

Cooperation in Microcredit Borrowing Groups: Identity, Sanctions, and Reciprocity in the Production of Collective Goods

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Cooperation to produce collective goods is widespread in society, and yet so is its failure. Theorists have identified competing mechanisms for facilitating group cooperation, including group identity, sanctions and reciprocity. Here I use empirical data to explore how these mechanisms influence cooperation in the natural laboratory of microcredit borrowing groups. Microcredit makes loans to high-risk borrowers through borrowing groups in which individuals' access to credit is dependent on the behavior of other members of the group, thereby creating a social dilemma for members and an opportunity to observe cooperation in real world groups. By analyzing both collective goods production (loans) and compliance (repayment), I find that the competing mechanisms have differential effects. Group identity, sanctions and reciprocity are all associated with more borrowing in the group. Only reciprocity, however, limits loan delinquency and is associated with group longevity, suggesting both that collective goods production is a distinct process from group compliance over time, and that reciprocity may be an important mechanism in both processes. I discuss how these findings contribute to our understanding of group cooperation, as well as the implications for the related theoretical concept of embeddedness.

Cooperation is ubiquitous in social life. Individuals collectively participate in all manner of endeavors including, for example, babysitting cooperatives, bowling leagues, and community associations. And yet failure to produce collective goods when they are desired is also widespread, such as when childcare or group leisure activities are unavailable, or communities pollute their local environment. Producing most collective goods entails a collective action problem because the product

depends on the cooperative behavior of members of a group. While each member decides whether to contribute to producing the collective good, each benefits when *other* members cooperate to produce the good. Given the ubiquity of cooperation and its failure, determining the mechanisms that will overcome the social dilemma between individual and collective interests inherent in collective goods production is a fundamental question in social science.¹

Collective goods production depends on group members' compliance with behavior that achieves the group's collective goals. The relationship between compliance rate and the amount of collective good produced may be an increasing or decreasing, monotonic or non-monotonic function (Marwell and Oliver 1993;

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¹ A great deal of social scientific work analyzes social dilemmas. Only a fraction of this literature is discussed here, but see Kollock's (1998) extensive review.

Heckathorn 1996), indicating that the link between collective outcomes and group compliance is complex. Oliver (1980), for example, describes goods such as wild-cat strikes and disease prevention through immunization, that require nearly unanimous compliance before *any* of the good is produced, so even high levels of compliance can fail to produce the good desired. In Olson's (1965) privileged groups, in contrast, a collective good may be produced by the contributions of only a few members, so the average level of compliance in the group is low. At another extreme, Heckathorn (1990) describes an "altruist's dilemma" in which compliance levels exceed that necessary to produce the collective good. While "over-production" of clean air may not be problematic, excessive production of some goods creates costs for the group. Heckathorn, for example, describes a "tragedy of the lawns" in which neighbors excessively groom their lawns to the point where the resources and chemicals required to maintain them entail significant costs, e.g., polluted ground water. In short, compliance must be distinguished conceptually and operationally from both the mechanisms said to produce it, and the good itself, such that compliance rates can vary separately from the amount of collective good produced.

Though compliance rates and collective goods production can vary somewhat independently, the same mechanisms are theorized to create both. In his formal analysis of collective goods production, Heckathorn (1996) identifies three mechanisms—voluntary cooperation, incentives/sanctions, and strategic interaction. According to *social identity* theory, voluntary cooperation stems from members' identification with and commitment to the group itself (Turner 1982; Tajfel 1982; Turner and Tajfel 1986).² Social psychologists (Dawes 1980; Kramer and Brewer 1984) and social movement scholars (e.g., Gamson 1991, 1992; Melucci 1995) explain that individual group

members are more likely to cooperate when membership in the group becomes salient to them as an identity.

Alternatively, rational choice (Coleman 1990; Heckathorn 1990; Macy 1991; Opp 1988) and social exchange theorists (Kollock 1994; Sell and Wilson 1991; Yamigishi and Cook 1993) explain that individuals comply with collective goals when cooperative behavior is in their individual interests. Two mechanisms facilitate cooperation according to this view. First, individuals cooperate when they face incentives that reward (or sanction) them for (non)cooperative behavior, independent of the collective good produced by the group. A different mechanism is that of strategic interaction in which individuals cooperate reciprocally.

The mechanisms of identity, incentives/sanctions and reciprocity can be distinguished into two different paradigms of explanation, what Macy (1997) terms the identity versus the interests frameworks. The crux of the disagreement between the competing paradigms is what is considered necessary and sufficient for group cooperation. For the identity framework, identification with the group is sufficient to produce cooperation (Dawes, van de Kragt, and Orbell 1990; Kramer and Brewer 1984). Though social identity theorists concede that individual interests also may be sufficient for cooperation in some groups (Dawes et al. 1990; Turner 1996), they are nonetheless viewed as *not* necessary for cooperation. Instead, according to the identity framework, there are two sufficient causes of cooperation, group identity, and individual interests (see Figure 1, part A).

According to the interests paradigm, in contrast, individual interests (via incentives, sanctions, or reciprocal exchange) are both necessary and sufficient to produce cooperation (Olson 1965; Hechter 1987). Further, according to this view, the observed correlation between identity and cooperation is because group identity is itself a *product* of cooperation, not a cause (see Figure 1, part B). For example, researchers have shown that reciprocity increases feelings of commitment to the group (Lawler and Yoon 1993, 1996). Similarly, norm enforcement can affirm collective values and group identity (Tyler and Boeckman 1997). Though cooperation may be bolstered by a shared sense of group identity in already successful cooperative groups, the interests paradigm claims that the

² Here I refer specifically to *social identity* theory, which is distinct from the body of theory and research known as *identity* theory (e.g., Burke and Reitzes 1991; Stryker 1968). See Hogg, Terry, and White (1995) and Stets and Burke (2000) for discussions of the similarities and differences between the two bodies of research.

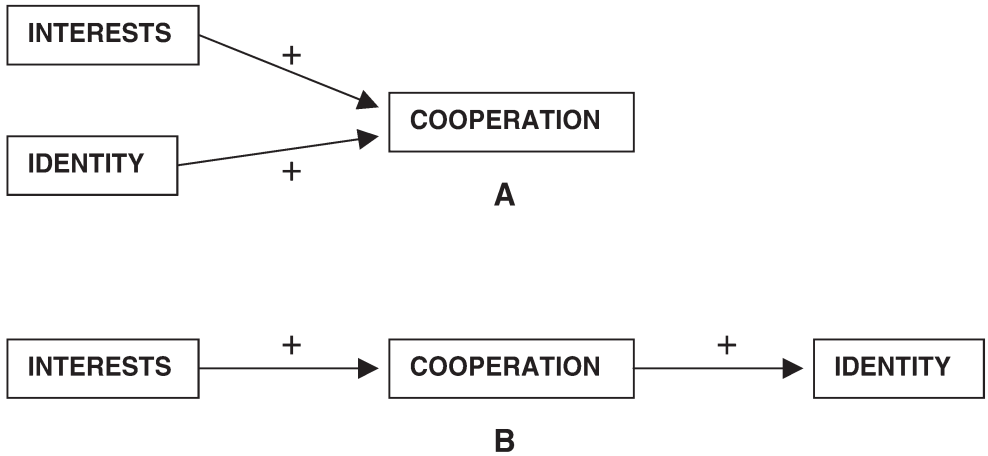


Figure 1. Alternative Causal Processes for the Production of Cooperation according to (A) Social Identity Theory and (B) the Interests Framework

relationship between identity and cooperation is epiphenomenal rather than causal.

An extensive body of experimental research has explored how each of the three mechanisms produces cooperation in small groups. Experimental research is ideal for theory testing because it allows complete control over the conditions and characteristics of the groups being investigated (for reviews of experimental literature on cooperation, see Dawes 1980; Kollock 1998; Yamigishi 1995). Analyzing behavior from social groups in natural settings, however, is also essential for evaluating social theories (Hedstrom and Swedberg 1998). Natural settings allow us to observe and analyze properties of group behavior in real time over a groups' life course, typically allowing a much longer time frame than is possible in experimental settings. Moreover, conditions that create natural experiments offer a much richer environment for analysis of mechanisms and outcomes than all but the most elaborate laboratory experiments. Finding actual social groups with such conditions, however, poses a stiff challenge for researchers. A new form of lending via *microcredit borrowing groups* provides a novel, real-world laboratory in which to analyze cooperation.

I use data from 106 microcredit groups to explore the three different mechanisms for producing cooperation by analyzing both the amount of collective good produced and group compliance overall. In section one I draw on

identity and interests theories and research to develop hypotheses regarding cooperation in microcredit groups. Next I describe what microcredit is, how it operates and why it is a good setting for analyzing collective goods. In section three I describe my data and the methods I use to analyze hypotheses from section two. Results are presented and discussed in sections four and five. The findings reveal some support for each of the theorized mechanisms, but with implications for both how we explain group cooperation, and how we examine it methodologically. My findings also have implications for research on the concept of embeddedness, which explores how social relationships affect behavior and outcomes. Finally I discuss some of the behavioral implications of these findings for encouraging cooperation in various types of groups interested in producing collective goods.

THEORETICAL DISCUSSION AND HYPOTHESES

SOCIAL IDENTITY FRAMEWORK

Group identity is a widely used concept, but here I use it specifically to refer to social identity theory. In the simplest terms, social identity theory argues that individuals are more willing to cooperate in a group if they feel part of the group, that is, they *identify* with the group (Tajfel 1981). Social psychologists who study small group behavior have demonstrated that

merely categorizing individuals as a group leads to increased cooperation (Brewer and Kramer 1986; Dawes, van de Kragt and Orbell 1990; Kramer and Brewer 1984). That is, the salience of the group for individual members influences cooperative behavior in the group (De Cremer and Van Vugt 1999; van Oudenhoven et al. 1996). Similarly, when individuals know that they experience a “common fate” with others, the level of cooperation increases (Brewer and Kramer 1986). In larger groups, social movement scholars explain that groups in which members are linked by a common identity will be more likely to act in collective action situations (Melucci 1995; Taylor and Whittier 1992; Hercus 1999).

Social identity scholars also theorize that actors come to identify with those they see as similar to themselves, developing a group identity based in perceptions of shared social categories (Tajfel 1982; Turner 1982; Turner and Tajfel 1986). Perceived similarities make group membership salient and thereby facilitate cooperative behavior within the group. Cerulo (1997) writes that a collective identity leads “group members. . .to consciously. . .cooperate” (p. 393). According to social identity theory, the mechanism of group identity is sufficient to produce cooperation, such that groups in which members feel membership is salient as an identity will have both higher levels of compliance and greater production of collective goods.

Hypothesis 1: Groups in which members identify with the group will produce (a) more collective good, and (b) higher group compliance rates.

INTERESTS FRAMEWORK

Interest-based explanations of cooperation build on Mancur Olson’s (1965) argument that collective action is difficult to produce because although the benefits are shared by all, the costs are borne individually, so individuals will rationally choose not to cooperate. According to Olson, successful collective action typically requires selective incentives, i.e., rewards (or sanctions) to individuals for compliant (non-compliant) behavior. Scholars have extended Olson’s argument in two ways to address cooperation in the absence of formal incentives, via

the mechanisms of norm-based sanctions and reciprocity.

The mechanism of sanctioning is extensively explored in theories of social norms (e.g., see Hechter and Opp 2001), which focus on social control as the key mechanism to facilitate cooperation in social dilemmas. Heckathorn (1988, 1990) explains that the externalities inherent in collective goods increase actors’ interests in ensuring that others’ comply with group expectations, leading to *sanctioning* that raises the level of social control in the group (see also Coleman 1990:270–3). Sanctions encourage compliance by limiting members’ incentives and opportunities for noncompliance, and compliance facilitates production of collective goods (Heckathorn 1988, 1990). Macy (1993) similarly demonstrates that sanctioning increases compliance, but he explains that actors do not need to calculate the marginal returns of complying in the face of sanctions; rather they *learn* to comply over time from experience. Regardless of whether actors learn or calculate to comply when facing sanctions, sanctioning behavior is argued to be key to producing collective goods.

Hypothesis 2: Groups that sanction will produce (a) more collective good, and (b) higher group compliance rates.

Other scholars focus on how social relationships among group members influence cooperative behavior. Actors embedded in social relationships, for example, are more likely to trust one another and to cooperate (Granovetter 1985; Uzzi 1996). Embedded ties facilitate the production of diverse collective goods including, informal economic exchange (DiMaggio and Louch 1998), firm survival (Uzzi 1996), coordination of political action among corporate actors (Mizruchi 1989), even decreasing price volatility in financial markets (Baker 1984, see also Uzzi and Lancaster 2004). Embedded ties also encourage compliance by limiting opportunism in formal and informal exchange relationships (Portes and Sensenbrenner 1993; Uzzi 1996).

A related but more formal theoretical literature explores the mechanism of *reciprocity*, or dyadic exchange, for collective goods production. According to Blau, “social exchange relations evolve in a slow process, starting with minor transactions in which little trust is

required because little risk is involved and in which both partners can prove their trustworthiness, enabling them to expand their relation and engage in major transactions" (1968, p.454; see also Molm and Cook 1995). Exchange that entails low risk provides information about the reliability of actors that may facilitate more extensive cooperation and even provide the basis for group-level cooperation. Experimental work in exchange theory demonstrates that dyadic exchange within a group will produce group-level cooperation (Yamigishi and Cook 1993). Similarly, work in experimental game theory finds that reciprocity increases cooperation (e.g., McCabe 2003; McCabe et al 1998). Evolutionary psychologists even suggest that the human mind has evolved and is functionally specialized for reciprocity in order to solve collective action problems (Cosmides and Tooby 1992; see also McCabe 2003).

This definition of reciprocity is different from some of the important game theoretic work on social dilemmas, most prominently work by Axelrod (1984) and others (e.g., Bendor 1987; Nowak and Sigmund 1992), which characterizes an actor's tit-for-tat strategy of cooperation defection in response to an interaction partner's behavior as a 'reciprocal strategy.' My use of reciprocity is also somewhat broader than exchange theorists' use of the term 'reciprocal exchange,' defined as one type of dyadic exchange in which actors make simultaneous decisions. (For more complete reviews of the extensive experimental and game theoretic research on reciprocity in social dilemmas see Cook and Cooper 2003; Ostrom 2003; Ostrom and Walker 2003).

Reciprocity further strengthens cooperation because noncompliance can be met with credible threats of withdrawal of cooperation. Reciprocity allows actors to make "credible commitments" (Schelling 1984) such that assurances of "I will cooperate so long as you do" are valid and self-reinforcing. Molm and her colleagues (2000), for example, find that reciprocal exchange produces high levels of trust and commitment between exchange partners. Horne (2001) uses experimental data to show that interdependent relationships among group members increase group compliance. The interests paradigm explains that reciprocal exchange relations between members of a group will facilitate cooperation.

Hypothesis 3: Groups in which members are engaged in reciprocal relationships will produce (a) more collective good and (b) higher compliance rates.

MICROCREDIT BORROWING GROUPS

I study group cooperation in *microcredit borrowing groups*. Microcredit refers to relatively small loans offered to entrepreneurs who have difficulty obtaining credit through banks. Muhammad Yunus (1999) started the Grameen Bank of Bangladesh in 1976, in which he conceived of making capital available to very poor rural women by forming small groups of borrowers from the same community to serve as a collective source of collateral to compensate for individuals' lack of financial collateral. The Grameen Bank furnishes the loan capital, while group members themselves provide the screening and oversight of borrowers. Similar to informal lending circles known as rotating savings and credit associations (Ardener 1964; Light 1972:19–44), Grameen borrowing groups rely on pre-existing personal relationships among members as the basis for group cooperation (Besley and Coate 1995; Woolcock 1998; Yunus 1993).

Though microcredit is found primarily in developing countries around the world, it also operates in the United States.³ By the late 1990s, nearly 200 microcredit programs in the United States loaned over \$126 million to microbusiness entrepreneurs, assisted in the creation of over 30,000 new businesses and served over 170,000 clients (Severens and Kays 1997). Similar to their counterparts in the developing world, U.S. microcreditors use borrowing groups to facilitate access to credit, contingent on the approval and repayment status of fellow group members.⁴ Microcreditors are not banks; they do not offer depository or any financial services other than small-business loans (McLenighan

³ For reviews of microcredit in developing countries, see Woolcock 1998; Morduch 1999. For more on microcredit in the United States, see Anthony 1997; Servon 1999; Sherrard Sherraden et al 2004; Taub 2004.

⁴ Not all microcreditors in the United States use borrowing groups, some lend directly to individuals.

and Pogge 1991). Most are nonprofits that offer credit (at interest rates comparable to other small business loans by banks) as a method of economic development and/or poverty alleviation (see Servon 1999; Sherrard Sherraden, Sanders and Sherraden 2004; Taub 2004).

Microcreditors use graduated loan packages (e.g., all borrowers must begin with a \$500 loan, with repayment in full allowing access to larger loans) and borrowing groups to compensate for the "high risk" characteristics of microcredit borrowers, which include low income, poor credit histories, or often, very small businesses. The vast majority of microcredit borrowers operate sole proprietorships in which they are the only employee, with annual sales of less than \$20,000 (Clark and Huston 1993). These so-called microbusinesses range from casual, part-time "hobbies" such as flower arranging, to self-employed service providers such as bookkeepers, to full-fledged small businesses, such as beauty shops. Entrepreneurs join borrowing groups for both the loan capital and the opportunity to meet other small business owners (Anthony 1997; Servon 1999).

Borrowing group formation is a haphazard process; it is neither random nor consciously directed by the microcreditor or the members themselves. Importantly, unlike microcredit in the developing world where borrowing group members have strong, embedded ties, members of borrowing groups in the United States are less likely to know one another prior to group membership (Edgcomb, Klein, and Clark 1996, p.13). Microcreditors attract potential borrowers by holding information meetings in community venues at which microcredit representatives explain how borrowing groups work: (1) members submit individual loan applications to their group, which are approved or denied by the borrowing group independent of the microcreditor; (2) credit is available only when all members with loans outstanding are current on their loan payments; and (3) only after a new borrower makes three timely payments is another member eligible to borrow. Individual access to loan capital is not limited by other members taking loans, only by a fellow borrower's failure to repay (i.e., credit availability is not a rival good). Groups are required to meet at least once per month, but they may choose to meet more often. The microcreditor encourages, but does not require, groups to cre-

ate rules for meeting attendance or handling repayment delinquency.

Borrowing groups dissolve for one of two reasons. Many groups end because group members do not desire further loans from the microcreditor; some members move on to conventional bank loans. Other groups end in failure. If a group member defaults on a loan (defined by the microcreditor studied here as a loan payment more than 120 days past due), credit availability is ended for the group. After a default, other group members with outstanding loans are still obligated to repay those loans, and they nearly always do. Given the high-risk characteristics of most borrowers, group failure is surprisingly rare in microcredit (Besley and Coate 1995; Woolcock 1998).

Payment delinquency prior to default also has a negative but less drastic effect on borrowing groups. Loan delinquency (defined as a loan payment more than 30 days past due) freezes credit availability in the group, but credit is restored if the delinquent borrower makes his or her payment before the 120-day past due deadline, or if the borrower refinances the loan. Delinquency negatively effects group members' access to credit, but the group can recover from delinquency so that members can continue to borrow loans. Delinquent borrowers are able to refinance loans up to the point of default, which helps to limit group failure.

Three characteristics of microcredit borrowing groups make them ideal for studying cooperation. Indeed, the similar group characteristics found in informal rotating savings and credit associations are used anecdotally as examples of group cooperation by many scholars of collective action, including Coleman (1988), Granovetter (1985), Hechter (1987), and Portes and Sensenbrenner (1993). First, each borrowing group produces the good of credit availability as a collective good of the group. Unanimous compliance in the form of on-time loan payments is necessary to continually produce the collective good of credit availability.

Second, acquiring credit through a borrowing group creates a social dilemma in that an individual member's repayment behavior entails externalities for other members. Each borrower in a group has some individual interest in not repaying his loan, but payment delinquency restricts access to credit for other group members. As noted above, because microcredit

borrowers already are considered high risks for bank loans, they face few negative consequences from defaulting on a microcredit loan. That means that delinquency and default on a microcredit loan likely are more costly for *other* members of the borrowing group than for a borrower herself.

Finally, borrowing group members themselves manage the group and collectively make all loan decisions. Collective decision-making ensures that all members agree to risk their own future access to credit with each loan approval. Because borrowing groups are required to meet regularly, and can decide themselves if, when, and how to control member noncompliance, members have sustained contact to both approve loans and monitor repayment. This sustained contact also provides group members the ability to identify commonalities and to establish new or strengthen already existing relationships within the group.

DATA AND METHODS

The borrowing groups analyzed here are from a large microcreditor called Working Capital. Operating from 1990 to 2001,⁵ Working Capital was a community development nonprofit organization that used borrowing groups to extend credit in over 70 communities in seven states (Harvard Business School 1993). From 1990 to 1995, Working Capital facilitated the creation of a total of 195 borrowing groups in Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont. (Working Capital also had additional groups operating in Florida and Delaware, but data for these groups were not available.) Over this period, members of these groups borrowed nearly 1,700 loans, valued at over \$2.1 million.

The sample of borrowing groups analyzed here is part of a larger project on microcredit which gathered both member and group data from a representative sample of all active and inactive members of Working Capital's 195 New England groups formed between January 1990 and December 1995. Data for the entire population of Working Capital borrowing

groups includes: group start dates and, if the group has ended on or before December 1995, end dates; number of group members; group borrowing and repayment rates; as well as all group members' responses to a set of closed-ended questions about reasons for starting their business.

In addition, data on individual borrowers and groups were gathered through a telephone survey in December 1995 of a representative sample of all members (population $N = 1,017$ members from 195 groups formed over the 5-year period), including members from both active and nonactive groups, stratified by state ($n = 298$ from 150 groups; response rate = 63% of valid phone numbers; 14% refused; 23% no contact with six callbacks). A subsample of the telephone survey respondents ($n = 177$ respondents from 106 groups)⁶ was asked detailed questions regarding their group activities (described later).

The dataset of 106 borrowing groups analyzed here is comprised of group-level data from the telephone survey subsample matched with the Working Capital group data on tenure, size, borrowing, and repayment rates for each group, and includes both currently active groups and groups that ended prior to the survey date. The data capture all 106 groups from formation to either of three conditions in December 1995, the end of the observation period: (1) end date by failure or default (9% of groups ended because of default); (2) end date, no failure (13%); (3) groups currently operating (78%). Thus, there is no left censoring of the data, but the data are right censored in that some groups have no known end date at the end of the observation period. This also means that some respondents (from 22% of groups in the sample) were asked questions about their group after the group ended, whereas the majority was surveyed while the group was still active. When I introduce the variables below, I discuss in more

⁵ In 2001, Working Capital merged with a larger, international nonprofit microcreditor called ACCION (<http://www.accion.org>).

⁶ One member was surveyed from 62 groups, two members were surveyed from 31 groups, and more than two members were surveyed from 13 groups. Responses for group characteristics did not vary significantly across multiple group members, and groups in which multiple members were surveyed did not differ from groups in which only one member was surveyed.

detail the potential impact of the fact that some groups had already ended.

Compared to the population of Working Capital groups, groups in the sample are more likely to be active at the time of the survey, defined as having loan activity during 1995 and no end date (see Table 1). Sample groups are also somewhat larger (6.1 members versus 5.3 members), have slightly longer tenure (24.9 months versus 21.4 months), and experience more borrowing (10.8 loans versus 8.6 loans) than the population. Sample groups are also somewhat more likely to be delinquent in loan repayment (58% of sampled groups had some delinquency versus 45% of groups in the population). Though the 106 groups in the sample differ somewhat from the population, the sample appears to be a fairly good representation of Working Capital borrowing groups in that it includes both successful and unsuccessful, active and inactive groups. In addition, there are no significant differences between the population and sample groups on the adjusted variables (using natural log transformations) used in the analyses described in detail below. The data are not meant to be representative of all microcredit borrowing groups in the United States.

COLLECTIVE GOOD: CREDIT AVAILABILITY

In microcredit borrowing groups, the collective good is credit availability. Group members gain access to credit by participating in a borrowing group, collectively approving loans, and individually borrowing and repaying loans. The number of loans borrowed in a group is a measure of the amount of collective good produced by the group, i.e., it indicates the group's suc-

cess in cooperating to gain access to credit. On average, groups borrowed 10.8 loans, with a range from 1 to 34 loans (or less than 1 loan per member in some groups, up to as many as 4 loans per member in other groups). Given the positive skew of this variable, I transform it by computing its natural log (see Table 2). I analyze the mechanisms for producing collective goods by regressing the natural log of group loans on the independent variables described below, using ordinary least squares (OLS) regression. Descriptive statistics for all variables are shown in Table 2. (Correlation table is shown in the Appendix.)

COMPLIANCE: DELINQUENCY RATE

Compliance in a borrowing group is the repayment of loans, since late payments restrict access to the good of credit. Delinquent loan payments, therefore, measure group *noncompliance*. According to Working Capital rules, loans for which any payment was late beyond 30 days cause credit to be frozen in the group, and so are designated as delinquent loans. I analyze compliance in the group in two ways. I first calculate the delinquency rate as the proportion of all group loans that were delinquent. Conditional on a group having any delinquency, the delinquency rate is regressed on the independent variables using OLS regression.

Second, I analyze the factors associated with the number of delinquencies in a group. Just over half of all borrowing groups in the sample (58%) have at least one delinquent loan, while the number of delinquencies varies from 0 to 11. I calculate a zero-inflated Poisson (ZIP) regression model (Long and Freese 2001:250–62)

Table 1. Population and Sample Working Capital Groups Operating between 1990 and 1995

	Population			Sample		
	N	%	SD	N	%	SD
Number of Groups	195	100	—	106	100	—
Active Group: No Group End Date	110	56	.50	83	78	.41
Mean Size of Group	5.3	—	2.4	6.1	—	2.5
Group Tenure (months)	21.4	—	11.3	24.9	—	11.2
Natural Log Group Tenure	2.9	—	.58	3.1	—	.52
Loans Borrowed	8.6	—	6.8	10.8	—	7.6
Loans per Member	1.6	—	.74	1.7	—	.80
Groups with Any Delinquency	87	45	.50	63	58	.50
Proportion of Group Loans Delinquent	.16	—	.25	0.20	—	.26

Note: SD = standard deviation.

Table 2. Microcredit Borrowing Group Characteristics

	Mean	SD
Dependent Variables		
Access to Credit (log group loans)	2.13	.75
Compliance: Delinquent Loans		
Number (range, 0–11)	2.1	2.9
Percent	.20	.25
Independent Variables: Controls		
Number of Members (natural log)	1.72	.44
Tenure, in months (natural log)	3.10	.52
Large Group ^a	.36	.48
Previous Ties ^b	.75	.43
Independent Variables		
Group Strength (group strength rating, 1–10)	7.33	2.0
Group Commonality (% with same reasons for starting business)	.75	.19
Sanctions (against members for meeting and/or loan delinquency, 0–2)	.87	.83
Reciprocity (exchange relationships, 0–2)	1.15	.65

Note: SD = standard deviation. N = 106 groups.

^a Groups with ≥ 7 members = 1.

^b Groups in which at least 2 members had ties prior to joining the group = 1.

that accounts for both overdispersion (positive skew) and excess zeros in this count variable. Zero-inflated count models, such as the one presented here, assume there are two latent categories in the data. Cases in the *always-0* category have an outcome of 0 with probability of 1, while cases in the *not always-0* category may have a 0 count, but there is a nonzero probability of having a positive count. Zero-inflated count models predict category membership first using a binary logit model. Next they compute the probability of each count, in this case using a Poisson regression, for those in the *not always-0* category. Finally, zero-inflated count models compute the observed probabilities as a mixture of the probabilities for the two categories.

INDEPENDENT VARIABLES

Group identity is measured in two ways. First, *group strength* is based on a question from the telephone survey asking respondents to “rate the overall strength of [their] group on a scale of 1–10.” In cognitive testing of the question in pretests and with a subset of respondents, respondents said they understood the question to mean the extent to which group members identify with their group and, as one respondent put it, “feel like a group.” Groups have an average rating of 7.3 (see Table 2).

Recall that about one-fifth of the groups were surveyed after the group ended, including nine percent because of group failure due to default. The circumstances surrounding the ending of the group could, and likely did influence members’ perceptions of group strength, particularly for groups that ended in default; groups that ended in default have significantly lower group strength (data not shown). The vast majority of groups however, were active at the time of the survey.⁷ Since groups have varying start dates, they are asked about their perception of group strength at different points of time during the groups’ tenure. The analyses control for group tenure (see below), and there is no correlation between active status and tenure (i.e., inactive groups did not have shorter tenure than currently active groups) or between tenure and group strength.

Admittedly group strength does not fully capture the concept of group identity since group strength may be interpreted as group success rather than “group feeling” (though group strength is not significantly correlated with either borrowing or delinquency, see Appendix

⁷ Including a variable for groups’ active status does not substantively change any of the results, and it is not significantly associated with any of the dependent variables except group loans ($p < .05$).

Table A1). Therefore I also measure the *group commonality* aspect of group identity with a variable for the percent of group members who express the same reasons for starting their business. All group members were asked to choose which answer best reflected their personal reasons for starting their business: working with people, being one's own boss, like to sell, like to make things, or because no jobs were available. Fifteen groups have missing data and were replaced with the mean. In the average group, about three quarters of group members give the same reason for being in business (see Table 2); over one-third of groups have less commonality, while in 20 percent of the groups *all* members have the same reason for going into business.⁸

Borrowing groups are able to create their own rules regarding the consequences of member noncompliance. Indeed, because the microcreditor does not require groups to sanction noncompliance, groups vary on whether, and for what, they sanction members. Members who miss group meetings postpone collective loan decisions, thereby disrupting members' access to capital. Delinquent loan payments are even more problematic for borrowing groups because credit is frozen in the group until all loans are current. Some groups, for example, impose a small fine for members who miss more than one group meeting; other groups impose a fine for late loan payments (in addition to the late payment charged by the microcreditor). Still others impose more informal sanctions, for example, group members visit a delinquent member at home *en masse* to confront him or her about the late payment. In the telephone survey, group members were asked two questions: (1) did your group ever take any type of action against members for missing meetings; and (2) did your group ever take any type of action against members for missing loan payments. The variable *sanctions* measures whether a group exerted no sanctions, one type of sanction for either meeting or loan delinquency but not both, or both types of sanctions, and so varies between 0 and

2. Forty-two percent of groups exerted no sanctions, 30 percent sanctioned for either meeting attendance or loan delinquency, while 28 percent exerted sanctions for both types of delinquency.

This measure of sanctions is in part endogenous to the dependent variable of loan delinquency, such that sanctions for loan delinquency can occur only after the delinquency, yet I am analyzing the effect of sanctions on the extent of loan delinquency in a group. The measure of sanctions used here, which captures not only sanctioning for loan delinquency but also sanctions for the more minor infraction of meeting nonattendance, analyzes the impact of groups that take coordinated action against noncompliant members on the individual delinquency that has severe negative consequences for the group, loan delinquency.⁹ Overall, 38 percent of groups have at least one loan delinquency and also sanction; 22 percent of groups have at least one delinquency *but do not sanction*; 21 percent of groups have no loan delinquencies *but do sanction*; 20 percent of groups have no loan delinquencies and no sanctions.

The two regressions of loan delinquency account for the relationship between sanctioning and delinquency. The ZIP regression models the impact of sanctions in groups that have zero delinquency (in which some sanction but others do not) as well as the impact of sanctioning or not on the total number of delinquencies in groups with any positive delinquency. The OLS regression of delinquency rate is conditional on groups having at least one delinquency, so analyzes the impact of sanctions only in groups where all had the "demand" to sanction loan delinquency.

Finally, in the telephone survey, respondents were asked two questions regarding the extent of interpersonal cooperation among members: (1) did members ever cooperate on personal matters outside of the group (e.g., babysitting, carpooling); and (2) did members ever cooperate on business matters outside of the group (e.g., referring customers or sharing advertising expenses). Group *reciprocity* varies between 0

⁸ Using a higher threshold measure of commonality by using a dummy variable for groups in which 100 percent of members have common business reasons, yields the same substantive results reported below.

⁹ Using a dummy variable for meeting sanctions only, which is not endogenous to loan delinquency, produces substantively identical results in the analyses of delinquency reported below.

and 2. The average group had a reciprocity level of 1.15.

CONTROL VARIABLES

Groups vary in size from 4 to 10 members, which should logically effect the number of loans borrowed in a group. I therefore control for group size by using the natural log of number of *members* in the group. In addition, it may be important to control for whether there are returns to scale (positive or negative) for large groups, such as the approximately one-third of groups with seven or more members. Although large groups might be expected to borrow more loans overall, given the staggered borrowing required in microcredit groups, members of large groups may be at a disadvantage. Therefore I include a dummy variable indicating *large group size* (7+ members) as a control variable. Though number of members and large size are highly correlated ($r = .74$), their multicollinearity is not problematic (variance inflation factors < 2.5 in OLS regression models).

Groups in the sample start at various times over the observation period of 1990–1995, so it is necessary to control for group age because newer groups have less time in which to borrow loans or risk nonpayment. Thus, a control for group *tenure* is included, measured as the natural log of the total months of tenure. The average group has a tenure of nearly 25 months.

Though I noted above that U.S. borrowing groups are unlike their counterparts in the

developing world in that members are less likely to know one another before joining the group, it is still the case that in many groups some members knew one another prior to joining the group. I control for these *previous ties* with a dummy variable for groups in which at least two members knew one another prior to joining the group.

Some readers may be concerned that I do not control for characteristics typically associated with borrowing and repayment, such as individual creditworthiness. Although all members of borrowing groups are “high risk” in some ways, there is substantial variation among members on education, income, and credit history. In analyses of individual-level borrowing and repayment not shown here (see Anthony and Horne 2003), surprisingly, these standard indicators of creditworthiness are either not significant or are in the opposite direction for explaining borrowing or repayment (e.g., lower education is associated with increased borrowing).

RESULTS

CREDIT AVAILABILITY

Microcredit borrowing groups provide access to credit as a collective good. Column one in Table 3 shows the results of the OLS regression of group loans on number of members, group tenure, large groups, previous ties, group strength, group communality, sanctions and reciprocity. Three of the four hypothesized mechanisms for producing collective goods are

Table 3. Unstandardized Coefficients for Group Loans and Delinquency Rate

	Log Group Loans		Delinquency Rate ^a	
Constant	-2.48**	(.46)	1.21**	(.31)
Log Members	1.06**	(.16)	-.11	(.15)
Log Tenure	.71**	(.10)	-.21**	(.07)
Large Group	-.38**	(.15)	.09	(.10)
Previous Ties	-.04	(.12)	-.05	(.07)
Group Strength	.06*	(.02)	-.01	(.02)
Group Commonality	.04	(.26)	.15	(.16)
Sanctions	.12*	(.06)	.02	(.04)
Reciprocity	.16*	(.08)	-.09*	(.04)
Adjusted R ²	.58**		.21**	
N	106		63	

Note: Standard errors in parentheses.

^a Conditional on any delinquency = 1.

* $p \leq .05$; ** $p \leq .01$ (two-tailed).

significant. Group strength is positively associated with more borrowing, supporting Hypothesis 1a. Group commonalities among members are not associated with increased borrowing. For the interests framework, groups that sanction borrow more (Hypothesis 2a), as do groups in which members have reciprocal relationships (Hypothesis 3a). It is notable, given the extent of theoretical disagreement among theories of collective action, that both identity and interests mechanisms are significant, suggesting that competing mechanisms potentially coexist and reinforce one another in actual social groups (on this point, see Elster 1989:133). I return to this issue in the discussion section below.

Three of the four control variables are highly significant. As expected, groups with more members borrow significantly more loans. Very large groups (seven or more members), however, borrow fewer loans overall indicating negative returns to scale. Group tenure is also positive and significant indicating that groups that have longer tenure borrow more loans. Somewhat surprising is the finding that pre-existing ties between members do not significantly affect borrowing in the group.

COMPLIANCE

Recall that group delinquency measures non-compliance in the group. Thus the mechanisms expected to increase compliance should have a negative effect in the analyses that follow in that the mechanisms should *reduce* delinquen-

cy. Column two in Table 3 shows the OLS results of delinquency rate (number delinquent per total group loans) regressed on control and independent variables, conditional on the group having at least one delinquent loan. Only reciprocity is significant for limiting the delinquency rate in borrowing groups, supporting Hypothesis 3b that groups with high levels of reciprocity will have higher compliance. Neither measures of group identity (strength or commonality) nor sanctions are statistically significant for limiting the delinquency rate in borrowing groups. Of the control variables, only group tenure is statistically significant; the longer a group survives the lower its delinquency rate.

I next analyze the number of delinquencies in a group by computing a zero-inflated Poisson regression model (in STATA-7, ZIP command) to account for both the over-dispersion and excess number of zero counts in the variable (see Long and Freese 2001:250–62). Results for these models are separated into two parts: the first set of coefficients is for cases in the *not-always-0* category (column one in Table 4); the second set, labeled “inflate” (column two in Table 4), correspond to the binary model predicting category and can be interpreted similar to estimates from logistic regression. I use the following covariates as both the independent variables and the inflated independent variables (for the binary model): members, large group dummy, tenure, previous ties, group strength, group commonality, sanctions and reciprocity. The logged number of group loans is designat-

Table 4. Zero-inflated Poisson Regression Unstandardized Coefficients for Number Delinquent Loans

	Number Delinquent (Non-zero Category)		Inflated (Always-zero Category)	
Constant	-2.73**	(.74)	-2.39	(2.92)
Log Members	.66	(.41)	-2.07†	(1.22)
Large Group	.21	(.27)	.69	(.95)
Previous Ties	-.06	(.20)	.89	(.74)
Group Strength	.09†	(.04)	.25	(.19)
Group Commonality	1.34**	(.45)	3.73†	(2.21)
Sanctions	.15	(.10)	-.23	(.34)
Reciprocity	-.54*	(.24)	-.23	(1.07)
Log Likelihood	-188.8			
χ^2	35.7**			
<i>df</i>	7			
Vuong	3.39**			

Note: Standard errors in parentheses. Group tenure is exposure variable.

† $p \leq .10$; * $p \leq .05$; ** $p \leq .01$ (two-tailed).

ed as an exposure variable in the model. The significant Vuong test statistic indicates that the zero-inflated model is preferred to a standard Poisson regression model.

For predicting the number of delinquencies (for groups in which number of delinquencies > 0), only reciprocity significantly limits delinquencies, supporting Hypothesis 3b. In contrast, both group strength and particularly group commonality are positively associated with delinquencies in a group, contradicting Hypothesis 1b. Sanctions is not significantly associated with number of delinquencies. None of the control variables are significant.

For groups in the zero-delinquency category (column two in Table 4), only groups with high levels of commonality are significant at the $p < .10$ level. Given their association with an increased number of delinquencies, the two findings together mean that groups in which members have high commonality are significantly more likely to have zero delinquency, but once these groups have one delinquency, they are at increased risk to have more. As to the control variables, the number of members is significant and negative, indicating that groups with more members are less likely to be in the zero delinquency category.

In estimating both the amount of collective good produced (loans) and group compliance (delinquency rate), the control variable group tenure is the strongest predictor. This means, not surprisingly, that groups that survive longer have the highest levels of cooperation. Explaining that groups that endure are the most successful, however, is really no explanation at all since group tenure itself can be conceived of as group success. Indeed, it begs the question of what factors matter for group longevity. Do group identity or interest mechanisms affect group tenure?

I explore this question by using event history analysis (using Cox regression; Allison 1984) to estimate months of group tenure as a function of number of loans, number of members, number delinquent loans, large group size, previous ties, and the four hypothesized mechanisms of group strength, group commonality, sanctions and reciprocity. Because I have the exact start and, where applicable, end dates of all groups, I am able to determine the effects of covariates on groups' tenure over the period of analysis (1990–1995). The dependent variable

is the duration of the group in months (natural log) from formation to when the group ended or the sample period ends. Twenty-three groups (22%) stopped operating during this period (i.e., experienced a nonsurvival event).

Table 5 shows the maximum likelihood coefficients from the Cox regression of group tenure on control and independent variables. Of the four hypothesized mechanisms for cooperation, both groups that sanction ($p < .10$) and particularly groups with high levels of reciprocity, have longer duration. Reciprocal groups and groups that sanction survive longer and thus are more able to gain the benefits associated with group survival, i.e., high rates of borrowing and compliance. Neither group strength nor group commonality is significant for predicting group tenure.

Groups with higher borrowing rates are less likely to continue operating for another month. This means that, controlling for other factors, groups that borrow *more* loans are more likely to end. In contrast, delinquency is not significantly associated with tenure. These two findings support the assertion made earlier that borrowing groups are more likely to end because they have successfully met the credit demands of their members, not because they failed. Number of members has no effect on group tenure, but the dummy variable for large group size significantly reduces a group's tenure. Surprisingly, groups in which members have

Table 5. Maximum Likelihood Coefficients from a Discrete Proportional Hazards Model of Group Tenure

	Months Group Tenure	
Log Group Loans	-1.69**	(.42)
Log Members	.79	(.76)
Number Delinquent Loans	.07	(.13)
Large Group	-1.93*	(.83)
Previous Ties	-1.20*	(.52)
Group Strength	-.06	(.09)
Group Commonality	-.51	(1.44)
Sanctions	.62†	(.34)
Reciprocity	.95**	(.37)
-2LL		144.7
χ^2		32.1**
df		9

Note: Standard errors in parentheses. N = 106. Percent censored = 78%.

† $p \leq .10$; * $p \leq .05$; ** $p \leq .01$ (two-tailed).

previous ties are less likely to continue their tenure.

DISCUSSION AND CONCLUSION

Theorists have identified competing mechanisms for producing group cooperation. The social identity paradigm explains that the salience of the group itself, as an identity to members either through strong identification with the group or extensive commonalities among members, promotes voluntary cooperation within groups. Alternatively, the interests paradigm explains that sanctioning or reciprocity produce cooperation in groups by directly affecting members' individual interests in participation. Microcredit borrowing groups provide a real-world laboratory in which to analyze how these mechanisms are associated with collective goods production and compliance in naturally occurring groups.

By analyzing both borrowing and delinquency in microcredit groups, as well as group tenure and survival, I find that group strength, group commonalities, sanctions, and reciprocity have differential effects. Group strength, sanctions, and reciprocity are all positively associated with increased borrowing in microcredit groups, indicating that both identity and interests are associated with the production of collective goods. For group compliance, however, neither group strength nor group sanctions matter. Instead, groups high in commonality are somewhat more likely to have full compliance (i.e., no delinquency), but once a high-commonality group has one delinquent loan, it has significantly more delinquencies than other groups. Only reciprocity is associated with lower delinquency rates. In addition, reciprocal groups, and to a lesser extent those that sanctioned have significantly longer group tenure and survival.

Why do mechanisms contribute differently to collective goods production, compliance, and group survival? Despite research that uses these terms interchangeably, collective goods production and compliance appear to entail related yet distinct social processes such that mechanisms that may enable group cooperation initially are not necessarily effective for maintaining cooperation over time (see also Heckathorn 1996). For example, it is unclear why sanctions facilitate borrowing but do not

limit noncompliance in borrowing groups. Given that I measure sanctions only *after* delinquency has occurred, and capture neither the frequency nor intensity of sanctioning, this variable may not be robust enough to capture the full extent of social control in a group. Further, the partial endogeneity of the sanctions measure may limit my ability to find an effect. Theoretically, when sanctions are delivered only *after* noncompliance they may be too little, too late to stop a cascade of noncompliance from actors in a group.¹⁰ It is for this reason that Ostrom (1990) argues that successful groups use *graduated* sanctions in producing collective goods. Graduated sanctions entail minor punishments for initial instances of noncompliance that are ratcheted-up for subsequent transgressions. Future research should explore how variations in the type, frequency and intensity of sanctions effect group cooperation and compliance over time.

Similarly, group identity is associated with more collective good but not compliance in borrowing groups. These findings on identity are consistent with both of the alternative explanations offered by the identity and interests paradigms in which identity is causal for social identity theory, but is an outcome of group cooperation for the interests paradigm. Theoretically, social identity explanations do not explicitly examine identity's influence on compliance over time. Presumably, so long as group members maintain a collective identity, cooperation will persist. The findings from this study suggest that group identity may indeed generate cooperation initially, but if group members do not establish the interaction mechanisms necessary to maintain it, such as interdependent reciprocal relationships or social enforcement mechanisms, group cooperation will not be sustained. The idea that identity may

¹⁰ Some economic and game theoretic models explain that it is merely the threat of sanctions that influence cooperation (e.g., Cremer 1986; Messner and Polborn 2003), so we would not necessarily expect to see an association between actual sanctions and compliance. Unfortunately my data do not indicate whether groups informed members about potential sanctions. My thanks to an *ASR* reviewer for making this point. See Anthony (2003) for more discussion of social control in borrowing groups.

encourage cooperation initially but cannot ensure group compliance over time is supported by the specific finding that high-commonality groups are more likely to be fully compliant, but once there is even one delinquency, high-commonality groups have significantly more delinquencies. Though the nature of the data here cannot allow strong conclusions, the findings suggest that identity may be endogenous to, but yet not fully determined by, successful group cooperation.

A potential criticism of this analysis of microcredit groups is that it does not adequately test the identity concept because it fails to capture the ethnically based entrepreneurial groups often found in immigrant communities in which group members have highly embedded social ties (e.g., Portes, Haller, and Guarnizo 2002; Sanders, Nee, and Sernau 2002). Certainly microcredit groups in developing countries rely for their success on strongly embedded ties among group members (Woolcock 1998). Yet, equating the concept of group identity with the concept of embeddedness is highly problematic because it conflates not only distinct theoretical concepts but also discrete and potentially nested mechanisms. Identifying a group as embedded typically means that members have interdependent, reciprocal relationships, extensive informal social control (i.e., ability to sanction with great efficacy), and strong group identity. That is, the three mechanisms this paper seeks to examine are intertwined in what is often labeled an embedded group. For example, consider the case of immigrant groups in my sample. About 10 percent of the borrowing groups in the sample used here are composed of Dominican immigrants (unfortunately data on the racial or ethnic composition of other groups do not exist). Members of these Dominican groups are very likely to know one another before joining the group, they report high levels of interaction within the group and contact outside of the group, and they have high levels of group identity (strength and commonalities), i.e., they are "embedded groups." These groups have relatively high levels of borrowing compared to other groups, but no apparent differences in delinquency or tenure (data not shown). To simply equate the embedded nature of these groups with social identity would obscure and underestimate the impact of each distinct mech-

anism on both collective goods production and compliance.

Defining identity as embeddedness also fails to explain how group commonalities, social relationships, interaction processes and collective outcomes are related over time. Though neither social identity theory nor the experimental research in that vein conflate identity (salience of the group) with embeddedness, this work does not explore cooperation in naturally occurring groups over time. An important implication of this study is that rather than competing mechanisms, group identity, reciprocity and sanctions are likely inter-connected processes in group cooperation (see also Elster 1989). It would be helpful for future research to carefully distinguish group identity from both social ties and other interaction mechanisms, to explore explicitly how identity, social ties and interests interrelate in social groups. For example, can group identity facilitate reciprocity, and if so, under what conditions? Conversely, how does reciprocity or group sanctioning capacity contribute to group identity formation? Edward Lawler and his colleagues explain theoretically, and examine empirically in experimental groups, how exchange relations and interaction processes produce group cohesion and collective outcomes (e.g., Lawler, Thye and Yoon 2000; Lawler and Yoon 1993, 1996). Future research should explore how different interaction mechanisms reinforce or conflict with one another in naturally occurring groups. Another important step is to examine how multiple dimensions of social ties might effect interaction and cooperation differently (see, e.g., Anthony 2003; Horne 2004; Flache and Macy 1996; Uzzi 1999).

Reciprocity appears to be an important mechanism for producing collective goods and compliance, though as noted above, the nature of the data does not allow me to fully determine the causal order such that reciprocal relationships may be both a cause and an outcome of successful group cooperation. Reciprocity provides microcredit borrowers with low-risk opportunities to learn about the reliability of fellow group members that may encourage them to take the risk of approving fellow members' loans. More than merely strong ties, reciprocal relationships enable members to gather information, assess reliability, continually monitor one another, as well as demonstrate their own

willingness to cooperate. Gambetta (1988) explains that actors interested in building trust will attempt to display both trustworthiness and trustfulness in order to encourage trusting behavior (cooperation) from others. Reciprocal relationships demonstrate both the trustfulness and trustworthiness of actors. By engaging in low-risk reciprocity, actors can build trust that enables them to cooperate. In addition, reciprocity entails mutual obligations that require conditional action to maintain connections over time (Gouldner 1960). Thus reciprocity also provides group members with a powerful mechanism for encouraging compliance because non-compliance puts exchange partners at risk of losing not only group membership, but also the reciprocal relationship itself.

The impact of reciprocity in borrowing groups, while controlling for pre-existing ties among members, has implications for the literature on embeddedness. The concept of embeddedness has proved a powerful metaphor for characterizing the association between social network ties and individual and collective outcomes. There is extensive literature, for example, on the impact of strong versus weak ties for the transmission of both information and social control (e.g., Burt 1992; Granovetter 1973; Uzzi 1996; Uzzi and Lancaster 2004). Though social ties may facilitate coordination among actors and encourage the formation of reciprocal relationships, as advanced by much of the social capital literature (Portes and Sensenbrenner 1993; Putnam 1995), it is unclear under what conditions embedded ties become reciprocal relationships, or which characteristics of an embedded tie facilitate social control. Indeed, there is somewhat contradictory theoretical (e.g., Flache and Macy 1996; Flache 2002) and experimental evidence (Horne 2001; Horne and Cutlip 2002) about the effect of interdependency on social control in groups. Uzzi (1999) has begun to unpack the concept of embeddedness by measuring different aspects of strong social ties (i.e., length and multiplexity of relationships) to demonstrate their somewhat contradictory effects on productive outcomes. The importance of reciprocity, but not ties alone, for cooperation in microcredit groups suggests this is a fruitful and necessary direction for the embeddedness literature to explore.

The findings that reciprocity is significant for group borrowing, compliance and survival sup-

ports the interests framework but does not fit easily with the portrayal of interests as atomistic and selfish. The role of reciprocity indicates that actors may become committed not to general group values or characteristics, but to *specific* others within the group. Commitment to other actors, not via common characteristics, but through reciprocal relationships facilitates interdependence, social influence, and possibly even collective identity itself in that it facilitates successful cooperation. Members' reciprocal relationships, coupled with a group's ability to enforce informal sanctions, facilitate the successful production of collective goods valued by the group. Interests are not the antithesis to group commitment or identity, but rather may be the link to the mechanisms necessary for these properties to emerge.

Theoretical work on group cooperation has advanced significantly within the interests framework of rational choice and exchange theory, built on formal modeling and sophisticated computer simulation tests of theoretical postulates, and empirical evidence from the small group laboratory. Yet theories require external as well as internal validation, both as a way of better understanding the social world and as a necessary component of theory building, so it is essential to empirically test theoretically derived hypotheses in actual social settings, as this paper does by studying microcredit borrowing groups. Ultimately, formal theory and simulations, on the one hand, and empirical analysis of behavior in both experimental and natural settings, on the other, should continually inform one another.

As in many other aspects of social life, microcredit borrowers gain access to what they desire only by cooperating with and relying on others. Microcredit borrowing groups create a novel solution to high-risk borrowers' inability to access credit, but they do so by creating a social dilemma for participants. Understanding how cooperation is produced in microcredit groups, even among individuals who may have no previous ties to one another, has implications for producing cooperation in many contexts. Other social groups seeking to create and maintain collective goods, such as project teams in firms or community groups, should create opportunities for group members to engage in low-risk exchange to build the relationships of reci-

procuity and trust needed to successfully produce the cooperation they desire.

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APPENDIX

Table A1. Bivariate Correlations of Microcredit Group Characteristics

	Log Loans	Number Delinquent	Proportion Delinquent	Log Members	Log Tenure	Large Group
Log Loans	1.00	—	—	—	—	—
Number Delinquent	.50**	1.00	—	—	—	—
Proportion Delinquent	-.01	.59**	1.00	—	—	—
Log Members	.59**	.38**	.06	1.00	—	—
Log Tenure	.59**	.28**	-.12	.29**	1.00	—
Large Group	.37**	.32**	.04	.74**	.28**	1.00
Previous Ties	.08	-.02	-.36**	.07	.09	.11
Group Strength	.14	.03	-.15	.04	-.04	.06
Group Commonality	.02	.03	.01	-.01	-.01	-.01
Sanctions	.17†	.19 †	.13	.12	.04	.14
Reciprocity	.10	-.13	-.27**	-.06	-.05	.01

	Previous Ties	Delivered by Ingenta Group Group Strength	Commonality	Sanctions	Reciprocity
Log Loans	—	—	—	—	—
Number Delinquent	—	—	—	—	—
Proportion Delinquent	—	—	—	—	—
Log Members	—	—	—	—	—
Log Tenure	—	—	—	—	—
Large Group	—	—	—	—	—
Previous Ties	1.00	—	—	—	—
Group Strength	.14	1.00	—	—	—
Group Commonality	.01	-.06	1.00	—	—
Sanctions	-.14	-.18 †	.21*	1.00	—
Reciprocity	.30**	.20*	.003	.01	1.00

Note: N = 106

† $p \leq .10$; * $p \leq .05$; ** $p \leq .01$ (two-tailed test)

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