Chapter 3
A Comparison of the Economic Literature on Microfinance and the Evolutionary Literature on Cooperation

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Abstract Microfinance initiatives provide financial support and loans to individuals from low-income backgrounds who are otherwise excluded from mainstream banking services. They do so by providing loans to groups of individuals who are jointly liable for their repayment. This model of lending creates a cooperative dilemma because if any member of a loan group defects and does not repay his/her share of the loan, the other members of the group are liable to repay it for him/her. Maintaining cooperation among borrowers and solving the cooperative dilemma created by the microfinance model may be crucial to ensure loan repayment. A vast literature in economics identifies factors that encourage successful loan repayment in microfinance initiatives and those that prevent defaults. Here, I compare the economic literature on microfinance and the equally prolific evolutionary literature on factors that encourage and maintain cooperation among individuals. I identify parallels between these two bodies of research, which have so far developed independently. Bringing them together enables us to examine the power and limitations of applying evolutionary theory to contemporary economic issues and may stimulate novel questions and insights in both disciplines.

3.1 Introduction

Ever since I first started working on the evolution of cooperation in humans, I have repeatedly encountered questions about how effective evolutionary theory is at explaining behaviour in the real world. Some people ask how any of this research is relevant and useful to society. Stricken both by these academically interesting questions as well as a sense of obligation to taxpayers who fund most scientific initiatives, I have spent some time thinking about them. In what follows, I make a first attempt to address both these questions.

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The broad aim of this chapter is to compare findings from the evolutionary literature on cooperation and the economic literature on microfinance. In Sect. 3.1.3, I explain why I focus on microfinance in particular. I describe what microfinance is, why it is important, how successful it has been across the world and how it might link to evolutionary theory on cooperation. In Sect. 3.2 and 3.3, I review findings from the evolutionary literature on cooperation and the economic literature on microfinance respectively; neither of these is an exhaustive review but rather a targeted summary of key results. To conclude, in Sect. 3.4, I evaluate how the findings of these two independent disciplines compare and whether they might inform each other.

3.1.1 What is Microfinance and What are its Aims?

Microfinance refers to informal and formal arrangements offering financial services to those who are otherwise excluded from mainstream banking services (Brau and Woller 2004). Microfinance providers range from local moneylenders to formal institutions that offer financial services to individuals from low-income households. The full range of services offered by microfinance institutions (MFIs) includes loans (also known as microcredit), savings and insurance schemes (Brau and Woller 2004). However, the major focus of most MFIs is to provide loans. It is this sector of the MFI industry that I focus on in this chapter.

The MFI movement first took hold in Bangladesh led by Muhammad Yunus in the 1970s. With help from the Government of Bangladesh, Yunus established the Grameen Bank in 1976. The aim of the movement is poverty alleviation (Brau and Woller 2004). By providing financial services to individuals from low-income households who otherwise do not have access to mainstream banking services, the long-term goal of many MFIs is to make these individuals economically self-sufficient. However, in the short term, MFIs also offer individuals loans to meet personal expenses such as in the event of emergencies or even weddings. Microfinance is currently one of the most powerful tools available to address poverty as it offers individuals the prospect of economic self-sufficiency rather than temporary aid and caters to people who cannot generate the collateral necessary to access mainstream banking services.

3.1.2 Have MFIs been Successful?

About 190 million individuals and their families across the world are served by more than 3,500 MFIs spanning Latin America, North America, Asia, Africa, Europe and Australia, including countries like the USA, Canada, Great Britain and Norway (Daley-Harris 2009; De Aghion and Morduch 2004; Reed 2013). Thus, MFIs exist not only in countries that are considered part of the developing world

but also in many of the rich, developed economies of the world. The flagship example of how successful microfinance can be comes from Bangladesh, where the Grameen Bank currently serves more than seven million clients (De Aghion and Morduch 2004; Reed 2013).

The majority of MFIs are not financially self-sufficient and operate on subsidies provided by governments as well as institutional and private donors (Brau and Woller 2004; Morduch 2000). The importance of achieving sustainability is the subject of a major debate in the microfinance community (reviewed in Brau and Woller 2004; Morduch 2000). Some scholars and practitioners advocate that MFIs must be financially self-sufficient in order to be sustainable. Others emphasise the social returns of microfinance and believe that sustainability can be achieved without self-sufficiency via contributions from committed donors. While the former group are in favour of raising interest rates, arguing that people 'require access to credit, not cheap credit', the latter argue that financial self-sufficiency often involves trading off reaching the poorest borrowers against reaching large numbers of borrowers (reviewed in Brau and Woller 2004; Morduch 2000). The global median interest rate in 2011 was 27%, but interest rates vary widely ranging from about 15 to greater than 80% (Rosenberg et al. 2013). Unsurprisingly, for-profit MFIs collect higher average interest yields than non-profit MFIs.

Several authors argue that microfinance programmes have been used by loan-takers more as an income-smoothing instrument, to tide over cash-flow problems, rather than as a source of capital for long-term investments in business initiatives (De Aghion and Morduch 2004; Ito 1998; Rutherford 1999). There is variation in rates of loan repayment and the degree of self-sustainability of MFIs both within and across countries (reviewed in Brau and Woller 2004; De Aghion and Morduch 2004; Morduch 1999). It is so far unclear whether microfinance has produced significant and sustained positive impacts for its potential beneficiaries (Buckley 1997).

3.1.3 The Microcredit Model and How it Links to Evolutionary Theory on Cooperation

Most microcredit programmes are based on the model of 'group lending with joint liability' (Hermes and Lensink 2007). Here, I explain what this means. Typically, when an individual wishes to take a loan from a bank, he or she needs to present the bank with collateral, often land or property, which the bank may keep in the event that the loan-taker is unable to repay the loan. The collateral therefore serves as a guarantee that the loan-taker will repay the loan. Consequently, individuals who are unable to provide collateral, if for instance they do not own any land or property, are unable to take out a loan. In this way, individuals from low-income households are excluded from mainstream banking services. The microcredit model of 'group lending with joint liability' removes the requirement for monetary col-

lateral. It does so by offering loans to groups of individuals who are jointly liable for them. Most often this means that if the group is unable to repay the loan then all group members are barred access to future loans from the programme. For example, if a group of four individuals takes a loan out together and one of them is unable to repay his or her share of the loan, the other three individuals in the loan group are liable to repay this individual's share of the loan if they do not want to be banned from the programme. Hence, in this model of lending, social collateral replaces the traditional monetary one.

The microcredit model of 'group lending with joint liability' creates a cooperative or common-pool resource dilemma. An individual can take out a loan with a group of other individuals and then refuse to pay back his or her share of it, knowing that the other individuals in the loan group would still be liable to pay his/her share. Thus, successful repayment of the loan is contingent upon at least some members of the loan group cooperating to repay it. This can be achieved either if all group members repay their share of the debt (i.e. they all cooperate) or if some members repay the shares of other group members along with their own shares (i.e. some cooperate and others cheat). Since successful repayment of the loan is contingent on individuals solving the cooperative dilemma, factors that encourage and maintain cooperation within loan groups should also improve loan repayment and therefore the success of MFIs. Many MFIs across the world report repayment rates greater than 90 % (Brau and Woller 2004), although most studies do not report the percentage of loans that are repaid equitably by all loan-group members.

Economists are well aware of the cooperative dilemma at the centre of the microcredit model, and a vast and ever-growing literature in economics has been identifying factors that are associated with loan repayment. An equally prolific literature in the evolutionary sciences is devoted to identifying what drives the evolution and maintenance of cooperation in a range of cooperative dilemmas. Thus, if evolutionary theory is effective at explaining human behaviour in the real world and cooperation is central to ensuring loan repayment in microfinance schemes, then we should expect a correspondence between the findings of these two independent bodies of literature. In other words, factors associated with loan repayment should also be those identified by evolutionary theory as important for the maintenance of cooperation. In the remainder of this chapter, I test this hypothesis by presenting and comparing findings from these two independent literatures.

Note that I am not suggesting that the only factors that affect the success of MFIs are factors that encourage cooperation. Indeed, not all microcredit programmes are based on the model of group lending via joint liability (although a survey conducted by Lapenu and Zeller (2001) in Africa, Asia and Latin America found that more than two-thirds of surveyed borrowers are served by group-lending programmes). Moreover, there is substantial variation in the structure of MFIs (Brau and Woller 2004; Hermes and Lensink 2007) which could also influence rates of loan repayment in ways that are unrelated to solving the cooperative dilemma posed by group-lending.

3.2 A Brief Review of the Evolutionary Literature on Cooperation

In this section I briefly review findings from the evolutionary literature on cooperation. Cooperation is defined as a behaviour that is beneficial to the recipient of the act, often (but not necessarily) at a cost to the actor (West, Griffin and Gardner 2007a). From an evolutionary perspective, the puzzle of costly cooperation is as follows: How does costly unselfish behaviour evolve and persist in a population where selfish individuals (defectors) would be more successful in the short term? The problem arises when cooperators repeatedly interact with selfish individuals who in the role of recipients always benefit from cooperators but as actors never bear the cost of cooperation. Such selfish individuals are expected to outcompete cooperators.

A general solution to this puzzle is to ensure that cooperators only ever interact with other cooperators (Fletcher and Doebeli 2009, 2010; Fletcher and Zwick 2006; Queller 1985, 1992). Hence, the evolution of cooperation requires mechanisms that allow cooperators to interact with each other at a higher probability than they do with defectors. Mechanisms that increase the likelihood that a cooperative individual is in a group with other cooperators promote the evolution of cooperation (Fletcher and Doebeli 2009, 2010; Fletcher and Zwick 2006; Queller 1985, 1992). Over the last half-century, many such mechanisms have been proposed (Nowak 2006; Sachs, Mueller, Wilcox and Bull 2004; West, Griffin and Gardner 2007b). Here, I focus on three that I think may be important in the context of microfinance.

3.2.1 Common Ancestry (Kin effects)

Cooperation can evolve when help is preferentially directed towards genetic relatives of the focal individual (Hamilton 1964a, 1964b, 1975). Kin selection (Maynard Smith 1964) describes the specific circumstance where cooperation evolves due to the actor and the recipient sharing ancestry. Common ancestry is a reliable indicator that the recipient of cooperation shares genes, including the cooperation allele[1], with the focal individual (Grafen 2007, 2009) and is therefore also likely to exhibit the cooperative phenotype[2]. Limited dispersal in multigenerational populations or the collective dispersal of relatives in groups promotes the association of relatives and the action of kin selection (Gardner and West 2006; Hamilton 1964a;

[1] An allele is one of a number of alternative forms of a gene such that each allele has a different effect on the organism. For example, a gene for height may have many alleles specifying different heights.

[2] A phenotype is an observable characteristic or trait of an organism, such as its behaviour, morphology or physiology. Phenotype is not necessarily completely determined by an organism's genes as it can be influenced by other factors such as the environment.

Irwin and Taylor 2001; Kümmerli, Gardner, West and Griffin 2009; Mitteldorf and Wilson 2000; Nowak, Bonhoeffer and May 1994; Nowak and May 1992; Taylor and Irwin 2000; West, Pen and Griffin 2002).

Kin selection is contingent on the availability of information about common ancestry. This information need not be processed consciously and may most commonly be obtained from spatial cues such as a shared nest, colony or household, or phenotype-matching when interacting individuals can estimate genotypic similarity based on phenotypic (trait) resemblance (Hamilton 1964b; Holmes and Sherman 1982; Lacy and Sherman 1983; Lehmann and Perrin 2002; Reeve 1989; Sherman, Reeve, and Pfennig 1997).

There is substantial empirical evidence that humans favour kin across domains such as food sharing (Gurven, Hill and Kaplan 2002; Gurven, Hill, Kaplan, Hurtado and Lyles 2000; Marlowe 2010), cooperative hunting (Alvard 2003; Morgan 1979), providing financial aid (Bowles and Posel 2005), child care (Anderson, Kaplan, Lam and Lancaster 1999; Flinn 1988; Marlowe 1999), mitigation of conflict (Chagnon and Bugos 1979; Daly and Wilson 1988a, 1988b) and even in their willingness to suffer physical pain to benefit someone in an experimental context (Madsen et al. 2007).

3.2.2 Prior Interaction

Cooperation can evolve when help is preferentially directed towards individuals who are known cooperators (Alexander 1987; Aoki 1983; Axelrod 1984; Brown Sanderson and Michod 1982; Trivers 1971). Knowledge of the recipient's prior cooperative history may come from the focal individual's own previous interaction with them (Axelrod and Hamilton 1981; Trivers 1971) or from knowledge of others' prior interactions with them (Leimar and Hammerstein 2001; Lotem and Stone 1999; Milinski, Semmann, and Krambeck 2002a; Mohtashemi and Mui 2003; Nowak and Sigmund 1998a, 1998b; Panchanathan and Boyd 2003, 2004). In this case, an individual's prior behaviour acts as a reliable indicator of the likelihood that he/she will exhibit the cooperative phenotype in the future. Reciprocal cooperation (also known as reciprocal altruism) is called 'direct' (Trivers 1971) if individuals interact repeatedly with the same partner, and 'indirect' (Alexander 1987) if they interact on repeated occasions with a set of partners but only once with any particular member of that set.

The two conditions necessary for reciprocal cooperation to evolve are (1) repeated interactions between the same (direct reciprocity) or different (indirect reciprocity) individuals and (2) information or memory of the outcome of the previous interaction (direct reciprocity) or cooperative reputation of the partner (indirect reciprocity). The availability of information or memory of a partner's prior behaviour is thus essential for reciprocity to evolve. It is unclear whether reciprocal cooperation can lead to stable cooperation in a population if individuals make errors, possess imperfect memory or information and participate in limited interactions (reviewed by Lehmann and Keller 2006). Reciprocal cooperation is also unlikely to evolve when reciprocating groups are large (Boyd and Richerson 1988).

There is strong, accumulating empirical evidence from laboratory experiments and field studies that humans demonstrate both direct reciprocity (Clark and Sefton 2001; Fehr and Gächter 1998; Gächter and Falk 2002; Gurven et al. 2002; Gurven, Hill, et al. 2000; Gurven 2004a, 2004b; Kaplan and Hill 1985; reviewed in Fehr and Fischbacher 2003 and Gächter and Herrmann 2009) as well as indirect reciprocity (Alpizar, Carlsson and Johansson-Stenman 2008; Milinski, Semmann, Bakker and Krambeck 2001; Milinski et al. 2002a; Milinski, Semmann and Krambeck 2002b; Seinen and Schram 2006; Wedekind and Braithwaite 2002; Wedekind and Milinski 2000; reviewed in Fehr and Fischbacher 2003 and Gächter and Herrman 2009). However, studies of food sharing in small-scale societies have reported the high frequency of reciprocity among kin (Allen-Arave, Gurven and Hill 2008; Gurven, Hill, et al. 2000). Kin selection and reciprocity may therefore augment and stabilise each other in establishing cooperation in these populations.

3.2.3 Assortation or Partner Choice

Cooperation can evolve when help is preferentially directed towards individuals specifically sharing the cooperative allele with the focal individual (Grafen 2009; Hamilton 1964a; Lehmann and Keller 2006; Wilson and Dugatkin 1997). Theoretical models vary based on the mechanism by which such assortment is achieved. For instance, linkage disequilibrium between the allele responsible for cooperation and another allele encoding some phenotypic trait (a green beard for example) allows individuals to identify others possessing the cooperation allele (Haig 1997; Jansen and van Baalen 2006). An alternative and earlier formulation of the 'green beard effect' specifies a single complex gene coding for both cooperative behaviour as well as the phenotypic trait indicating its presence in an individual (Dawkins 1976; Hamilton 1964a, 1964b). In other models, individuals assort based only on whether they are similar with reference to an arbitrary characteristic or tag (Axelrod, Hammond and Grafen 2004; Riolo, Cohen and Axelrod 2001). In all these models, individuals' phenotypes for the 'green beard' gene or tags act as reliable indicators of whether they are likely to exhibit the cooperative phenotype. The maintenance of linkage between 'green beard' and cooperative genes is essential for cooperation to evolve via this mechanism. Since mutation and recombination are likely to break down such linkage, 'green beard' effects are generally considered unstable (Blaustein 1983; Dawkins 1976; Lehmann and Keller 2006).

The evidence pertaining to tag-based recognition of cooperators in humans is mixed. While some experimental studies suggest that people can use facial and other cues to identify likely cooperators (Fetchenhauer, Groothuis and Pradel 2009; Pradel, Euler and Fetchenhauer 2009; Verplaetse, Vanneste and Braeckman 2007), there is considerable evidence demonstrating that most humans, including trained policemen, can detect likely cheaters no better than chance (Aamodt and Custer 2006; DePaulo, Stone and Lassiter 1985; DePaulo 1994; Ekman and O'Sullivan 1991; Zuckerman and Driver 1985). It has been suggested that culturally inherited

traits like accents, rituals and practices or adornments, as well as arbitrary behavioural signals such as secret handshakes, may serve as tags (Riolo et al. 2001).

Cooperation can also evolve as a costly signal indicating the underlying quality of an individual as a potential mate, friend or ally (Gintis, Smith and Bowles 2001; McAndrew 2002; Roberts 1998; Zahavi 1997). In this case, the cooperative allele itself acts as a tag and a reliable indicator that the focal individual possesses some other fitness-enhancing trait which makes him/her a desirable mate or interaction partner (Miller 2007). There is empirical evidence that in humans cooperative behaviour enhances individuals' status and standing, affording them social advantages in the long run (Alvard and Gillespie 2004; Birkás, Bereczkei and Kerekes 2006; Gurven, Allen-Arave, Hill and Hurtado 2000; Hawkes and Bird 2002; Sosis 2000; and reviewed in Miller 2007).

3.3 A Brief Review of the Economic Literature on Microfinance

In this section, I review findings from the literature on microfinance regarding factors that affect loan repayment performance. I have organized these findings based on the three mechanisms that I outlined in the previous section, considered important for the evolution and maintenance of cooperation. This facilitates comparison between the two bodies of literature. Note that the reviewed studies all analyse the repayment rates of loan groups and not those of their individual members.

3.3.1 Kin Effects

A relatively small number of studies have explicitly examined whether the presence of kin in a loan group facilitates repayment. In a study conducted among 128 loan groups across three group-lending programmes in Bangladesh, Sharma and Zeller (1997) found that repayment problems increase when there are more relatives in the group. Similarly, Ahlin and Townsend (2007) found a significant negative association between the percentage of close relatives in the group and repayment rate among 262 loan groups in Thailand. Both these papers suggest that individuals might find it difficult to impose penalties on relatives in order to ensure loan repayment. In their review, Hermes and Lensink (2007, p. 3) suggest that 'screening, monitoring and enforcement among relatives does not take place or at least is less effective, since relatives may more easily collude against the programme and delay repayment'.

Ahlin and Townsend (2007) examined whether cooperation or sharing between loan group members in other activities was associated with repayment performance. They formulated a sharing index measuring whether individuals had helped loan-group members with money or free labour, coordinated the transport of crops, the purchase of inputs or the selling of crops. The sharing index was also calculated

separately for relatives and non-relatives in the group. They find that if they pool relatives and non-relatives together in the analyses, then sharing is negatively associated with repayment. This result is intriguing and may be further evidence that enforcement is difficult when group members have close relationships, indicated here by the degree of sharing between them. However, upon distinguishing between relatives and non-relatives, the authors find that sharing among non-relatives remains negatively associated with repayment whereas sharing specifically among relatives is positively associated with it. Thus, perhaps kin that share with each other reciprocally are less likely to freeride and therefore less likely to require enforcement. Much like Allen-Arave et al. (2008) and Gurven et al. (2000) found in their studies of food sharing, kin effects and reciprocity may augment and stabilise each other in establishing cooperation and effective loan repayment.

In contrast to the above-described studies, Al-Azzam, Hill and Sarangi (2012) found no significant association between the number of relatives in the group and repayment performance across 160 loan groups in Jordan. Since the studies described in this section measured the repayment performance of loan groups and not the individual repayment performance of each group member, their findings suggest that in the case of a deficit, kin do not appear to repay each other's shares any more than non-kin group members do.

3.3.2 Prior Interaction

Several studies have investigated the effects of pre-existing social ties, past interactions and frequency of meetings on rates of loan repayment. These are all factors that are likely to indicate the extent to which individuals have reputational information about their group members, which as described in Sect. 3.2.2 is another mechanism by which cooperation can evolve. Zeller (1998) found that the number of social bonds between group members, such as whether they belonged to the same village, hamlet, ethnicity, extended family and religion, has a significant positive association with repayment rates in 146 loan groups across six lending programmes in Madagascar. In contrast, Wydick (1999) showed in a study conducted in Guatemala that social ties within groups, measured as the number of years individuals were acquainted before they formed the group, whether all members were friends and whether they were involved in any joint social activities, appeared to have no significant effect on repayment; if anything, the direction of the association was negative for all three variables. Similarly, Ahlin and Townsend (2007) found no association between repayment and the percentage of group members living in the same village in Thailand.

The loan groups included in most of the above studies were formed non-randomly, i.e. members chose their group members. This creates a problem of 'endogeneity' or autocorrelation so that it is difficult to disentangle the causal effects of social ties from any other variables that influenced group formation. Dean Karlan's (2007) study avoided this problem by studying 2,000 individuals in Peru who were randomly designated by the MFI to different loan groups; this allowed him to disentangle

the effects of social connections from other variables that affect group formation. He found that individuals who live in closer geographic proximity to their group members are more likely to repay loans and save more. He suggests that this is because group members are better able to monitor each other and enforce repayment. He empirically demonstrated that individuals who knew each other before joining the loan group had more accurate information about each other's prior default histories; this suggests that the reason that social connections may improve loan repayment is that they increase the availability of reputational information. Karlan (2007) also shows that members can distinguish between strategic defaults and defaults due to external shocks and bias punishment towards the former type of default. Wenner (1995) found that loan groups in Costa Rica that screened members on the basis of their reputations showed better repayment performance than those that did not.

In a study using economic games mirroring a microfinance scheme, Cassar, Crowley and Wydick (2007) find that simple acquaintanceship is not adequate to improve repayment performance; this study was conducted in South Africa and Armenia. Instead, those who have been helped by others in the past (when faced with exogenous shocks) are more likely to contribute in a subsequent round of the game. Note that this study was conducted with an all-female sample.

Feigenberg, Field and Pande (2013) performed an experimental intervention with an MFI in India, where they randomly varied the frequency with which groups met (weekly vs. monthly) during the first loan cycle. The results show that more frequent meetings are associated with increases in long-term social interaction and lower default rates. In contrast, van Bastelaer and Leathers (2006) found that the frequency of group meetings was negatively associated with repayment rates in rural Zambia. However, the farmer loan groups included in this study decided themselves how frequently they met. Thus, these authors suggest that in this case, the negative relationship between frequency of meetings and repayment rates may result from reversed causality where groups with widespread non-repayment hold more frequent meetings in order to improve repayment. Interestingly, Abbink, Irlenbusch and Renner (2006) found that repayment rates decreased as individuals approached the end of a microfinance game experiment as one might expect if individuals realized that future opportunities for reciprocity would be low.

3.3.3 Assortation or Partner Choice

Most MFIs encourage loan groups to form endogenously, i.e. individuals select their group members themselves. Theoretical work on microfinance predicts that this self-selection process used in most group-lending schemes should improve repayment rates by mitigating adverse selection[3] in credit markets and thus lowering

[3] When lenders cannot differentiate risky borrowers from safer ones, they cannot differentially charge riskier clients higher interest rates. This raises the average interest rate for all clients and therefore drives safer clients out of the credit market and increases the proportion of risky clients that the lender now caters to. This is known as adverse selection.

the cost of borrowing (Ghatak 1999; Van Tassel 1999). However, few studies appear to have investigated whether self-selecting groups perform better than groups that have been allocated randomly by an MFI, perhaps since most MFIs use the same mechanism of group formation and do not vary much in this respect. Among these is a study by Sharma and Zeller (1997), which found that groups formed via self-selection of group members did show better repayment performance. In contrast, Wydick's (1999) study of Guatemalan MFIs finds no difference between the repayment rates of groups comprising acquaintances compared with those consisting of strangers.

A number of authors have investigated the effects of assortation on loan repayment by using economic game experiments played both in a laboratory with student subjects and under field conditions with individuals who are most likely to use microfinance. Abbink et al. (2006) conducted a laboratory experiment using a microfinance game with student subjects and found that while self-selected groups contributed more in the first round, cooperation declined among these groups in later rounds. On the other hand, they found that while repayment in randomly chosen groups started lower, it declined more slowly as rounds progressed than it did in the self-selected groups. Giné, Jakiela, Karlan and Morduch (2010) demonstrated that allowing groups to self-select members increased repayment rates in a microfinance game played with small enterprise owners and employees in Lima.

Another way to examine the effects of assortation on loan repayment is to test whether groups that are socially and culturally more homogeneous have better repayment performance. Karlan (2007) found that cultural homogeneity was associated with better repayment performance in Peru. Similarly, Cassar et al. (2007) found that social and cultural homogeneity improves loan repayment in a laboratory microfinance experiment conducted in South Africa and Armenia. In contrast, Paxton, Graham Douglas and Thraen (2000) found a negative association between group homogeneity and repayment in Burkina Fasso, and Kritikos and Vigenina (2005) found no association between the two in Georgia. Similarity in age or levels of education had no significant impact on repayment in a study conducted in Bangladesh (Godquin 2004).

Hence, there is mixed evidence that assortation improves loan repayment in microfinance schemes. These findings need to be interpreted carefully because, as mentioned previously, few studies may have been able to test for the effects of assortation since MFIs do not vary much for this variable; the studies that have done so produced mixed findings. Studies using controlled experiments, on the other hand, all produce similar findings that suggest that self-selection enhances repayment performance.

3.3.4 Laboratory Experiments

Recent research has begun to use laboratory experiments to investigate behaviour in the context of microfinance schemes. A particularly interesting study by Dean Karlan, conducted among 41 female borrowers in Peru, investigated how well

behaviour in laboratory experiments reflects the behaviour of individuals participating in microfinance schemes. Karlan (2005) found that more 'trusting' first-players in a trust game were more likely to have repayment problems when examining microfinance data collected 1 year after the experiment. On the other hand, 'trustworthier' second-players in the trust game displayed higher likelihoods of loan repayment. However, he found no relationship between repayment performance and behaviour in a public goods game.

Cassar et al. (2007) played a microfinance game with 498 individuals across 36 groups in South Africa and Armenia. They found that individuals' 'trusting' behaviour in a trust game is not associated with loan repayment in a microfinance game. However, similar to Karlan (2005), they found that 'trustworthiness' in the trust game was positively associated with loan repayment in the microfinance game.

3.4 Conclusion

The studies reviewed in Sect. 3.3 demonstrate that there is mixed evidence in the economic literature that the three evolutionary mechanisms considered here (kin effects, reciprocity and assortation) affect loan repayment in the predicted direction. While some studies on MFIs support the findings of the evolutionary literature on cooperation, others do not.

There are several potential explanations for these mixed results. One possibility is that the cooperative dilemma inherent to the microcredit model of group lending via joint liability does not affect loan repayment and as a consequence (or otherwise) evolutionary theory on cooperation does not apply to microfinance. While this hypothesis cannot be rejected at this stage, I think that it is unlikely to explain my findings. This is because I find that there is mixed support for evolutionary models in the microfinance literature as opposed to no support. Indeed, some studies do find evidence in favour of the evolutionary theories that I have considered in this chapter. Moreover, successful repayment of the loan necessarily involves cooperation either from all individuals in the loan group or from some individuals who pay not only their share but also the shares of defaulting members. The overall repayment rates of many MFIs are very high. For instance, Grameen Bank in Bangladesh has reported repayment rates greater than 95 % for most of its life (De Aghion and Morduch 2004; Morduch 1999). These data suggest that at least some members of loan groups are cooperating to repay these loans.

The studies reviewed here were conducted in different parts of the world with people living in different environments and not all mechanisms were considered and compared in each study. Since natural selection operates in the context of a particular environment, different mechanisms might operate to produce cooperation in these different environments, leading to mixed support for any one mechanism. Furthermore, there may be a trade-off between factors that allow individuals to screen good partners for cooperation and those that allow them to enforce it within a group once it has formed; this could lead to mixed findings. For example, an indi-

vidual may be most likely to cooperate with kin but least likely to punish them. In this case, individuals may choose to be in loan groups with kin but if enforcement is important for ensuring loan repayment, they may be unable to ensure cooperation and therefore loan repayment.

In this chapter I focussed on three major mechanisms that can support the evolution of cooperation. Recent theory and empirical research on the evolution of large-scale cooperation argue that culturally transmitted norms may be an important driver of variation in levels of cooperation across human populations (Boyd, Gintis, Bowles and Richerson 2003; Boyd and Richerson 1985; Choi and Bowles 2007; Gintis 2003; Guzmán, Rodríguez-Sickert and Rowthorn 2007; Henrich et al. 2012; Henrich 2004; Henrich et al. 2005, 2006, 2010). Other studies highlight the crucial role that demographic and ecological factors play in shaping cooperative behaviour (Lamba and Mace 2011, 2012, 2013). Indeed, there is some evidence that factors like sex (D'Espallier, Guérin and Mersland 2011) and loan-group size (van Bastelaer and Leathers 2006; Zeller 1998) are associated with loan repayment. Hence, cultural norms and/or demography may also play an important role in determining the success of MFIs.

At the beginning of this chapter I described my motivation for undertaking this study. I think that the above analyses demonstrate the utility of evolutionary theory as a hypothesis-generating tool that systematises the study of human behaviour. Although I present only a preliminary, qualitative and coarse-grained comparison of two vast bodies of literature, both very technical, my mixed findings raise many questions that warrant further deliberation and may inform researchers in both disciplines.

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