

# Social Identity and Group Lending\*

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## Abstract

The success of joint liability programs depends on nature and composition of borrowing groups. Group formation is a costly process and in our model these costs vary with the social identity of group partners. We show that risk heterogeneity in a borrowing group may arise due to the social identity of the agents. The presence of caste and gender bias may not resolve the adverse selection and moral hazard problems created by information asymmetry between the borrowers and the lender. We also find that with costly group formation and state verification, individual liability lending may be better than joint liability lending. Thus ignoring social identity and group formation costs can lead to the failure of a joint liability program. Finally, the paper also suggests that targeting different social groups requires the use of a menu of joint liability costs.

**Keywords:** Group Lending, Risk Heterogeneity, Formation Costs, Social Identity

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# 1 Introduction

Small loans to groups of poor borrowers have become immensely popular in recent years in large parts of the developing world and have begun sprouting in poverty-stricken pockets of the developed world as well. Formally called microfinance or microcredit, such loans usually target groups with no access to formal lending institutions and have become the cornerstone of many development strategies. In 1999 it was estimated that globally some 8-10 million households were involved in microfinance programs and according to World Bank estimates, this figure would stand at 100 million poor households by 2005 (Morduch, 1999). The most famous example of course continues to be the much emulated *Grameen Bank* which lends primarily to groups of women borrowers in Bangladesh. From a modest beginning of \$0.18 million in loans in 1979, the Grameen Bank had lent out \$278.32 million by 2001. It has served as the role model in microfinance, spawned innumerable clones and several hybrid institutions across the world. *Banco Sol* in Bolivia and *Bank Rakyat* in Indonesia are some of the other major success stories. Today such microfinance programs are firmly entrenched in Africa, Asia, Latin America, Canada and roughly 300 US sites. Fledgling microcredit institutions now exist in Eastern Europe, China, Pacific Islands and the Caribbean. Microfinance has had its share of failures, but it is an integral part of the new development strategies and is now present in all corners of the world.

This paper aims to provide answers to two simple questions: (i) How do we explain the success and failure of group lending programs? (ii) Contrary to what the theoretical literature claims in practice there is evidence of joint liability programs that exhibit risk heterogeneity. Can we explain this discrepancy between theory and practice? The paper provides simple explanations for these questions by introducing costly group formation among the borrowers of microcredit programs mediated through the social identity of the group members.

An increasingly persuasive body of research in economics today argues that economic agents are embedded in social structures and their behavior is influenced by the social contexts in which they live. There is hardly any form of economic activity, from running a hot dog stand to manufacturing silicon chips, that does not require social collaboration. This paper examines the role of social identity as the glue underlying the formation of groups – the basic building block of all group lending programs, and the consequences of group composition on the problems of asymmetric information. Identity refers to a person's sense of self or being and locates an individual in different

social categories. To name a few – gender, caste, ethnicity and religion are common examples of such social constructs to which we belong and our sense of belonging or identification with a particular group affects our behavior. Incorporating social identity allows us to model the interaction between identity and the rational behavior thereby enhancing the scope of our analysis. As Sen (1999) in his book *Reason before Identity* argues “... *identity-based theorizing can also be used in less demanding and more subtle ways. Rather than demanding a world of separate moral islands, it can be used merely to reject theories of justice or rationality that are judged to be inadequately attentive to the claims of community and of affiliate concerns.*”<sup>1</sup> He further goes on to argue that social identity has two roles: a delineating role which affects formulations of ideas and conduct and a perceptual role which is concerned with the way an agent perceives the world.<sup>2</sup>

Using a simple model Akerlof and Kranton (2000) illustrate these notions by identifying four channels through which identity affects outcomes – people have identity based payoffs derived from their own actions and from the actions of others; third parties can generate persistent changes in these payoffs; and while some people can choose their own identity others are constrained in their ability to do so. There is no dearth of examples of such events, ranging from people willing to lay down their lives for their country, to ethnic conflict in Africa and the rise of acts of terrorism motivated by religion. Examples of identity-related acts suggested by Akerlof and Kranton (2000) include self-mutilation, alumni giving and extreme sports like mountaineering. Specific economic examples include gender discrimination in the workplace, household division of labor and the economics of poverty and social exclusion (see also Alesina and La Ferrara (2000) on the last topic). This list of examples however is by no means exhaustive or complete. Sociologists and anthropologists have long relied on identity to understand human behavior and economics has begun to develop formal models to further our understanding of social identity. Our paper is a contribution to this growing

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<sup>1</sup>In recent years there have been a number of papers in this vein. See for example Mailath and Postelwaite (2002), Akerlof and Kranton (2000), Okuno-Fujiwara (2002), Kali (2003), Folbre (1994) and Bardhan (1993). For some early work on how social elements can influence economic decisions we refer the reader to Granovetter (1985) and Akerlof (1976).

<sup>2</sup>Maalouf (1996) in his investigation of political violence and the surge of nationalist feelings explores these complementary functions of identity. This Lebanese born French writer suggests that our notions of identity is deeply ingrained. Consider the following passage from his book: Sometimes, after I’ve given a detailed account of exactly why I lay claim to all my affiliations, someone comes and pats me on the shoulder and says “*Of course, of course – but what do you really feel, deep down inside?*”

literature in economics and examines the interaction between economics and identity in the context of microfinance programs.

The typical microlending program loans small amounts of money to a group of borrowers. The interest rate on the loan is usually between the formal and informal sector rate. The money is lent to a group of borrowers (often sequentially) who chose their own members. The group is held jointly liable for the loans. Formal lending institutions have usually quite unsuccessful at providing these loans due to asymmetric information about the riskiness of the borrowers and their lack of collateral. The Indian experience in this regard has been quite well documented (see for instance Morduch (1999) and Somanathan (2003)). On the other hand group liability solves the typical asymmetric information problems of adverse selection and moral hazard resulting in high repayment rates. The underlying rationale is that there are efficiency gains from group formation that compensate for information asymmetries since group members know each other well. Moreover, they have the ability to impose non-pecuniary punishments on fellow group members that the lending institution is incapable of doing. Thus the success of joint liability programs crucially depends on the structure and composition of the group.

While it is well understood that groups have a great potential for enabling members to reach their goals, group formation is by no means an easy and costless task. In a recent paper Throp, Stewart and Heyer (2003) investigate different examples of group benefits and costs and demonstrate that the chronically poor face greater disadvantages in forming groups. Social identity is a key variable for group formation in traditional and developing societies. Whether we believe in the notion of a moral economy or the more recent understandings of such institutions which demonstrate their rational nature (see for instance Commander, (1983)), there is no disagreement among scholars across disciplines that social categories like gender and caste are very important. It is already quite well documented in the mutual insurance literature that group formation is not exogenous. For instance Goldstein (2000) finds that informal insurance networks typically involve kin, neighbors and gender groups. Fafchamps and Lund (2000) find risk sharing occurs within a cluster of small households. In a recent study using innovative matching techniques De Weerd (2002) finds that kinship, geographical proximity, the number of common friends religious affiliation and wealth determine the formation of risk sharing networks in rural Tanzania. Moreover, poor households are more susceptible to shocks since their networks are not as dense as those of the rich. Goldstein *et al.* (2002) model endogenous group formation for risk sharing using the notion of association costs.

They conclude that gender plays a key role in mutual insurance networks in Ghana, with women acting independently of men even within households. Murgai *et al.* (2002) study water sharing arrangements in Pakistan and use association costs to describe the formation costs of these networks. They also conclude that kinship and geographical proximity are key determinants of network formation.

Interestingly however there is very little work that investigates the relationship between social identity and group lending. This is despite that fact that it is acknowledged in the literature and well documented in the informal risk sharing studies. In their classic paper Ghatak and Guinane (1999) have argued that “*A major obstacle to joint liability as a lending mechanism arises when social ties among borrowers are too weak to support feelings of group solidarity.*” Similar concerns have also been voiced by Mondal and Tune (1993). A cursory glance at microfinance programs around the world reveals that the majority of these programs, regardless of their modus operandi, target women as their primary borrowers. The traditional tontine in Africa has always been organized along tribal lines and tribal alliances are still an important social force in Africa (see also Udry (1994), and Fafchamps and Minten (1998)). Using data from Eritrea, Lensink and Mehrteab (2003) demonstrate the importance of social ties for repayment rates in microfinance programs. Godquin (2002) however finds that social ties have a negative impact on repayment rates, while Olomola’s (2000) study finds that the degree of acquaintance within fellow group members has a positive effect on repayment. Wydick (1999) finds that peer pressure is important for repayment, as well as groups where members have businesses close together have higher repayment rates. In India, not only do these programs often target women, but the caste also plays a vital role in these programs, especially in the context group formation and program administration. Similarly, another widely accepted stylized fact is the notion that microcredit programs usually do not help the “poorest of the poor”, a group that can usually be distinguished by some social characteristics like caste or gender. Although different authors use different definitions for social ties it is clear that they have a significant affect on repayment rates. Our paper fills a gap by studying the relationship between group lending and costly group formation based on social identity. It can be argued that the benefits of group lending stem from the fact that members can pool information, have common norms and the ability to sanction each other as well as the benefits of risk sharing. We take the argument a step further by positing that social identity affects the formation of groups itself, which can

affect joint liability programs due to adverse selection and moral hazard.<sup>3</sup>

There are a number of reasons for considering the role of identity for microfinance programs. Some as already mentioned affect group formation and group behavior, while others can have consequences for the reach of such programs or may even affect group lending program itself. A major reason for the success of group lending programs is that members of a group can monitor and sanction each other in non-financial ways. Such actions however depend on the group composition and prevailing social norms. When groups are formed endogenously, the rational agents take into account their ability to sanction others in their group. Thus by introducing social identity into group lending we take the analysis a step backwards to understand what types of groups will be formed. Secondly, different social groups may have different action sets and also may react differently to incentives. For instance, women in rural societies are less mobile than their male counterparts and therefore unlikely to “take the money and run”. Similarly Rahman (1998) finds that women in Bangladesh are more sensitive to verbal hostility afflicted by fellow members and bank officials if repayment problems occur.<sup>4</sup> In fact this is well reflected in Grameen’s repayment rates – only 1.3 percent of women were experiencing repayment difficulties in 1991 while the number for men was 15.3 percent (Khandekar, Khalily and Khan, 1995). Coke (2000) argues that the typical Filipino woman is restricted in her choice of business activity which affects the utilization of the loan and its subsequent repayment rates. For instance if the majority of women in a village open small grocery stores, competition among them will affect profitability and repayments. It is also well documented now that group lending programs do not reach the very poor (see for instance Somanathan’s (2003) study on India). It is entirely possible that this is related to the social identity of the actors especially in areas like the tribal belt studied Somanathan. A better understanding of the role of identity will not only allow us to understand the success and failure of microfinance, but will also provide guidance for appropriate policy intervention and targeting.

The rest of the paper is organized as follows. Section 2 develops the

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<sup>3</sup>In fact a major component of a successful group lending program is the degree of homogeneity of a group. Taub (1998) in his study of the Good Faith Fund in Arkansas concludes: “*Belonging to an artificially constructed group is not the same as belonging to one previously embedded in a community with strong preexisting social ties, one where social sanctions and other group pressures are likely to be effective.*”

<sup>4</sup>Management scientists have argued that cultural factors of the sort mentioned here have a strong influence on group outcomes. See Gibson (1999) and the references therein for more on this topic.

model to analyze adverse selection, moral hazard and auditing issues. Section 3 provides comparisons with the existing literature and has some concluding remarks.

## 2 A Model of Group Lending

Consider a community with a microfinancing program where individuals can differ in their riskiness and belong to different social groups. Each individual in the community is either a safe or a risky borrower. At the same time individuals have a social identity like their gender or caste which is given and affects interaction among agents. Although caste is an important determinant of social identity in the world today, we focus on caste primarily for the sake of exposition – the analysis carries over to any other form of social identity with costly group formation. According to the *Human Rights Watch* organization over 250 million *Dalits* or untouchables in the world today face caste based discrimination in their daily life. This figure includes the so called untouchables of South Asia (including Nepal, Bangladesh, India, Sri Lanka and Pakistan), the “Buraku” people of Japan, the “Osu” of Nigeria’s Igbo people and certain groups in Senegal and Mauritania. In fact, in most rural areas the association boundaries between social groups are clearly demarcated and there is almost no mobility across the castes. In a study on India, Banerjee and Somanathan (2003) have found that the measure of heterogeneity for India has a mean value around 0.85 compared to 0.26 in the US cities making India much more heterogenous than the US.<sup>5</sup> They conclude that caste mobility is still not pervasive in India. On a similar note NGOs in rural south India have found that the extreme prejudice faced by Dalit women on the three fronts of class, gender and caste makes it difficult for them to participate in micro financing programs (*Source: GFUSA*).

The pool of borrowers in the community consists of safe high caste and risky high caste borrowers as well as their low caste counterparts. The model developed here follows the simple and elegant formulation of Ghatak and Guinnane (1999). Each individual is denoted by the ordered pair  $ij \in \{h, l\} \times \{r, s\}$ , where the first element describes their social identity and the second their degree of risk. Let  $P_{ij}$  denote the probability of success of an individual borrower who obtains microcredit. We assume that borrowers engage in an economic activity using their loan whose success probabilities are as follows:  $P_{is} > P_{ir} \geq 0$ ,  $i = h, l$ . Also it is assumed that the safe (risky)

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<sup>5</sup>The measure of heterogeneity used is the standard ethnic fractionalization index  $h$  where  $h = 1 - \sum s_i^2$  where  $s_i$  refers to the population share of the  $i$ -th group.

borrowers in either social category have the same success probability, i.e.,  $P_{lj} = P_{hj}$ ,  $j \in \{r, s\}$  allowing us to drop the social identity subscript on probabilities. Note that all borrowers are assumed to be risk neutral. Hence keeping everything else constant a safe borrower of either social group is always preferred by the risky borrowers. Let  $Y^h$  denote the outcome if an individual's project succeeds while the value of a failed project is normalized to zero.

A typical microfinance institution like the Grameen Bank is assumed to be the sole lending party in this community. Denote by  $R$  the total repayment amount inclusive of the principal. Following Ghatak and Guinnane (1999) we assume that a borrowing group consists of two individuals who are jointly liable for the loan. Since borrowers are jointly liable, we denote by  $c > 0$  the extra cost incurred by an individual if her partner's project does not succeed. Further the situation is characterized by asymmetric information: each member of the group knows the level of risk associated with their partner but the bank is unaware of this. We assume that borrowers have no collateral. Both these assumptions are standard in the group lending literature and provide the rationale for initiating group lending programs.

Next we introduce the implications of social identity on group formation in the community. We assume that it is costly to form groups, with the costs of group formation being different for different partners.<sup>6</sup> For a high caste member we set  $C_{lr}^h = C_{ls}^h = \lambda > 0$  and for a low caste member we have  $C_{hr}^l = C_{hs}^l = \beta > 0$ . Typically it is easier to associate with people from ones own caste and hence we normalize the costs of forming a group with a partner of the same social identity to zero. Thus in our model forming groups across social identities is costly while linking with a person from the same social group is costless. These adjustment costs may occur due to various reasons like violating established social norms or possible social ostracism as a form of sanction.<sup>7</sup> For instance, a high caste borrower may have to face the verbal wrath of other high caste members if he chooses a low caste partner. This can also take the form of threats or even physical and mental torture, all of which, as argued in Alesina and La Ferrara (2000) adversely affects the individual's effort and enthusiasm. Similarly, in some societies a woman might have difficulties forming a group with a safe male borrower since it would violate the community's customs. The same problems can arise in the context of forming a group across ethnic ties.

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<sup>6</sup>Clearly if one person is to be liable for another's loan, then we expect these persons to have a fairly close relationship and creating such close ties is not costless.

<sup>7</sup>These costs are analogous to the idea of association costs in Goldstein *et al.* (2002) and Murgai *et al.* (2002).

These social adjustment costs can be assumed to be given exogenously. On the other hand they can also be endogenously obtained by a simple extension of the Alesina and La Ferrara (2000) formulation. We now briefly illustrate this extension. Let the utility of the high and low caste agents from social interaction in the community be respectively given by

$$U_h = U(\lambda, \alpha_l) \quad \text{and} \quad U_l = U(\beta, \alpha_h)$$

where  $\alpha_l$  is the proportion of low caste agents in the community and  $\alpha_h$  is the proportion of high caste agents in the community. While Alesina and La Ferrara (1999) label  $\lambda$  and  $\beta$  as the “degree of intolerance” we call them adjustment costs. Let  $\bar{u}$  be the reservation utility from social interaction in the community. Using the fact that  $U(\lambda, \alpha_l) \geq \bar{u}$  for all participating individuals, we get  $\lambda^* \leq g(\bar{u}, \alpha_l)$ . Similarly, we can obtain  $\beta^* \leq h(\bar{u}, \alpha_h)$ . This is quite appropriate when thinking about caste and race. The experience of high caste agents in a primarily low caste village will be quite different from a high caste agent in the opposite situation. Similarly, a white person in a predominantly black neighborhood will face adjustment costs that are different from those of a white person living in a predominantly white neighborhood. Assuming that there are  $n_h$  number of high caste and  $n_l$  number of low caste agents in the population, the number of high caste agents who participate in the group lending program is given by

$$n_h^* = \Pr\{\lambda^* \leq g(\bar{u}, \alpha_l)\}n_h.$$

Similarly the number of participating low caste members is given  $n_l^* = \Pr\{\beta^* \leq g(\bar{u}, \alpha_h)\}n_l$ . Thus, in equilibrium we obtain  $\alpha_h^* = \frac{n_h^*}{n_h^* + n_l^*}$ . This denotes the proportion of high caste individuals who participate in the group lending program in equilibrium. Note, as shown in Alesina and La Ferrera (2000), existence of at least one such equilibrium is guaranteed. Moreover another implication of this formulation is that if  $n_h < n_l$ , then  $\alpha_h^* < \alpha_l^*$ , suggesting that if there are fewer high caste agents than low caste agents, then the optimal proportion of participating high caste members will also be lower in the population. This implies that if there are fewer high caste agents in the population, the probability of finding a high caste match is lower for all agents leading to a higher expected adjustment cost.

## 2.1 Adverse Selection in Group Lending

We now explore the implications of social identity for potential adverse selection due to the asymmetric information inherent in the problem. Since

the bank does not know the borrower's type and cannot rely on collateral, any loan offering is likely to lead to adverse selection. Ghatak and Guinane (1999) show that the joint liability lending can eliminate this problem. Since each pair of borrowers is now jointly liable, safe borrowers will not team up with risky borrowers. Thus by lending jointly the bank is able to overcome the problem of adverse selection. Suppose borrower  $ij$  team up with borrower  $i'j'$ . Then the expected utility of borrower  $ij$  is given by

$$EU_{ij,i'j'} = P_j P_{j'}(Y^h - R - C) + P_j(1 - P_{j'})(Y^h - R - c - C)$$

where  $C = \lambda^*$  if  $i = h$  and  $i' = l$ ;  $C = \beta^*$  if  $i = l$  and  $i' = h$ ; and  $C = 0$  if  $i = l = i'$  or  $i = h = i'$ . Note that the participation constraint for group formation is satisfied when  $EU_{ij,i'j'} \geq 0$  for all possible  $ij$  pairings. Based on this the expected payoff of a safe high caste borrower when her partner is a safe low caste borrower is given by

$$EU_{hs,ls} = P_s P_s(Y^h - R - \lambda^*) + P_s(1 - P_s)(Y^h - R - c - \lambda^*)$$

Similarly the expected payoff of a safe high caste borrower when her partner is a risky high caste borrower is given by

$$EU_{hs,hr} = P_s P_r(Y^h - R) + P_s(1 - P_r)(Y^h - R - c)$$

As mentioned earlier no adjustment costs are incurred in this case because of caste homogeneity, i.e.,  $C = 0$ . A safe high caste borrower will prefer a risky high caste borrower over safe low caste borrower when

$$EU_{hs,hr} > EU_{hs,ls} \Rightarrow \lambda^* > (P_s - P_r)c$$

Similarly we find that a safe low caste borrower will prefer a risky low caste borrower when

$$EU_{ls,lr} > EU_{ls,hs} \Rightarrow \beta^* > (P_s - P_r)c$$

Our first proposition summarizes these findings by identifying instances where adverse selection occurs.

**Proposition 1** *Joint liability lending may not alleviate the problem of adverse selection in presence of positive adjustment costs across groups if either only  $\lambda^* > (P_s - P_r)c$ , or only  $\beta^* > (P_s - P_r)c$ , or  $\lambda^* > (P_s - P_r)c$  and  $\beta^* > (P_s - P_r)c$ .*

This proposition suggests that a group lending program can lead to adverse selection and risk heterogeneity in group formation when there are adjustment costs. In the presence of the adjustment costs a group lending program can lead to gender or caste oppression through the exclusion of a social group from a lending program. When  $\lambda^* > (P_s - P_r)c$ , then the adjustment cost of having a partner from a different social group exceeds the cost of having a risky partner from own social group which is given by the right hand expression of the inequality. Hence a safe low caste borrower may not get access to loans or as is more likely to happen, a safe low caste borrower may not be able to find a partner to form a group and hence gets left out of the program.<sup>8</sup> This has consequences for both poverty reduction and propagation of social institutions like the caste system.

**Remark:** *Joint liability lending can be used to prioritize and promote social objectives.* Social objectives here can range from empowering women to caste and ethnic integration. This follows as a corollary of the above proposition. Let  $\lambda^* < (P_s - P_r)c$  and  $\beta^* < (P_s - P_r)c$ , i.e., borrowing groups are socially heterogenous. Then the lender can promote group formation among women without preventing male borrowers from participating in the program by lowering  $c$ . This will ensure that  $\lambda^* > (P_s - P_r)c$  and hence women will form groups with other women. In other words by offering different joint liability penalties to the different borrowing groups the lending institution can influence group composition and poverty alleviation. Consequently when borrowers differ along two characteristics one of which is observable, by offering a menu of contracts using the observable characteristic, the lending institution can influence the matching process. Similarly let  $\lambda^* > (P_s - P_r)c$  and  $\beta^* > (P_s - P_r)c$ , i.e., the borrowing groups are socially homogenous. Next suppose the lending institution wants to target borrowers belonging to a lower caste (with cost  $\beta$ ) or the poorest of the poor who have a hard time forming groups because they are fewer in number and socially excluded. Then one way to achieve this is by charging different liability costs to the two groups. By setting  $c_1 > c$  the lender can ensure that  $\lambda^* \leq (P_s - P_r)c$ , thereby forcing the upper caste borrowers to form groups with the lower caste borrowers. Thus joint liability lending can be used to promote social integration. Of course this process will get an additional boost if  $\beta^* \leq (P_s - P_r)c$  when lower caste borrowers will prefer upper caste borrowers to their own types.

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<sup>8</sup>Of course this can also arise due to matching frictions and is shown in the next proposition.

Till now we have considered four possible borrowers – one of each possible type.<sup>9</sup> However it is well known in the matching literature that the number of potential matches of each type can lead to some suboptimal outcomes. We have also seen that the size of the two groups in the community affects the adjustment costs. Further, group size can interact with the identity parameter (adjustment costs) giving rise to “interesting” pairings. Assume for the moment that group lending program satisfies the participation constraint of each type of borrower. To study the effects of group size we will assume that each borrower type  $ij$  can have either  $2n$  or  $2n + 1$  where  $n = 0, 1, 2, \dots$ , potential members. Consider the situation where there are  $2n + 1$  safe high caste borrowers and either  $2n$  or  $2n + 1$  risky high caste borrowers, and the same number of risky low caste borrowers. There are no safe low caste borrowers in the population. This situation will always lead to adverse selection. In fact in such a community adverse selection will occur even if  $\lambda^* = \beta^* = 0$ , i.e., adverse selection will occur even in the Ghatak and Guinnane (1999) formulation. The outcome will be similar when the number of safe high caste borrowers is zero, but there are  $2n + 1$  safe low caste borrowers.<sup>10</sup> Next consider the two configurations shown below in the table.

<b>Borrower Type</b>	<b>Number (Case A)</b>	<b>Number (Case B)</b>
Safe High caste	$2n + 1$	$2n + 1$
Risky High caste	$2n$	$2n$
Safe Low caste	$2n + 1$	$2n$
Risky Low caste	$2n$	$2n + 1$

**Case A:** In this case  $2n$  safe high caste borrowers will form groups within themselves. The  $2n + 1$ -th safe high caste borrower will choose one of the risky high caste borrowers rather than a safe low caste borrower if  $\lambda^* > (P_s - P_r)c$ . Similarly,  $2n$  of the safe low caste borrowers will form group within themselves. The  $2n + 1$ -th safe low caste borrower will choose one of the risky low caste borrowers if  $\beta^* > (P_s - P_r)c$ . Therefore,  $(2n - 2)$  risky high caste borrowers will form groups within themselves and  $(2n - 2)$  risky

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<sup>9</sup>It is worth pointing out at this point that most of the theoretical joint liability lending literature only considers groups of two members. Ghatak (1999) is an exception to this issue, which we believe merits further investigation.

<sup>10</sup>There are 16 possible matching scenarios in this case and here we discuss only some of the interesting ones.

low caste borrowers will also form groups within themselves. The  $(2n-1)$ -th risky high caste borrower and the  $(2n-1)$ -th risky low caste borrower will form a group if their participation constraint is satisfied. Thus we see that adverse selection may persist even with joint liability lending because a safe borrower opts for a risky borrower due to matching frictions arising from community composition.

In some instances matching with a partner from a different social group may entail negative  $(\lambda^*, \beta^* < 0)$  adjustment costs. For instance, a high caste borrower may be able to exert pressure on a low caste partner and hence stand to gain from such a match. Similarly a low caste borrower may derive some benefits from teaming up with a high caste partner.<sup>11</sup> It is also possible to think that pairing across genders might be more enjoyable than pairing with a partner of the same gender and some agents may obtain benefits from doing so. Despite having negative adjustment costs, we still find that the composition of population in the community can lead to adverse selection. Moreover, surprisingly enough, in some situations safe low caste borrowers (safe high caste) may prefer risky high caste (risky low caste) borrowers. We show this in the next case.

**Case B:** Let  $\lambda^*, \beta^* < 0$ . In this case the  $2n$  safe high caste borrowers will form groups with  $2n$  safe low caste borrowers. The  $2n+1$ -th safe high caste borrower will form a group with one of the  $2n+1$  risky low caste borrowers if the participation constraint is satisfied. Thus even with negative adjustment costs joint liability lending may not alleviate adverse selection. The next proposition summarizes these findings. It states that in joint liability lending programs asymmetric subgroup composition can lead to adverse selection regardless of whether adjustment costs are positive or negative.

**Proposition 2** *When there are  $2n+1$  safe borrowers of either type the possibility of adverse selection can arise depending upon the size of the adjustment costs  $\lambda^*$  and  $\beta^*$ .*

First, note that the number  $2n+1$  follows from the fact that in our model each group is a pair. With more arbitrary group sizes a similar version of this proposition will hold. Second, while it is clear that matching frictions can lead to adverse selection problems, here we have seen that adjustment costs may exacerbate these issues. Even with negative adjustment

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<sup>11</sup>This might be due to the perceived upward social mobility or enabling the process of Sanskritization as documented by Srinivas (1955).

costs it is possible for adverse selection to arise just due to asymmetry in the composition of the community's population. This explanation provides support for the claims advanced by many researchers about the somewhat dismal performance of the *Good Faith Fund* in Arkansas. We now turn to the moral hazard issue.

## 2.2 Moral Hazard in Group Lending

The success and failure of a microfinanced project chosen by the borrower depends on borrower's effort level and other complementary inputs. The lending institution cannot observe the borrower's action choice. Given the nature of asymmetric information between the lending institution and the borrowers and the absence of collateral, the borrower does not have to choose his actions by equating marginal costs with benefits. Hence the possibility of moral hazard, i.e., the borrower not fully accounting for the costs of project failure cannot be ruled out. Ghatak and Guinnane (1999) show that group lending can alleviate this problem. The essence of their argument is that safer project choices allow banks to pass on these savings in the form of lower interest rates to the borrowers. Hence borrowers have an incentive to increase their effort level. We follow their formulation to examine the implications of social identity on moral hazard in group lending.

Let borrower  $ij$ 's action or effort choice determine the probability of success of her project  $P_{ij}$ . Similarly the success of the partner's project depends on her effort level  $P_{i'j'}$ . We assume that project success is perfectly correlated with effort. So effort choice of individual  $ij$  is given by  $P_{ij} \in [0, 1]$ . Further effort creates a disutility, and we model this disutility from effort choice as  $(1/2)\gamma P_{ij}^2$  where  $\gamma > 0$ . Thus greater effort leads to greater disutility. We assume that the lending institution cannot observe the borrower's effort choice and that all borrowers are risk neutral. It is also assumed that  $Y^H < \gamma$  to ensure that we have an interior solution.

**Proposition 3** *In joint liability lending programs effort choice of individual  $ij$  increases with the partner's effort level and decreases as the number of agents of the other social group increases in the population.*

**Proof:** Consider a high caste borrower who chooses effort level  $P_{hj}$ . Then her objective function can be written as

$$\max_{P_{hj}} P_{hj}(Y^H - R) - cP_{hj}(1 - P_{i'j'}) - \lambda^* \alpha_l^* P_{hj} - \frac{1}{2}\gamma P_{hj}^2$$

The second term denotes the expected joint liability cost and the third term shows the expected adjustment costs since  $\alpha_l^*$  is the probability of having a low caste partner. An alternative way to think of  $\alpha_l^*$  is that it denotes the proportion of low caste individuals in the population. From the first order conditions we obtain

$$P_{ij}^* = (Y^H - R - c)/\gamma + cP_{i'j'}/\gamma - \lambda^*\alpha_l^*/\gamma$$

It is easy to check that  $\partial P_{ij}^*/\partial P_{i'j'} > 0$ , or the safer the partner's project choice, the safer the project choice of a borrower. Next observe that  $\partial P_{ij}^*/\partial \alpha_l^* < 0$ . We know that  $\partial \alpha_l^*/\partial n_l > 0$ . This gives us  $\partial P_{ij}^*/\partial n_l < 0$  as desired. ■

The proposition shows that the choice of a risky project by the partner reduces individual  $ij$ 's probability of choosing a safe project because of the increase in expected joint liability costs. Similarly, as the number of low caste agents in the community increases, the proportion of low caste agents in group lending activity increases. Consequently the high caste borrower's disutility cost increases. Therefore the high caste borrower now chooses a lower effort level creating a hidden moral hazard problem.

We can now examine the implications of cooperative and noncooperative behavior in a borrowing group assuming a zero profit condition for the bank. The zero profit condition for the bank is given by

$$RP_{ij} + cP_{ij}(1 - P_{i'j'}) = L$$

where  $L > 0$  is the amount loaned. Recall the best response function from the previous proposition states that  $P_{ij}^* = (Y^H - R - c)/\gamma + cP_{i'j'}/\gamma - \lambda^*\alpha_l^*/\gamma$ . Hence in a symmetric Nash equilibrium characterized by zero profits we have:

$$\bar{P}^{nc} = \frac{-(\lambda^*\alpha_l^* - Y^H) + \sqrt{(\lambda^*\alpha_l^* - Y^H)^2 - 4\gamma L}}{2\gamma}$$

Next assume that the borrowers will behave as collusive agents. We solve the high caste borrower's objective function again assuming that  $P_{ij} = P_{i'j'} = P$ . The first order condition now gives a different optimal effort choice which is shown below.<sup>12</sup>

$$P^* = \frac{Y^H - R - c - \lambda^*\alpha_l^*}{\gamma - 2c}$$

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<sup>12</sup>Note that these expressions are similar to the ones obtained by Ghatak and Guinane (1999). They only differ by the social identity adjustment factor  $\lambda^*\alpha_m^*$ . It can be checked that the individual liability effort level is the same in both models since it does not depend on social identity.

Using the zero profit condition we can compute the bank's preferred optimal probability as follows

$$\bar{P}^c = \frac{-(\lambda^* \alpha_i^* - Y^H) + \sqrt{(\lambda^* \alpha_i^* - Y^H)^2 - 4\gamma L}}{2(\gamma - c)}$$

Thus we see that  $\bar{P}^c > \bar{P}^{nc}$  and find that a cooperative group will select a higher effort level. As in Ghatak and Guinnane (1999) this also implies that repayment rates with cooperative borrowers is higher than under non-cooperative borrowing behavior.

### 2.3 Costly Auditing and Group Lending

We now consider the problem of costly state verification which arises in any state-contingent contract. The borrower has an incentive to deliberately report states of the world that reduce her loan repayment obligations. Therefore to recover the debts the lender can audit the borrowers' assets to see how much wealth is available to collect in lieu of the loan repayment. However this process of auditing is costly and when the costs are too high no loan contracts may be feasible. Ghatak and Guinnane (1999) show that joint liability lending is efficient in this regard since each borrower's partner now has an incentive to audit the borrower due to her liability in the event of default. This lowers the lender's state verification costs. We now revisit this problem taking social identity into account.

We will assume that borrowers can write costless side contracts with each other and can also costlessly observe the returns of their partner. This ensures that all group members make the same announcement about the state of the world. We now look at the truth telling incentives for each member:

$$\begin{aligned} Y^H - R - \lambda^* \alpha_i^* &> \max \left\{ 0, (1 - \omega)(Y^H - \lambda^* \alpha_i^*) \right\} \\ Y^H - 2R - \lambda^* \alpha_i^* &> \max \left\{ 0, (1 - \omega)(Y^H - \lambda^* \alpha_i^*) \right\} \end{aligned}$$

where  $\omega$  is the probability of an audit by the lender. The first constraint is in the nature of a participation constraint when group formation occurs across social identities, i.e., for the sake of simplicity we assume that a high caste borrower has a low caste partner. Clearly it is the second constraint that will bind. It says that when a borrower gets a high return while her partner has a low return, she has the incentive to state the truth and pay her own debt and incur the joint liability penalty as well. Next the bank's zero profit constraint can be written as

$$P^2R + P(1 - P)2R - \omega(1 - P)^2\tau = \rho$$

where  $\tau$  is the auditing cost and as before  $\rho$  is the opportunity cost of the bank's loan.

Assuming that  $C = R$  and solving the two binding constraints we get,

$$R = \omega^*(Y^H - \lambda^*\alpha_i^*)/2$$

and the probability of an audit by the lender as  $\omega^* = \omega_{jl}^{si}$  :

$$\omega_{JL}^{si} = \rho / \left[ \left\{ P(Y^H - \lambda^*\alpha_i^*) - (1 - P)\tau \right\} - (1/2)P \left\{ P(Y^H - \lambda^*\alpha_i^*) - 2(1 - P)\tau \right\} \right]$$

where the subscript denotes probability of an under joint liability lending and the superscript says that social identity has been accounted for. It is easy to verify that the probability of audit under individual liability is given by

$$\omega_{IL} = \rho / \{PY^H - (1 - P)\tau\}$$

Also from Ghatak and Guinnane (1999) the probability of an audit under joint liability is given by

$$\omega_{JL} = \rho / \left[ \left\{ PY^H - (1 - P)\tau \right\} - (1/2)P \left\{ PY^H - 2(1 - P)\tau \right\} \right]$$

From these expressions it is easy to verify that  $\omega_{JL} < \omega_{IL}$  when  $P < 2\tau/(Y^H + 2\tau)$ . However when we take the social adjustment costs into account this changes considerably. For  $\omega_{JL}^{si} < \omega_{IL}$  we need  $P < 2(\tau - \lambda^*\alpha_i^*)/(2\tau + Y^H - \lambda^*\alpha_i^*)$ . Note that  $2(\tau - \lambda^*\alpha_i^*) < 2\tau + Y^H - \lambda^*\alpha_i^*$  because it satisfies the trivial condition  $Y^H + \lambda^*\alpha_i^* > 0$ , i.e.,  $P$  is indeed a probability. Further observe that

$$2\tau/(Y^H + 2\tau) > 2(\tau - \lambda^*\alpha_i^*)/(2\tau + Y^H - \lambda^*\alpha_i^*)$$

because it trivially satisfies the condition  $\lambda^*\alpha_i^*(Y^H + \tau) > 0$ . Consequently for some  $P$  we will get the following condition

$$2(\tau - \lambda^*\alpha_i^*)/(2\tau + Y^H - \lambda^*\alpha_i^*) < P < 2\tau/(Y^H + 2\tau)$$

Thus when we take the social adjustment costs into account, we see that for some range of project success probabilities we get  $\omega_{JL}^{si} > \omega_{IL}$ . In other words, unlike Ghatak and Guinnane (1999) we find that auditing is not necessarily more efficient under joint liability lending. This is summarized in the next proposition.

**Proposition 4** *Ignoring social adjustment costs in the process of costly state verification can lead to inefficient outcomes.*

This proposition argues that in the presence of group formation costs, individual liability lending may be better than group lending. In fact the essence of this proposition states that we cannot analyze the advantages of joint liability lending through its impact on borrower behavior independent of the transactions costs benefits of this approach. Only such a complete analysis will provide the conditions under which joint liability lending can outperform individual liability lending.

### 3 Discussion

In recent years a number of papers have dealt with the importance and future of microfinance programs and have explained the theoretical and empirical significance of joint liability lending programs. While microfinancing programs have been highly successful in many countries, their success has not been unequivocal. According to Pitt and Khandekar (1995), microfinancing programs have been successful in poverty alleviation in Bangladesh, Malaysia, South Korea, Malawi and Cameroon and whereas they have failed in India, Egypt, Venezuela, Kenya and Lesotho. The jury is still out on their impact on poverty alleviation. Similarly, repayment performance of joint liability programs also exhibits variation across countries. While there are many instances of successfully operating joint liability programs, microfinancing is by no means devoid of failures. It has now been well documented that microcredit programs have been less successful in areas of low population density and weak social ties like Arkansas, parts of Africa and several Pacific Islands. The reasons cited for the failure is that low density makes it hard to find partners who might be far away and/or have weak social ties. In other words a heterogeneous (in terms of social and cultural factors) population makes it hard to form groups.

This paper explains how costly group formation affects microfinancing programs. For example, due to the group formation costs such programs may not be able to reach the poorest sections of society or some safe borrowers may get excluded from the program. In fact as suggested earlier it is plausible that due to high social adjustment costs, the poorest households in the tribal regions of India like Jharkhand are excluded from the microfinancing programs (see the Somanathan (2003) study for details). Amin, Rai and Topa (2003) have found out that in Northern Bangladesh microcredit

programs are successful in reaching the poor, but have been less successful in reaching the more economically vulnerable sections of the community.

We examine joint liability lending programs by modeling costly endogenous group formation. The costs of group formation depend on the social identity of the actors. Agents in the model can form groups costlessly with those having their own social identity, while it is costly to form a group with an agent whose identity is different. We find that introducing such costs of group formation affects all aspects of joint liability programs. We show that adverse selection and moral hazard cannot be ruled out. Finally, when we look at the issue of costly auditing we find that it is possible that individual liability lending may be better than joint liability lending once we incorporate group formation costs.

The common notion of “assortative matching” in joint liability lending programs is not always true when we introduce such group formation costs. Costly group formation may force a safe borrower to tie up with a risky borrower. In fact greater the caste/gender prejudice in the community, higher will be the social adjustment cost and as a result higher will be the risk heterogeneity in credit groups.

Most of the theoretical and empirical literature on microfinance argues in favor of risk homogeneity though there are some notable exceptions like Sadoulet and Carpenter (2001), and Lensink and Mehrteab (2001). Sadoulet and Carpenter (2001) model a situation where both safe and risky borrowers can gain from forming a group because the joint liability contract may allow the borrowers to set up some insurance arrangements. In such an arrangement safe borrowers gain a transfer from forming a group with a risky borrower, whereas a risky borrower can gain from matching with safe borrowers and in turn make a transfer payment to compensate her. They find clear evidence of risk heterogeneity in Guatemala as an optimal choice in joint liability lending, but are unable to provide empirical evidence supporting the transfer payments claim. Lensink and Mehrteab (2001) document a similar phenomenon in Eritrea after adjusting for matching frictions. They claim that the insurance hypothesis may be one possible explanation, especially when returns on projects are negatively correlated. Again they do not provide any empirical support for the insurance hypothesis. Our paper provides a simple and alternative explanation for risk heterogeneity. By introducing a cost for the formation of groups we find that risk heterogeneity cannot be ruled out.<sup>13</sup> What is interesting about our explanation is that it

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<sup>13</sup>Note that in 1999 the population densities of Guatemala and Eritrea were 113 and 33 persons per square kilometer respectively (*Source*: CIA World Fact Book). These numbers

simple, and not contradictory to the insurance arguments made in the other papers. In fact both can co-exist to create risk heterogeneity.

In our paper we have shown that if group formation is a costly affair, the joint liability lending programs may not alleviate moral hazard problems. In particular we find that while effort level increases when the partner's effort level increases because of lower joint liability costs. However, when the number of agents of the other social group participating in the joint liability program increases, it leads to greater adjustments costs and hence a lower effort choice. This echoes the commonly made claim that homogenous social groups are a prerequisite for a successful group lending program.

Our reexamination of costly auditing shows that in some cases individual liability lending may be better than joint liability lending. The cost of auditing in our model is higher than the cost of auditing in other joint liability lending models which do not account for group formation costs. Hence monitoring may not be a cakewalk for lending parties even with joint liability lending programs. Thus individual liability lending may be better when there are zero transaction cost of lending, while joint liability lending may be a better option because it permits economies of scale when positive transaction costs exist. Thus our analysis makes it clear that a holistic analysis that incorporates both impact of joint liability lending on group behavior as well as the transactions costs of lending is necessary to understanding the success and failure of these programs.

Our findings also have implications for policies like targeting a particular social group and when to use a menu of joint liability contracts. Barriers of caste, gender and untouchability are definitely main obstacles in the process of including "poorest of the poor" section of the society. Our paper gives the economic intuition of failure of group lending programs in racially or culturally divided regions. Social adjustment does not come without incurring some cost. So, joint liability lending programs are not really costless programs when caste or gender bias are deep-rooted problems in our society. The problem may become further complicated if lending parties also biased preferences. Our model points out that in these situations safe-risky combination may not be a second best option but the first best. Microfinancing can be sustainable even with risk heterogeneity because risk homogeneity may not emerge at all as a result of costly group formation. We conclude that assortative matching is not a generalized solution in case of microfinancing – risk heterogeneity within the group takes place in many cases where group formation itself is a costly affair and social identity plays a key

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in themselves could lead to high group formation costs.

role in choosing the fellow partners.

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