributed in a population. Ultimately, those with the most social capital can take the most advantage of their endowment (Fafchamps 2006; Nugroho 2008; Tonkiss 2000; Vajja and White 2008). For ROSCAs, this imbalance implies that the very poor cannot participate in even these informal financial institutions. This reasoning could explain why recent studies have rejected the assumption that credit-constrained and poor people participate in ROSCAs. However, the shift from individual to community social capital should at least reduce this elite effect, because poor people gain the same social capital endowment as their rich co-villagers. We thus move on to detail our empirical model and the case setting we chose to test our hypothesis.

IV. Empirical Methods

A.   Data source: Indonesia Family Life Survey

To develop our research, we selected Indonesia as the case setting, for several reasons. First, Indonesia has been a frequent object of research since a pioneer study by Geertz (1962), so we can compare our findings with a rich stream of literature. Second, Indonesia's society offers a long tradition of collectivism, reinforced by the end of a long dictatorship in 1998. Third, Indonesia is one of the most heterogeneous countries in its ethnic, linguistic, and religious diversity. This heterogeneity increases the generalizability of the results.

In Indonesia, ROSCAs are known as Arisan and constitute traditional economic systems, similar to those in China 2000 years ago (Shanmugam 1991) and to other standard models spreading in South-East Asia. Normally an Arisan consists of a group of friends who gather weekly and contribute approximately 1,000 rupees (US$0.10) in each meeting, after which

11

one of the participants wins the pot of money. Popularity is one of its main features: Both

the richest and the poorest classes consider Arisan a critical appointment in their social lives.

Different forms appear in Indonesian society, including office, ethnic and religious,

neighborhood, and market Arisans (Varadharajan 2004).

The data source for the present study, the Indonesia Family Life Survey (IFLS), is an

ongoing, longitudinal, nationally representative survey, carried out in Indonesia since 1993

by the RAND Foundation. The sample consists of approximately 30,000 individuals, spread

across 13 of the 27 Indonesian provinces, and it is representative of about 83% of the

population. We used data from IFLS3, carried out in 2000, and IFLS4, in 2007, including

information collected at the individual, household, and community levels. These data cover a

wide range of themes: consumption, education, family and friend relationships, economic

status, demographics, job market, health system, environment, infrastructure, community

activities, social services, and governmental planning for example (Strauss et al. 2004; 2009).

B.   Empirical model and variables

We estimate a probit model in which the dependent variable represents individual

participation in an Arisan. The Y dummy variable equals to 1 if a respondent indicates that he

or she has participated in Arisan in the previous 12 months, and 0 otherwise. The following

equation defines the estimation:

$$Pr(Y = 1) = \Phi(\beta_0 + \beta_1 X1 + \beta_2 X2 + \beta_3 X3 + \beta_4 X4 + \beta_5 X5) + \varepsilon, \qquad\qquad (Eq.1)$$

where Φ is the cumulative distribution function for the standard normal, and letters on the

right side of the equation correspond to the determinants of participation we want to test.

Specifically,

- X1 is a vector of individual characteristics: sex, age, marriage status, religion, and

  education.

12

- X2 is a vector of the characteristics of the head of the household (sex, age) and household (size, expenditure per capita, urban or rural environment).

- X3 is a vector of variables to measure the endowment of community social capital.

- X4 is a vector of variables to measure the presence of credit facilities.

- X5 is a vector of other controls included to capture possible effects of environment and health system conditions.

- ε is the error term.

This specification is similar to that for models previously used to analyze ROSCAs (Varadharajan 2004). We discuss the motivations and expected results for the X3 and X4 variables, which represent our principal contributions. In our discussion of the results, we will include all variables. Table 1 provides a detailed description of these variables.[5]

[Table 1 here]

To measure the endowment of social capital in Indonesian villages (X3), we consider three proxies. First, we count the number of citizens involved in a wide range of community projects. These activities should build relationships based on mutual knowledge and provide individuals with the resources necessary to engage in ROSCAs, such as being known by other community members, being trusted, creating networks to foster reciprocal behaviors, and mutual monitoring. Thus "Participation in community activities" is a continuous variable, calculated as the percentage of the population in each community who has participated in different community projects (i.e., average across all projects): village cooperatives, youth groups, village mobile library, neighborhood watch program, community public works, other village activities, kampung improvement program, and water management system. Second, we looked for the presence of a public meeting facility aimed to foster civic participation and

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[5] For further details on the IFLS waves, see Strauss et al. (2004).

public debate. Thus "Presence of convention hall (d)" is a dummy proxy, entered without any further elaboration, equal to 1 if there is a convention hall in the village and 0 otherwise. Third, we consider the presence of health service facilities managed by community members, using family planning posts as representative. The functioning of this health service requires participation by the community to support for different activities. Users, principally women, then also contribute to its management and daily functioning. Finally, "Nr. of FPP" (per 1000 inhabitants) is a continuous variable equal to the ratio between the number of family planning post (FPP) and the total population in the area.

In X4 we include indicators to test the relevance of the presence of different credit infrastructures. This group of variables does not address the question raised by the credit-constrained assumption. Rather, it distinguishes credit facilities that are complementary or substitutive with ROSCAs. For example, "Local Bank - BRI (d)" is a dummy variable indicating the presence in the village of a Bank Rakyat Indonesia (BRI) branch. The largest Indonesian bank, BRI also provides microfinance programs and potentially could substitute for ROSCAs. In turn, "Local Bank - KUKESRA (d)" indicates the presence of Kukesra projects, run by the government since 1995 to provide credit to family business and poor women. The "Local Bank - Rolling funds (d)" dummy variable indicates the presence of a rolling funds project, a micro-finance program that proved unsustainable and badly managed at the local level. It thus is interesting to compare it with ROSCA participation, a more traditional and successful form of micro-finance. Finally, "Local Bank - Private (d)" is a dummy variable indicating the role of private banks and the informal credit market, which is dominated by private borrowers. Thus it offers another alternative to ROSCAs.

For the full model, we must tackle two key issues in our empirical strategy: multicollinearity and endogeneity. Regarding the former, despite seemingly reasonable expectations, the degree of correlation among most of the regressors in our study is relatively

14

low. Thus, though some multicollinearity exists, it is not a serious concern for our estimates. In Table 2 we report the correlation between sensitive variables as age, per capita expenditure and social capital proxies.

[Table 2 here]

With respect to endogeneity, the question is slightly more complicated. In our model specification, a certain degree of correlation between some regressors and the error term could create a simultaneity problem, such as when the amount of social capital available at the village level is facilitated by a higher propensity to cooperate and participate in ROSCAs in the past. We therefore decided to exploit the longitudinal nature of the survey by matching participants in IFLS3 (data for 2000) and IFLS4 (data for 2007). Our dependent variable, individual participation in Arisan, comes from IFLS4, as the individual variables that should not suffer from endogeneity problems (sex, age, civil status, religion, urban/rural, education). Other variables came from data in IFLS3 (2000), such as household expenditure per capita, community social capital, credit facilities, and other community characteristics. Separate from concerns about reverse causality for income (see the next section), we introduce a viable time lag between the propensity to participate in ROSCA and determinants of participation that are sensitive to endogeneity, especially community social capital. Technically, this specification uses predetermined regressors to identify possible relationships with a dependent variable measured ex post.

In addition, to control for the persistence of participation in Arisan, we include as a dependent variable individual participation to Arisan in the IFLS3 (2000). Finally we include a set of district dummies (kapupaten in Indonesia), to address regional differences and provide a robustness check for our main findings.

V. Results

Our empirical evidence confirms that ROSCAs (or Arisan in Indonesia) are a well-established form of collectivistic culture instrument; the proportion of participants does not change much over time. In Table 3, more than 32% of the IFLS3 survey respondents participated at least in one ROSCA; after seven years, the corresponding figure was only slightly smaller (27%). Thus participation in Indonesian ROSCAs appears characterized by persistence over time, which supports our choice to include a dummy variable to measure ROSCA participation in the past (obtained from corresponding IFLS3 survey data).

[Table 3 here]

Table 4 contains some descriptive statistics for the variables in the empirical analysis. For comparison, we report the mean and standard deviations for the whole sample and the sample restricted to ROSCA participants. Our sample of approximately 14,000 individuals, around 27% of which participate in Arisan, mostly features women; the dummy variable indicating male gender is well below 0.5.

[Table 4 here]

On average, individuals participating in ROSCAs are older (33 years versus 31 years of age), unmarried, and with more education. Those participating in ROSCAs also belong to wealthier families; the mean value for total expenditures per capita (log) is 12.5 for participants and 12.3 for the whole sample. Participation in ROSCAs increases in urban villages compared with rural ones; the mean value for the corresponding dummy variable in Table.4 signals that about 53% of individuals live in urban areas, but 61% of ROSCA participants do. Regarding the key indicators, individuals participating in ROSCAs generally live in villages with a higher-than-average endowment of community social capital (mean value for the three proxies considered).

In Table 5 we report the results calculated using Equation (1), which estimated the individual decision to participate in a ROSCA. The base specification (regression with

16

controls for individual and household characteristics and no district dummies) is in column

(1). In column (2) we include regional controls (with district dummy variables) and reveal

that the variable "Urban" was capturing hidden regional heterogeneity effects, which

disappeared in column (2). Then in Columns (3) and (4) we display the estimations of a

model augmented by, respectively, the proxies of community social capital and the presence

of credit facilities. Finally, Column (5) displays results for the complete model, which

incorporates further indicators of local environment and health conditions. We also provide

fit statistics and find support for the statistical validity of all models, according to the log-

likelihood statistics. For both models, the null hypothesis can be rejected at the 1% level or

better.

[Table 5 here]

We start by commenting on variables that appeared in previous models and were included

as control variables herein. Gender has a highly significant and negative effect on

participation; all else being equal, men are less likely to participate in ROSCAs (Besson

1995; Guérin 2006). Women consider ROSCAs a valid solution to facilitate their household

economy.[6] Similarly, age matters, in that it positively and significantly correlates with

ROSCA participation. Following our interpretation of ROSCAs as forms of collective action,

age can influence participation because adults are more linked to and involved in society

(Anderson and Baland 2002). However, this relationship is not linear (i.e., squared variable

coefficient), probably because at some point, interest in and motivation for ROSCA

participation, similar to other community activities, may decline. The coefficient for the

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[6] However, women's participation in ROSCAs as an "economic and social refuge" is

considered a negative goal for development, because it cannot challenge traditional, and often

subordinate, roles of women in developing countries.

marital status dummy is negative and significant; married people are less likely to join Arisan projects. This result matches previous literature: Single women tend to be more economically vulnerable and need insurance tools and saving solutions. All coefficients for the variables indicating the level of education are significant and positive. According to Varadharajan (2004), controlling for income, a person with a higher-than-average education is more likely to participate in ROSCAs (omitted category = "No education at all"). Education offers a potential resource, in the form of human capital for developing economic activities and significant social relationships (Becker 1974; Bourdieu 1986; Coleman et al. 2006), and it is linked to economic status, because wealthier families provide better education to their children. In coherence with this finding, we observe that household expenditures per capita (measured with data from IFLS3 to avoid endogenous effects; see Section 3) correlate positively and significantly with ROSCA participation, in line with other studies (Besley and Levenson 1996; Varadharajan 2004). However, some research finds that the middle class has the highest coefficient of correlation (Weinberger and Jutting 2001), suggesting an inverted U-shaped curve. We thus support recent studies that have rejected the assumption that the poorest people participate in ROSCA.

To assess the role of community social capital, we examine the estimated effects for our proxies. All the coefficients are positive, and two of three are significant (10% level). After controlling for other factors, we find that high levels of participation in community projects, family planning posts, and the presence of public spaces help foster ROSCA participation. In particular, when community social capital derives from citizen participation in community activities, individual ROSCA participation is highest.

Our results thus offer novel evidence that ROSCAs represent outcomes of social capital endowment at the village level, in support of our hypothesis. This result also is robust, for three main reasons. First, the model is comprehensive in its number of variables, which

control for multiple individual and household characteristics. Second, we control effectively for endogeneity by introducing a time lag between the dependent variable and the community characteristics, and controlling for Arisan participation persistence. Third, the results hold regardless of the district dummies, which should control for regional heterogeneity.

Regarding the presence of other credit facilities at the community level, we find both complementary and substitutive elements in our empirical analysis. The presence of private banks correlates negatively with ROSCA participation; for Kukesra programs, the correlation is positive. It is not possible to identify reasons for the difference in signs, because the presence of credit facilities is being measured, not participation. The existence of different effects linked to alternative credit facilities implies that ROSCAs represent both complementary and substitutive services, not just a solution for credit-constrained people.

Coefficients for the other control variables, introduced to capture effects related to environment and health system conditions, offer the expected signs. In particular, living in a reasonably safer environment is positively and significantly correlated with ROSCA participation; people living in healthy environments are usually better instructed and wealthier than people living in slums. Moreover, they do not live in an area marginalized by society and instead have an easier access to community activities and public spaces that create community social capital.

VI. Conclusion

The research we have presented focused on participation in rotating savings and credit associations in Indonesia. Having established that ROSCAs are successful examples of collective action in the informal financial sector, we examined the positive outcomes they offer and addressed the question of participation determinants. The IFLS provided information about Indonesian households and villages, which we used to expand existing

models that have focused mainly on individual determinants. For our empirical analysis, we used a probit estimation of different models that included individual characteristics and proxies for social capital, credit infrastructure, and other community characteristics.

We thus assert that ROSCAs benefit from the presence of community social capital, which in turn is based on networks of reciprocity and a culture of cooperation. This relationship acknowledges that social capital enhances the level of trust at the village level, which is essential for the functioning of ROSCAs (i.e., based on auto-selection, mutual monitoring, and social sanctioning). Our proxies for social capital (citizen participation in community projects, number of family planning posts, and presence of convention hall) significantly helped explain why people participate in ROSCAs. Therefore, it is not only individual characteristics but also the context in which people live that influences their participation in this traditional form of collective action. Even if the link between social capital and collective action has been well developed, this study offers new empirical findings in support of prior theory.

Moreover, our analysis describes the role of some specific credit facilities. In particular, we have challenged the dominant view of ROSCA as a substitute for formal credit. Instead, ceteris paribus, in Indonesia, ROSCAs are neither complements of nor substitutes for formal credit and finance infrastructures.

Considering the complexity of ROSCAs and the related phenomena, advice for policy makers would be premature. Instead, we offer some suggestions for further research that could better address specific policy issues. First, regarding the signs and significance of the variables linked to education, household expenditures, and the presence of credit facilities, it is reductive simply to consider ROSCAs alternative solutions for poor households dealing with credit constraints. The socio-economic determinants of participation require closer investigation, to improve the targeting step in micro-finance projects that imitate ROSCAs'

structure and functioning. Otherwise, even if the poorest are the target of projects, they will be marginalized, just as happens in the formal credit market.

Second, the results regarding the role of community and social capital support a community-driven development approach. Considering in particular the reality for Indonesia, we argue that the construction of networks in a community must be fostered not only in specific development projects but across all aspects of community life (education, public works, health system). When people live in villages with rich networking activities (top-down initiatives, planned by local institutions),they profit from networks of reciprocity and mutual knowledge, which enhance their capability to engage in specific forms of collective action (bottom-up initiatives). It would be interesting to develop research that investigates better measures of social capital to increase the robustness of related models. Furthermore, the results leave unaddressed the issue of the role of local institutions for planning, implementing, and monitoring community projects and how they might enhance cooperation at the local level.

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Table 1

DETAILED DESCRIPTION OF VARIABLES

VARIABLE	DESCRIPTION
1	
Dependent variable: Arisan participation (d)	Dichotomous dummy, participation in Arisan: 1 = yes; IFLS4 (2008)
2	
Sex (d)	Dichotomous dummy, gender: 1 = "male"
Age	Continuous variable, age (years)
Age - square	Square of the continuous variable, age (years)
Status married (d)	Dichotomous dummy, civil status: 1 = "married." Division of respondents into subgroups: "married" and "not married"
Religion Islam (d)	Dummy, religion of the individual: 1 = "Muslim"
Some education (d)	Dummy, education of the individual: 1 = "some education." Division of respondents into subgroups: "none," "some," and "high"
High education (d)	Dummy, education of the individual: 1 = "high education." Division of respondents into subgroups: "none," "some," and "high."
Head of the household: sex (d)	Dichotomous dummy, gender of household head: 1 = "male"
Head of the household: age 25-40 (d)	Dummy, age of the household head (years): 1 = "between 25 and 40 years old."Subdivision in classes starting with a continuous variable
Head of the household: age more than 40 (d)	Dummy, age of the household head (years): 1 = "older than 40."Subdivision in classes starting by a continuous variable

VARIABLE	DESCRIPTION
Monthly p/capita tot.expenditure (logs)[IFLS3]	Continuous variable, logarithm of per capita household expenditures. Variable calculated by summing expenditures for each household, dividing the value for the family size, and applying the logarithm
Urban (d)	Dichotomous dummy, household localization: 1 = "urban"
Household size: more than 5 (d)	Dummy, household members (nr): 1 = "More than 5 household members."Subdivision in classes starting by a continuous variable
3	
Participation in coop. activities	Percentage variable, % of the population participating in community activities: cooperative, youth group, village mobile library, neighborhood watch program, community public work, activities associated with IDT programs, kampong development program, infrastructure development program for poor village, water management system, solid waste management system.
Presence of a convention hall (d)	Dichotomous dummy, presence of convention hall: 1 = "yes"
Nr. of family plann. post (per 1000 inhab.)	Continuous variable, number of family planning post per 1000 inhabitants. Division of the original variable (number of family planning post) by the number of inhabitants, then multiplied by 1000
4	
At least 1 large bank with microfinance progr. (d)	Dummy, presence of Bank Rakyat Indonesia or Bank Perkreditan Rakyat or Village Credit Institution or Village Credit Fund Institution: 1 = "At least one large bank with microfinance programs"
At least 1 cooperative bank (d)	Dummy, presence of Village Unit Cooperative or Other Cooperatives: 1 = "At least one cooperative with credit services"

VARIABLE	DESCRIPTION
At least 1 KUKESRA or private bank or credit (d)	Dummy, presence of Kukesra programs or private band or other credit sources: 1 = "At least a kukesra program or private bank"
Rolling funds_Poor Villages Prog. (d)	Dummy, presence of IDT programs: 1 = "Poor village program"
Borrow_Private person (d)	Dummy, presence of a private person to borrow money: 1 = "private person to borrow money"
6	
Slums (d)	Dichotomous dummy, people living in slums: 1 = "in the village there are people living in slums"
Mass immunization (d)	Dichotomous dummy, vaccination in the last 5 years (y/n): 1 = "in the village a mass immunization has been conducted in the last 5 years"

Notes: Group codes:1 = *Arisan*, dependent variable (from IFLS4); 2= individual characteristics, control variables; 3 =household characteristics, control variables; 4 = community social capital; 5 =credit facilities; 6=other community control.

Table 2

CORRELATION MATRIX FOR SELECTED VARIABLES INCLUDED IN THE REGRESSIONS

		[1]	[2]	[3]	[4]	[5]
[1]	Age	1				
[2]	Age -square	0.99***	1			
[3]	Monthly p/capita tot. expend. (logs)[IFLS3]	-0.07***	-0.09***	1		
[4]	Participation in comm.activ. [IFLS3]	0.02***	0.02***	-0.04***	1	
[5]	Nr. of FPP (per 1000 inhab.) [IFLS3]	0.02***	0.02***	-0.06***	0.17***	1

Notes: Pearson correlation coefficients. ***= sig. 1%.** = sig. 5%.* = sig. 10%.

Table 3

PARTICIPATION PERSISTENCE IN ROSCAS IN INDONESIA

		"Have you participated in Arisan in the last 12 months?"(question in IFLS 3 Survey)		
		No	**Yes**	**Total**
"Have you participated in Arisan in the last 12 months?" (question in IFLS 4 survey)	**No**	57.4	2.2	73.2
	Yes	9.8	16.9	26.8
	Total	67.3	32.7	100.0

Source: Elaborations on RAND IFLS3 and IFLS4 data.

Table 4

DESCRIPTIVE STATISTICS FOR SELECTED VARIABLES

Variable	All individuals in the sample			Only Arisan participants [IFLS4]		
	N	Mean	SD	N	Mean	SD
	(1)	(2)	(3)	(4)	(5)	(6)
Arisan participation IFLS4 (d)	14286	0.27	0.44	3826	1.00	0.00
Sex (d)(1= male)	14286	0.47	0.50	3826	0.27	0.44
Age	14286	43.67	14.98	3826	42.49	13.09
Status married (d)	14286	0.11	0.32	3826	0.07	0.26
Religion Islam (d)	14286	0.89	0.31	3826	0.91	0.29
Some education (d)	14286	0.44	0.50	3826	0.39	0.49
High education (d)	14286	0.46	0.50	3826	0.56	0.50
Household size: more than 5 (d)	14286	0.54	0.50	3826	0.53	0.50
Monthly per capita tot. expenditure (logs)[IFLS3]	14286	12.29	0.99	3826	12.56	0.99
Urban (d)	14286	0.53	0.50	3826	0.61	0.49
Head of the household: sex (d)	14286	0.86	0.35	3826	0.85	0.36
Head of the household: age 25-40 (d)	14286	0.26	0.44	3826	0.27	0.45
Head of the household: age more than 40 (d)	14286	0.72	0.45	3826	0.72	0.45
Arisan participation in 2000 (d) [IFLS3]	14286	0.33	0.47	3826	0.63	0.48
Participation in collect.act.[IFLS3]	14286	0.04	0.05	3826	0.04	0.04
Presence of a convention hall (d) [IFLS3]	14286	0.86	0.35	3826	0.87	0.34
Nr. of family plann. post (per 1000 inhab.) [IFLS3]	14286	0.50	0.60	3826	0.50	0.61

Source: Elaboration using RAND IFLS3 and IFLS4 data.

Note: (d) indicates a dummy variable.

Table 5

DETERMINANTS OF THE PROBABILITY OF PARTICIPATING IN AN ARISAN: PROBIT ESTIMATES

	(1)	(2)	(3)	(4)	(5)
INDIVIDUAL CHARACTERISTICS					
Sex (d)(1= male) (d)	-0.17***	-0.17***	-0.18***	-0.18***	-0.18***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Age	0.00**	0.01***	0.01***	0.01***	0.01***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Age - square	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Status married (d)	-0.06***	-0.07***	-0.07***	-0.07***	-0.08***
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
Religion Islam (d)	0.03***	0.02*	0.02**	0.02*	0.03**
	(0.012)	(0.012)	(0.012)	(0.013)	(0.013)
Some education (d)	0.09***	0.10***	0.10***	0.10***	0.09***
	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)
High education (d)	0.17***	0.17***	0.17***	0.17***	0.16***
	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)
Arisan participation in IFLS3 (d)	0.29***	0.27***	0.27***	0.27***	0.26***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
HOUSEHOLD CHARACTERISTICS					
Household size: 5 or more (d)	-0.01	0.00	0.00	0.00	0.00
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Monthly p/capita tot. expenditure (logs)[IFLS3]	0.03***	0.03***	0.03***	0.03***	0.03***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Urban (d)	0.02***	0.00	0.00	-0.01	0.00
	(0.008)	(0.010)	(0.010)	(0.010)	(0.010)

Head of the household: sex (d)	0.01	0.01	0.01	0.01	0.01
	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
Head of the household: age 25-40 (d)	0.09***	0.08**	0.09**	0.09***	0.09***
	(0.034)	(0.034)	(0.034)	(0.034)	(0.034)
Head of the household: age 40 or more(d)	0.09***	0.09***	0.09***	0.09***	0.09***
	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)

COMMUNITY SOCIAL CAPITAL

Participation in comm.activ. [IFLS3]			0.27***	0.30***	0.27***
			(0.092)	(0.093)	(0.093)
Presence of a convention hall (d) [IFLS3]			0.01	0.01	0.01
			(0.012)	(0.012)	(0.012)
Nr. of FPP (per 1000 inhab.) [IFLS3]			0.02***	0.02***	0.02***
			(0.007)	(0.007)	(0.007)

CREDIT FACILITIES

Local Bank – BRI (d)				0.00	0.01
				(0.009)	(0.009)
Local Bank – Kukesra" (d)				0.03***	0.04***
				(0.006)	(0.006)
Local Bank – Rolling funds (d)				-0.01	0.00
				(0.007)	(0.007)
Local Bank – Private (d)				-0.03***	-0.03***
				(0.009)	(0.009)

OTHER COMMUNITY CONTROL

Slums (d) [IFLS3]					-0.08***
					(0.009)
Mass immunization (d) [IFLS3]					0.02
					(0.014)

District dummies	No	Yes	Yes	Yes	Yes
Obs.	14285	14283	14283	14283	14283
LogL	-6808.7	-6603.04	-6591.68	-6570.05	-6535.1
Chi^2	2984.40	3390.44	3413.17	3456.43	3526.33
	***	***	***	***	***
PseudoR^2	0.18	0.20	0.21	0.21	0.21

Notes: The dependent variable is a dummy variable equal to 1 if the respondent answered "Yes" to the question "Have you participated in Arisan in the last 12 months?" and 0 otherwise, during the fourth wave of the Indonesia Family Life Survey (IFLS4) in 2007. Marginal effects are reported. (d) indicates dummy variables. FPP means Family Planning Post.
***sig. 1%.**sig. 5%.*sig. 10%.