

**Are Women “Naturally” Better Credit Risks in Microcredit?
Evidence from Field Experiments in Patriarchal and Matrilineal Societies
in Bangladesh**

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Abstract

We use controlled experiments to identify the proximal causes of gender differences in the repayment of microcredit. We recruit male and female subjects from a patriarchal and a matrilineal community in Bangladesh, who live in the same villages, and find that the female subjects have a greater willingness to repay microcredit in every society irrespective of the type of loan. Thus, the observed gender differences in the repayment of microcredit cannot be explained by the different roles that women play in different societies. In other words, women are “naturally” better credit risks than men in microcredit. We confirm that our results are not driven by the common culture and values among our subjects that stem from geographical proximity.

JEL Codes: C90, G21, J16.

Key Words: Microcredit, gender and repayment, matrilineal and patriarchal societies, field experiment.

1. Introduction

One often hears the maxim that men and women are intrinsically different (Lawrence, 2006). There is even a bestselling book entitled "*Men are from Mars, Women are from Venus*" that explores innate differences between the genders.¹ In 2005, then president of Harvard University, Lawrence Summers, drew the ire of women (and some men) by suggesting that the under representation of female scientists at elite universities may stem in part from innate differences between men and women.² Even microcredit is no stranger to such distinctions where, it is often said that women have better repayment behavior than men (see, for example, D'espallier, Guerin, and Mersland, 2011; and Armendiz de Aghion and Morduch, 2010).³ But why is it so?

Our goal in this study is to provide insights into the underpinnings of what might make women better microcredit customers. That is, are they so because that is how “nature” has wired them or are they so due to the “nurturing” lessons they learn from childhood? One way to answer this question is to find two distinct societies that have historically evolved in distinct directions in terms of gender relations—such as a patriarchal and a matrilineal society, where men and women are nurtured in opposite ways—and engage them (both the men and women) in a simple loan repayment game (i.e., an experimental task), which captures the essential features of microcredit. If it is the differential nurturing that leads women to be better borrowers, loan repayment behavior of men and women would be mirror images in

¹ The book, written by John Gray, has sold more than 50 million copies and the catchy title has become a part of popular culture to underscore the intrinsic differences between men and women.

² <http://www.thecrimson.com/article/2005/1/14/summers-comments-on-women-and-science/>

³ In an early research on credit risk, Jaffee and Russell (1976) argued that the loan repayment decision of a borrower is driven by her ability and willingness to do so. Studies on organizational performance suggest that small businesses run by female owners survive and succeed less often than those run by their male counterparts (see for example, De Mel, McKenzie, and Woodruff, 2008; Fischer, Reuber, and Dyke, 1993; and Kalleberg and Leicht, 1991). This suggests that the better repayment performance of women microcredit clients is not driven by their greater ability of doing so. Rather, it could simply be an outcome of a greater willingness to repay, i.e., a better repayment behavior of female microcredit clients.

these two distinct societies. If, on the other hand, women are naturally better at loan repayment behavior, we would observe similar behavior by them in both of these societies.

In identifying gender differences in repayment behavior across two distinct societies, it is crucial to conduct the experiments in an environment of cultural similarity across the subjects since a cultural heterogeneity might influence the findings of such experiments.⁴ We believe we have found a solution to control for cultural differences in our study. In particular, we have traced an indigenous community in the Sylhet district of northeast Bangladesh—the Khasi—which has a matrilineal family structure and a matrilocal residence system. The Khasis live in small *punjis*, i.e., clusters of houses within the same cultural boundary (Chakraborty and Ali, 2009). We discovered two *punjis* in the *Sadar* county of Sylhet, where the members of the Khasi community have been living side by side with the members of another indigenous community—the Patro—for hundreds of years. Extant research suggests that these two communities are ethnographically very close (Patro, 2010) but, unlike the Khasi, the Patro community has a patriarchal family structure.⁵ We conducted a modified version of the microfinance repayment game developed by Abbink, Irlenbusch, and Renner (2006) with both male and female subjects from these two societies.⁶ Since the female

⁴ This is particularly relevant because cultural differences might explain, in part, the differences in the degree of trustworthiness across societies (Guiso, Sapienza, and Zingales, 2004) which, in turn, might explain the differences in repayment behavior in microcredit (Karlan, 2005).

⁵ Patriarchy refers to a system of governance in which men rule societies through their position as head of households (see for example, Waber, 1947). In particular, the following features are observed in a patriarchal society: (a) a patrilineal system, where property and title are inherited through the male lineage; (b) a patrilocal residence system, which refers to a custom in marriage whereby the wife goes to live with the husband's family; and (c) male dominance in political and spiritual leadership (see for example, Hartmann, 1979). In a matriarchal society, on the other hand, the position of women is the mirror image of that of men in a patriarchal society. Anthropologists, however, argue that pure matriarchal societies do not exist (Campbell, 2002), although some characteristic features of matriarchy are observed in some small scale societies across the world. For example, there are two indigenous communities in Bangladesh—the Khasi and the Garo—where matrilineality (a system in which descent is traced through maternal ancestors) and matrilocal residence system (i.e., a custom in marriage whereby the husband goes to live with the wife's family) are observed. But these two communities are not truly matriarchal because only a man can be a *minister* (i.e., a leader of the clan), or a priest in these societies (Chakraborty and Ali, 2009).

⁶ Abbink et al.'s microfinance repayment game is a modified version of the public goods game that captures the essential features of joint liability and dynamic repayment incentives—the features that are often imbedded in microcredit contracts. In its original version, Abbink and his co-authors investigated the impact of group size

subjects in our experiments play different roles in their societies, it allows us to investigate whether the observed gender difference in the repayment of microcredit is an outcome of nurturing effects. However, what makes our choice of experimental setup more appropriate is that through a stroke of natural selection, we were able to control for the potentially differential effects of culture impacting our findings.

Employing the microfinance repayment game allows us to investigate the drivers of a borrower's willingness to repay a microloan. In our modified version of the game, we extend small loans to the subjects under individual and joint liability-based loan contracts, with the provision of follow-up loans upon successful repayment of a current loan, i.e., we include a dynamic repayment incentive. Each subject independently invests in a risky project. If the project fails, the subject cannot make any repayment. If, on the other hand, the project is successful, the subject can either repay her loan with interest, or strategically default and repay nothing. In sessions where loans are extended without joint liability, subjects are required to repay only the individual component of their loans. The individual repayment game (IRG) ends if a subject does not repay either because she is unable to or because she does not want to. On the other hand, in sessions where joint liability loans are issued, in addition to repaying the individual component of a loan, a subject is expected to contribute to bailing out any defaulting peers, whose projects may have failed. The group loan repayment game (GRG) ends if the group, as a whole, fails on its loan obligations. In all forms of the repayment game, the repayment decisions by the subjects are observed over multiple loan cycles. However, unlike Abbink et al., we do not continue the game for a finite (and known) number of rounds where a non-contribution in all rounds is a subgame perfect equilibrium (see, for instance, Cassar, Crowley, and Wydick, 2007). Rather, in each session, we use a

and social ties on loan repayment rates. Later, Cassar, Crowley, and Wydick (2007) used a modified version of this game to disentangle the effects of different types of social capital among the group members in joint liability-based loans. The microfinance game developed by Gine, Jakiela, Karlan, and Morduch (2010) is similar in spirit to that of Abbink et al. as well as Cassar et al. It investigates repayment behaviors in both individual and group loans.

simple lottery to determine the maximum number of rounds (between 5 and 10) to be played. We do not disclose this number to the subjects. Thus, the end of the experiments comes as a surprise to our subjects and they are not able to game the outcome of the later rounds as they would if they knew they were approaching the end.

We find that women, relative to men, display a greater willingness to repay their loans in both communities irrespective of the type of loan (i.e., individual or group). Thus, gender differences in the repayment behavior in microcredit *cannot* be explained by the different roles that women play in our two very distinct societies. In other words, women appear to be naturally better credit risks than men.

One may, however, argue that we observe similar behavioral patterns in the two communities because our experimental subjects share common cultural values stemming purely from a geographical proximity. Therefore, as a robustness check of our findings, we recreate the same experiments described above with men and women from the Marmas — another indigenous community located 150 miles away (and still within Bangladesh) from the Khasi and the Patro communities. A unique feature, that distinguishes the Marma community from the Khasi and the Patro, is that Marma males and females are treated as equals (see Marma, 2010; and Lewin, 1869). Prior research suggests that the dominance of a particular gender (typically male) in a society, which is often rooted in conflict over scarce resources and in social relationships over power, organizes human behavior in culturally patterned ways (see for example, Lorber, 1994). Thus, in a society, where men and women are treated equally, we may not observe certain gender differentiated behaviors that we typically observe in a gender- stratified society. Our results, however, suggest that our main findings, that women have a greater willingness to repay microcredit, hold true in the Marma community as well. This strengthens our argument that the better repayment behavior of female microcredit borrowers is not driven by the different roles that women play in different societies.

The study that comes closest to ours is the one by Gneezy, Leonard and List (2009) who examine gender differences in competitive inclination across the Maasai in Tanzania (a patriarchal society) and the Khasi in Northeast India (a matrilineal society).⁷ They report that while women are less competitive than men in the patriarchal society, the trend reverses in the matrilineal society, where women are more competitive than men. Thus, the authors conclude that gender differences in competitive inclination are related to nurture. However, a potential limitation of their study, which the authors themselves suggest (see footnote 4, p. 1638), is that a cultural heterogeneity among the subjects might, in fact, influence their findings given that the two communities are in two different continents and differ vastly in ethnic origins, cultural norms, social values and other factors. Given this drawback in their experimental design, it is unclear exactly how much of their findings may be driven by such cultural differences. By contrast, an innovation of the current paper lies in controlling for this potential cultural difference in the two societies that we study.⁸

The remainder of our study proceeds as follows. We discuss the background literature in the next section. In section 3 we discuss the relative positions of women in the two communities where we conducted our experiments. The experimental design is described in section 4. We discuss the results in section 5 including the results of the robustness test. We conclude in section 6.

⁷ In fact, the Khasi in Bangladesh is an offshoot of the Khasi in Northeast India (Chakraborty and Ali, 2009).

⁸ In an attempt to control for the effects of cultural differences stemming from geographical distance, Andersen et al. (2012)—who studied the role of socialization in explaining gender differences in competitive inclination—recruited subjects from patriarchal and matrilineal communities in the Meghalaya province of India. We believe that our experimental setup is cleaner as we recruited subjects from the same village.

2. Background Literature

Prior studies that seek to identify the drivers of repayment in microcredit can be categorized into two broad groups. Studies in the first group suggest that high repayment in microcredit can be attributed to behavior inducing mechanisms, such as joint liability and dynamic repayment incentives, which are typically embedded in microloan contracts. For instance, theoretical researchers have unequivocally argued that joint liability can resolve the adverse selection and moral hazard problems inherent in rural credit markets by inducing peer screening in the loan application stage, and peer monitoring in the loan utilization stage (see, for example, Stiglitz, 1990; Varian, 1990; Ghatak, 1999 and 2000; and Ghatak and Guinnane, 1999). In practice, however, a borrower's reliance on her group members to repay loans may open the door for free riding (Besley and Coate, 1995) which, in turn, may adversely affect loan repayment rates in joint liability-based microcredit. Thus, it is not surprising to find inconclusive evidence in empirical and experimental studies regarding the impact of joint liability on loan repayment rates. For example, based on evidence from a randomized controlled trial experiment in the Green Bank of Caraga in the Philippines, Gine and Karlan (2010) suggest that joint liability plays no role in improving the repayment performance of borrowers. On the other hand, the experimental study by Gine et al. (2010) in Urban Peru suggest that, compared to individual loans, repayment rates are better in a borrowing group of two members. In the present study, we investigate gender differences in repayment behavior in both individual and group loan contracts. However, we do so by replicating the Grameen Bank-model of group lending, where groups are formed with five borrowers.⁹ Thus, the size of the borrowing group is larger in our experiments relative to that of Gine et al. This difference might be crucial as Abbink et al (2006) suggest that, as group size increases, say from two to four, repayment rates deteriorate due to a free-riding effect.

⁹ Cassar et al. (2007) observe repayment rates in a group of six borrowers in a framed field experiment in South Africa and Armenia, but do not observe loan repayments in individual-liability loans.

Studies in the second group emphasize on socio-economic and demographic characteristics of the borrowers, and community level factors where the MFI operates—as drivers of loan repayment in microcredit. Sharma and Zeller (1997), for example, have investigated the repayment performance of 128 borrowing groups in Bangladesh and found that borrowers from relatively wealthier households have better repayment records. Using data from Bangladesh, Khandker, Khalily and Khan (2005), on the other hand, suggest that access to electricity, and paved road networks, are correlated with low default rates. In a more recent study, Ahlin, Lin, and Maio (2011) show that default rate in microcredit is inversely related to the level of financial sector development in a country, where the MFI operates.

It is, however, worth underscoring that irrespective of loan type and other relevant factors, women microcredit-borrowers have displayed better repayment performance than their male counterparts in countries like Bangladesh (see for example, Hossain, 1988; Khandker, Khalily, and Khan, 1995; and Sharma and Zeller, 1997); Malawi (Hulme, 1991); Malaysia (Gibbons and Kasim, 1991); and Guatemala (Kevane and Wyidick, 2001). In a cross-country study, D'espallier et al. (2011) investigate the repayment records of 350 MFIs in 70 countries. Their results confirm that, *ceteris paribus*, a higher percentage of female clients in MFIs are associated with a lower portfolio risk, fewer write-offs, and fewer provisions. In this paper, we seek to identify the proximal causes of such gender differentiated behavior in the repayment of microcredit.

The origin of gender differences in human behavior has been a long-debated issue. Most theorists who have considered the origins question have taken either an *essentialist* or a *social constructionist* perspective (Eagly and Wood, 2002). Those subscribing to the *essentialist* perspective, for example, emphasize that men and women are born different and they remain so for the rest of their lives because gender differences in behavior have their roots in biology and genetics (see for example, Baron-Cohen, 2003; and Lawrence, 2003).

Neuroscience and evolutionary psychology, the two rapidly progressing fields that investigate the proximal causes of behavior, support this point of view. Evolutionary psychologists, for instance, explain gender differences in behavior based on evolutionary principles about sexual selection pressures. They argue that gender differences in behavior result from different reproductive pressures that ancestral males and females encountered over human history (see, for instance, Buss and Kenrick, 1998; Gangestad and Simpson, 2000).

The *constructionists*, on the other hand, view gender differentiated behavior as a context-dependent outcome of social processes (see for example, Geertz, 1974; Williams and Best, 1982; Eagly, 1987; Bohan, 1993; and Lorber, 1994). According to this view, gender differences in behavior arise from the societal position of women and men through, for instance, the division of labor into homemakers and full time paid employees. Thus, a testable implication of the *constructionist* view is that we should observe a reversal of any gender differentiated behavior in two distinct societies where the roles of men and women are mirror images. In this paper, we examine the validity of this view in the context of micro loan repayment behavior.

Although no formal studies have so far been undertaken to identify the proximal causes of gender differences in the repayment of microcredit, various anecdotal explanations prevail in the literature, which are consistent with the constructionist view. One such explanation is that women have fewer credit opportunities in developing countries. Thus, in order to ensure continued access to credit, they (a) adopt more conservative investment strategies (Todd, 1996); and (b) exert greater effort in their projects (Ameen, 2004). Continued access to loans is particularly valuable to women entrepreneurs because, in most developing societies, they have limited access to household resources (Armendariz de Aghion and Morduch, 2010). Another argument is that women clients can be monitored easily by loan officers as they stay close to home rather than going out to work like the men (Rahman,

2001; and Goetz and Gupta, 1996). The essence of these arguments is that gender difference in the repayment of microcredit can be explained simply by the roles that women play in a typically male dominated society.

However, there are also reasons to believe that gender differences in repayment behavior have a natural basis. On the one hand, the act of repaying a loan signals the level of trustworthiness of a borrower (Becchetti and Conzo, 2011).¹⁰ On the other hand, psychological and biological research suggests that women can be naturally more trustworthy than men. For instance, evolutionary psychologists argue that women have historically invested more in raising their offspring than men. Ancestral women used to compete with other women in order to attract long term mates to protect the future of their offspring. Thus, women evolved, through the process of biological evolution—dispositions that favor trustworthiness and risk aversion (see for example, Archer, 1996)¹¹ — the two critical virtues that may naturally promote better loan repayment behavior among women. Biological research, in this context, suggests (a) that the level of trustworthiness is positively associated with the level of oxytocin release in a person (Kosfeld et al., 2005; and Zak, Kurzban, and Matzner, 2005); and (b) that the magnitude of oxytocin release is significantly higher among women than men (Carter, 2007).

In this paper we examine whether the gender difference in the repayment of microcredit has its origins in nature or nurture by observing micro loan repayment behavior of male versus female subjects in a patriarchal and a matrilineal community in Bangladesh. In

¹⁰ The study by Karlan (2005) provides support of this argument in the context of microcredit. After investigating the repayment records of the borrowers of FINCA (Foundation for International Community Assistance—a leading MFI in Peru), Karlan suggests that trustworthy individuals are more likely to repay microcredit loans.

¹¹ Ancestral men, on the other hand, competed with other men for sexual access to women, which may have resulted in a male disposition that favors risk taking, aggression and competition.

the next section we provide an overview of the relative position of women in these two distinct communities.

3. Women's Position and Gender Relations in the Khasi and Patro Communities

Despite living in the same villages, the two communities we conducted our experiments in differ significantly in terms of the position of women in the household and in society. In the Khasi community, for example, women carry forward the family lineage. Accordingly, women head Khasi households, and children are known by their mother's family names. Due to the matrilineal customs, the bridegroom moves to the bride's house after the wedding. Widowed and divorced women also live in their mother's house (Patam, 2010). The matrilineal families give rise to a system in Khasi society, where men frequently hold roles that seem to mirror those of women in a patriarchal society. For instance, it is only the female children among the Khasis, who inherit ancestral property. Further, a Khasi husband lives in a household where he has no authority over decision making, or over the distribution of resources (see also Gneezy et al., 2009). The Patro society, on the other hand, upholds the male line of lineage and a patriarchal family system. Males are considered to be the household head and the inheritors of ancestral property. Consistent with patrilocal customs, the bride moves to the groom's house after the wedding. Patro men are allowed to have multiple wives, but marrying a widow is strongly discouraged (Patro, 2010).

Chakraborty and Ali (2009) investigate women's position in these two communities and report sharp contrasts in gender relations. For example, in Khasi households, husbands raise the children, whereas child rearing is considered to be a wife's responsibility in Patro households. Therefore, it is common among the Khasi women to find work outside the village especially during lean periods when they are forced to go further away to find employment. In the Patro community, on the other hand, the prospect of women moving

around freely is not considered appropriate behavior by either the men or the women. However, the sharpest contrast that these authors identify is that, in direct conversations, Patro parents unequivocally revealed their preference for male children, while female children are always more welcomed among Khasi parents.

4. Experimental design

4.1. Subjects

A total of 280 subjects participated in our experiments in 28 sessions. Of these 280 subjects, 160 are Khasi (70 male and 90 female), and 120 are Patro (60 male and 60 female). The experiments were conducted over the month of June, 2012. Each session had either 10 male or 10 female subjects belonging to the same community. Subjects had no role in determining the participants in any specific session.¹² The experiments lasted for a maximum of four hours. The subjects were informed that they would receive 50 Bangladesh Taka (BDT) for participation and that they would be able to earn more money depending on the choices they made during the course of the experiments.¹³

Prior to participation, each subject filled out a short survey, which took, on average, 15 minutes to complete. The survey was designed to collect information on a subject's age, level of education, religion, marital status, occupations, and ownership of assets. Extant research suggests that these factors may affect repayment performance of the microcredit borrowers in Bangladesh (see, for example, Sharma and Zeller, 1997). A subject's age is measured in years; and her level of education is measured by the number of years of formal

¹² This restriction is important because if subjects are allowed to choose their own playing partners, it may introduce a differential level of social capital among subjects in different sessions which, in turn, may have a differential impact on the repayment performance in group loans. See Cassar et al. (2007) to understand the role of social capital in the repayment of group based microcredit.

¹³ BDT is the official currency of Bangladesh. When the experiment was conducted in 2012, one US Dollar was equivalent to 81 BDT. The average daily income in Bangladesh was than 186 BDT in 2012 (World Development Indicator: <http://databank.worldbank.org/>). Since the participants of our experiment came from the poorest segment of the population, it can be convincingly argued that a show up fee of 50 BDT was enough to ensure that they took the experiments seriously.

schooling. We categorize subjects, based on their marital status, into two categories: married and single, where the second category includes those who are unmarried, divorced and widows. Based on their primary professions, we categorize subjects as farmers and non-farmers. The market value of assets owned by a subject—such as cultivable land, houses, ornaments, cattle and other valuables—is measured in BDT.¹⁴

Summary statistics of our survey data are presented in Table 1. Our average subject is 32 years old; the Patro subjects are slightly older than the Khasi subjects. The average years of schooling is a little over three years, with the Patro subjects having more education than the Khasi subjects. Almost 80 percent of our subjects are married. On average, market value of the assets owned by the Patro households is higher than that of the Khasi households. Almost 33 percent of our subjects report agriculture as their main occupation. A further decomposition suggests that 85 percent of the Patro subjects are involved in non-farm income generating activities, while the corresponding number is 54 among the Khasi, which is consistent with previous studies (see for example, Chakraborty and Ali, 2009). Data in Table 1 further suggest that there are differences in observable characteristics in gender across both societies. For instance, within the Patro (Khasi) community, the male (female) subjects are wealthier and more educated than their female (male) counterparts. These differences are statistically significant at the five percent level.

<Table 1>

4.2. Microfinance Repayment Game

Recall that we use a modified version of the game devised by Abbink et al. (2006) in that we consider a simple experimental setup capturing the essential features of individual

¹⁴ In the regressions, natural logarithm of one plus assets is taken to deal with skewness and to incorporate subjects who do not have any physical assets.

and group based microcredit without a predetermined endpoint. In particular, our subjects participate in two repayment games. Each game consists of multiple rounds of borrowing and repayment. The first game is designed for us to observe repayment behavior in individual loans (*individual loan repayment game (IRG)*), while the second game is designed for us to observe repayment behavior in joint-liability based loans in a group of five borrowers (*group loan repayment game (GRG)*). It is worth mentioning that in the odd (even) numbered sessions, subjects first played the IRG (GRG) followed by the GRG (IRG). We do so in order to control for any potential order effects in our within-subjects experimental design.¹⁵

In each round of the IRG, each subject received a loan of 5 experimental BDT, which had to be invested in a risky project. The probability that the project would yield enough return to repay the loan with interest was $5/6$.¹⁶ If the project succeeded, the investor received a payoff of 12 experimental BDT. If the project failed, the subject received zero. A simple lottery was used to determine the status (success or failure) of a project. If a project was successful, the subject had a choice to repay their loans with interest or to default strategically. Following Cassar et al. (2007), we assumed a 20 per cent interest rate on both individual and group loans.¹⁷ Thus, in the IRG stage of the game, each subject whose project was successful had a choice of repaying 6 experimental BDT or to default strategically. If the subject decided to repay, the game moved to the next round; otherwise, the game ended right then. By the same token, if an individual's project failed, she could not make the loan repayment and the game ended. This design captures the important feature of dynamic repayment

¹⁵ Extant evidence suggests that in laboratory experiments, performance in a series of tasks may depend on the order in which the tasks are addressed. This is known as an order effect in the literature, which occurs when a prior experience with one task may affect a subject's behavior in subsequent tasks. Order effects are typical in within-subjects experiments, like ours, as the same subjects participated in the IRG and GRG stages of our experiment. One particular way of controlling for order effects is to randomly assign the order in which the games are played. For a discussion on order effects, see Harrison et al. (2005).

¹⁶ Both Abbink et al.(2006), and Cassar et al. (2007) introduced this same stochastic probability of success in their experiments.

¹⁷ Prior studies suggest that the effective interest rate on Grameen Bank's loan is around 22 percent (Ahmad, 2007).

incentives associated with actual micro loan contracts. At the beginning of each session, the experimenter randomly (and unknown to the participants) chose any number, n , between 5 and 10. After the n^{th} round, the game was discontinued even if a subject decided to repay. The subjects were never informed about this number. A similar procedure was followed in the *group loan repayment game*. In other words, through our game design, we ensured that the subjects could not guess in advance when the game would end.

In the GRG stage of the experiments, we randomly divided the subjects into two groups with each group containing five members. At no point during the experiments did the subjects know who else was in the group with them.¹⁸ At the beginning of the GRG, each member of the group individually received 5 experimental BDT; however, the group, as a whole, was responsible for repaying 30 experimental BDT (*i.e.*, the total amount disbursed to the group plus interest payment). By design, the subjects whose projects failed could not repay their individual shares of the group loan. Like the IRG, a subject whose project was successful had a choice to repay or (strategically) default. The debt burden of the group was, therefore, split equally among those whose projects succeeded and those who were willing to repay. Thus, the debt burden of an individual subject decreased as more and more successful group members decided to repay. Subjects were, however, not allowed to repay loans using earnings from the previous rounds. That is, individual round earnings could not be carried over.¹⁹ This implied that the full repayment of a group loan was possible only if at least three group members decided to repay. At the end of each round, the subjects were informed about the number of group members who contributed towards the repayment of group loan, and their resulting payoff (one's own project payoff minus her own share of the group loan

¹⁸ By ensuring that subjects played with anonymous partners, we made sure that the magnitude of social capital, among subjects did not influence their loan repayment decisions.

¹⁹ The underlying assumption is that poor borrowers cannot accumulate enough savings, at least in the short run, from which they can repay loans if their projects fail. See Deaton (1989) for the factors that hinder poor household's ability to save for precautionary purposes.

repayment if she decided to repay at all). At no point, however, the identity of a non-contributing subject or the reason for non-contribution (project failure or strategic default) was revealed. If the group, as a whole, fulfilled its repayment obligations, the game proceeded to the next round. Otherwise, the game ended at that stage. Thus, similar to individual loans, and consistent with actual practice, the joint liability-based loans in our experiments also contained dynamic repayment incentives.²⁰

5. Results

In both the IRG and GRG stages of our experiments, we estimate the number of times a subject repays a loan divided by the number of times her project is successful. Following Cassar et al. (2007) and Gine et al. (2010), we use this as a proxy for the loan repayment rate, which measures a subject's willingness to repay. We examine whether these proportions vary across genders, using a simple *t* test.²¹ First, we do so in our pooled sample of Khasi and Patro subjects. Then we separately observe the pattern of gender differences in the loan repayment rates (if any) in each society.

Data reported in Table 2 suggest that the women subjects of our experiments show a greater willingness to repay in both individual and group loans. For instance, in the IRG treatment, average repayment rate of the female subjects is 16 percentage points higher than that of the male subjects. Average repayment rate of the female subjects in group loans, on the other hand, is 17 percentage points higher than that of the male subjects. In both cases, the figures are statistically distinct at the one percent level. Upon further decomposition, we find that women are better credit risks in either societies and irrespective of the types of loans. For example, in case of individual loans, average repayment rate of the Patro (Khasi) women is

²⁰ We refer the reader to the experimental instructions in the appendix to get a deeper understanding of how we operationalized our experiment.

²¹ In particular, we use a Welch's *t*-test (Welch, 1938) that enables us to compare two proportions with unequal variances (see for example, Ruxton, 2006).

15 (16) percentage points higher than that of the Patro (Khasi) men. In both cases, the differences are significant at the five percent level. We find similar evidence in joint liability based loans as well. For example, under a joint-liability based group loan contract, average repayment rate of the Patro (Khasi) women is 24 (14) percentage points higher than that of the Patro (Khasi) men. In both cases, the differences are also significant at the five percent level.

<Table 2>

5.1. Multivariate Analyses

So far we see evidence that females display better repayment behavior across both communities where women play very distinct roles. A reasonable conclusion is that women are naturally better credit risks with microloans. However, we have not yet attempted to control for observable characteristics—such as age, education, marital status, primary occupation, and ownership of assets of the borrowers—that prior studies have identified as potential drivers of repayment decisions by microcredit customers in Bangladesh (see for example, Sharma and Zeller, 1997).

We, therefore, control for the effects of these factors on the repayment performance of the borrowers in a multivariate regression framework. Since the dependent variable of our regression model — the loan repayment rates — is a continuous variable, we use an Ordinary Least Squares (OLS) estimation method. Our choice of the empirical method is consistent with that of Cassar et al. (2007), who use the same dependent variable as proxy for the repayment behavior in microcredit. In our OLS regressions, we pool data from both the Khasi and the Patro samples. Since a total of 280 subjects from both these communities participated

in two experimental sessions (i.e., in the IRG and GRG stages of the game), we have a total of 560 (280 x 2) observations in our pooled sample.²²

Following Gneezy et al. (2009), we begin with a parsimonious specification, where in order to measure gender differences in repayment behavior across the two communities, we regress the loan repayment rates on a dummy variable for community (*Khasi*: one if the subject belongs to the Khasi community, zero otherwise), a dummy variable for gender (*female*: one if the subject is female, zero otherwise), and their interaction terms. The results, reported in column 1 of Table 3 (SP1), suggest that female borrowers repay their loans more frequently than their male counterparts in both communities. For example, in the Patro community, the average loan repayment rate of the female borrowers is 20 percentage points higher than that of the male borrowers. This difference is statistically significant at the one percent level. In the Khasi community, on the other hand, the corresponding number is 13.5, which is statistically significant at the five percent level.

In the second specification (SP2), we add a dummy variable for loan types (*group*: one if repayment behavior is observed in the treatment with joint liability loans, and zero otherwise). We also include a set of variables in order to control for the effects of the observables discussed above. The results suggest that after controlling for the types of loans and other observables, average repayment rate of the Patro (Khasi) women exceeds that of their male counterparts by 21.4 (11.2) percentage points. The difference is statistically significant at the one (five) percent level. It is also evident from the results reported in the second column of Table 3 that repayment behavior improves in the borrower's age and the level of asset ownership.

²² Note that our pooled data set is akin to a balanced panel data, where loan repayment decisions of the same subjects are observed in two consecutive treatments. Accordingly, we also employed a fixed-effect, a random-effect, and a population-averaged panel regression method in order to estimate gender differences in the repayment of microcredit. All of our relevant coefficient estimates are qualitatively and statistically similar across the different estimation methods including the OLS model.

A notable finding of our analysis is that when joint liability is added to the loan contract, on average, repayment rate falls by 13 percentage points, which is statistically significant at the one percent level. This finding suggests that, *ceteris paribus*, when an investment project yields adequate returns to repay a loan, more people repay under an individual-liability loan contract than under a joint-liability loan contract. A reasonable implication is that microcredit borrowers tend to free ride on the good fortune of their partners (see also Besley and Coate, 1995). At first blush, it may seem that our findings run counter to what has been reported by others, such as, Gine et al. (2010) in the context of urban Peru. A closer examination, however, reveals that these authors find a positive association between joint liability and repayment rates because the magnitude the free riding problem may not be substantial in a small group of two borrowers; although it may increase in the size of the borrowing group as suggested by Abbink et al. (2006). In practice, the size of borrowing groups varies from five to twenty (Baland et al., 2013), where free riding problem may be high enough as the results of our experiments suggest. This may explain, at least partially, why joint liability is losing popularity among lenders across the world (Gine and Karlan, 2010).

<Table 3>

In sum, the female subjects in our experiments display better repayment behavior than the males irrespective of the roles they play in their respective societies and irrespective of the nature of the loan. Thus, we can argue that the observed gender difference in the repayment of microcredit does not have its root in nurturing; rather, women are naturally better borrowers in microcredit.

We underscore that we calculated a within-subjects t test, also known as a repeated-measures t test, to examine whether our results are influenced by the order in which subjects participated in the games. In our within-subject experiments, same subjects participated in both individual and group loan repayment games. One may, therefore, argue that their decisions in the second game have been revised by the outcomes of the first game (see for example, Harrison et al., 2005). In section 4.2 we mentioned that, in order to control for any potential order effects, we randomly assigned the order in which subjects played these two games. In particular, while half of the subjects in our experiments played the individual loan repayment game first, the other half played the group loan repayment game first. The use of a within-subjects t test enables us to examine whether any bias remains after randomizing the order of play.²³ It measures whether the average loan repayment rate in the first game of our experiments (0.57) is statistically different from that in the second game (0.60). A non-significant t -statistic ($t = 0.938$, with 279 degrees of freedom) suggests that they are not. Thus, we argue that our results are not influenced by any order effects.

5.2. Does Geographical Proximity of the Subjects Drive Our Results?

One may argue that we observe similar behavioral patterns in the two communities because our experimental subjects share common cultural values stemming purely from a geographical proximity. Therefore, as a robustness check of our findings, we conducted our microfinance repayment game with male and female subjects in another indigenous community of Bangladesh—the Marma. Our Marma subjects live in the southeastern district of Khagrachori,²⁴ 150 miles south of Sylhet district. Gender relations among the Marmas are different from that among the Khasis or Patros in that Marma males and females enjoy equal

²³ For a discussion on how to calculate a repeated-measure t -statistic, see Von Ende, 2001.

²⁴ According to the latest population census report, the total population of Khagrachori is 525,664 (Bangladesh Bureau of Statistics, 2006). The size of the *Marma* population in this district is 42,178.

status in society. For instance, although the men carry on the family lineage among the Marmas, both male and female children have equal rights to ancestral property. Women live with their husbands' families after marriage, but men have to pay a bridal price to the bride's parents. For these and other reasons, the Marmas are considered to be a gender neutral society (see for example, Marma, 2010; and Lewin, 1869). Thus, the dominance of a particular gender in society, which feminist scholars have identified as the source of gender-stratified behavior (see for example, Lorber, 1994), is not likely to drive the results of the microfinance repayment game among the Marmas.

A total of 150 Marma subjects (80 males and 70 females) participated in our experiments. We followed the same experimental procedures, where the subjects participated in both the individual and group-based repayment games. As before, we examine the pattern of gender difference in micro credit repayment within a multivariate regression framework. We regress the loan repayment rate on a gender dummy, loan type dummy and its interaction with the gender dummy, as well as other control variables discussed above. The results reported in Table 4 provide support to our finding in that the women subjects display a significantly better repayment behavior than the men in both the individual and group loan repayment games. In particular, average repayment rate of the Marma women exceeds that of the Marma men by 24 percentage points, which is statistically significant at the one percent level, suggesting that our main findings that women are better credit risks hold true among the Marmas as well.

<Table 4>

6. Conclusion

According to a recent report of the Microcredit Summit Campaign, more than 70 percent of the clients of microcredit are women.²⁵ One reason behind this gender bias is that women have traditionally displayed a better track record of loan repayment than the male borrowers. In this paper we dig deeper in trying to ascertain what may cause such gender differentiated behavior. Although no formal study has so far examined this issue, economists and other social scientists appear to anecdotally support a constructionist argument that such repayment behavior is driven by the differential roles that men and women play in a typically male dominated society (see for example, Armindariz de Aghion and Morduch, 2010). In the present paper we investigate the intriguing possibility that women might display a better repayment behavior irrespective of their relative position in society.

To help find answer to this question, we conduct a modified version of a standard microfinance repayment game, developed by Abbink et al. (2006), in the patriarchal Patro and the matrilineal Khasi communities in northeast Bangladesh. Since the roles of men and women are mirror images in these two societies, one should observe a reversal of the gender differentiated behaviors across these two societies if the constructionist conjecture is correct. The results of our experiments, however, suggest that women borrowers display a significantly better repayment behavior in both communities, irrespective of the type of loans. In order to ensure the robustness of our findings, we replicated the same experiments in the Marma community, where men and women are treated equally. Our findings hold true among the Marmas as well.

We conclude that women are naturally better credit risks in microcredit. We suggest that MFIs operating in Bangladesh and in similar underdeveloped economies around the

²⁵ <http://www.microcreditsummit.org/about-the-summits.html>

world would do well to promote events and to provide incentives such that more women are encouraged to leave the perimeters of their homes and join such micro lending programs, as part of their growth strategy.

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Table 1: Summary Statistics

	Overall			Khasi			Patro		
	Pooled	Female	Male	Pooled	Female	Male	Pooled	Female	Male
Individual characteristics:									
Age	31.64 (11.26)	31.22 (12.07)	31.79 (10.55)	30.90 (10.55)	30.65 (9.64)	31.21 (11.69)	32.36 (12.13)	33.5 (11.65)	31.23 (12.59)
Education	3.48 (3.53)	3.27 (3.44)	3.731 (3.63)	3.17 (3.19)	3.27 (3.21)	3.06 (3.09)	3.89 (3.91)	3.27 (3.68)	4.51 (4.06)
Farmer	0.33 (0.47)	0.24 (0.43)	0.43 (0.49)	0.46 (0.00)	0.30 (0.46)	0.67 (0.47)	0.15 (0.36)	0.15 (0.36)	0.15 (0.36)
Married	0.79 (0.419)	0.83 (0.38)	0.76 (0.447)	0.81 (0.39)	0.85 (0.35)	0.75 (0.43)	0.76 (0.43)	0.78 (0.41)	0.73 (0.44)
Assets	103,202 (104,581)	955.07 (98,456)	95,914 (111,616)	90,461 (86,596)	108,365 (89,691)	76,441 (77,125)	102,676 (124,684)	76,220 (108,237)	129,133 (134,901)
<i>N</i>	280	150	130	160	90	70	120	60	60

Table 2: Repayment Decision by the Subjects

Number of times a subject repaid a loan divided by number of opportunities to repay
Mean (Standard Deviation)

	Individual Loan	Group Loan
Pooled	0.649 (0.434)	0.519 (0.409)
Pooled Men	0.565 (0.448)	0.429 (0.424)
Pooled Women	0.723 (0.409)	0.598 (0.381)
Patro	0.655 (0.437)	0.486 (0.415)
Patro Men	0.576 (0.437)	0.367 (0.410)
Patro Women	0.733 (0.426)	0.605 (0.388)
Khasi	0.645 (0.433)	0.545 (0.404)
Khasi Men	0.555 (0.459)	0.483 (0.431)
Khasi Women	0.716 (0.401)	0.593 (0.379)

Table 3: Gender Difference in the Repayment of Microcredit

Khasi and Patro (N = 560)		
	SP1	SP2
<i>female</i>	0.198***	0.214***
<i>Khasi</i>	0.048	0.074
<i>female x Khasi</i>	-0.063	-0.102
<i>Group</i>		-0.129***
Age		0.004***
Education		-0.002
Married		-0.037
Farmer		-0.021
Assets		0.012***
Constant	0.471***	0.322***
R ²	0.04	0.095

*significant at the 10 per cent level;

**significant at the five per cent level;

***significant at the one per cent level.

Table 4: Gender Difference in the Repayment of Microcredit: The Marma

	Marma (N = 300)
<i>female</i>	0.240***
<i>Group</i>	0.013
<i>female x Group</i>	-0.009
Age	-0.007**
Education	0.011
Married	-0.019
Farmer	0.022
Assets	0.003
Constant	0.461***
R ²	0.07

*significant at the 10 percent level;

**significant at the five percent level;

***significant at the one percent level.

APPENDIX: Experimental instructions for the subjects in odd-numbered sessions. In even-numbered sessions, the order of the games was reversed.

General Instructions:

Thank you for participating in today's decision making game. You will receive 50 Taka for showing up. Based on the decisions you and your partners make in these games, you can earn more money in addition to the show up fee. You will receive experimental Taka (ETK) as rewards/prizes of the games. At the end of the game, for every 1 experimental Taka you submit, you will receive 2 Taka. It will take maximum of four hours to finish the games. You will take part in two different games. The instructions will be discussed separately at the beginning of each of these games. Each game may have multiple rounds.

All your decisions in these games will be kept confidential, that is, no one in this room will know about your decisions. You are not allowed to talk amongst yourselves. If anyone is found trying to communicate with other participants, s/he will be declared disqualified. A disqualified participant will not receive any payment. If you have any questions, or if you do not understand any rules of the game, please raise your hand. You will be personally attended to.

Instructions for Game 1:

I have six balls in this jar—five green and one red. Your task will be to draw one ball from this jar. If you draw a green ball, you will receive 12 ETK. If you draw a red ball, you will not receive any money. If a green ball is drawn, you will decide whether or not to contribute 6 ETK to this pot. If you do not contribute, the game will end. If you contribute, the game will proceed to the second round. The second round will be played the same way. That is, if you draw a green ball and decide to contribute to the pot, the game will proceed to the third round, and so on. Please remember that the money you receive in any round of this game cannot be used in the subsequent rounds.

(At this point, the subjects are taken to another room one by one, where they draw one ball from the jar and reveal decision to contribute to the pot. The experimenter records their individual decisions. After this, they return to the first room, and wait quietly for the next round to begin.)

Instructions for Game 2:

In this game you will belong to a group of five players. Both your decisions and your partner's decisions will determine your earnings from this game. You will not choose your playing partners, and at no point in this game you will know the identity of your partners.

I have six balls in this jar—five green and one red. Your task will be to draw one ball from this jar. If you draw a green ball, you will receive 12 ETK. If you draw a red ball, you will not receive any money. If a green ball is drawn, you will decide whether or not to contribute 12 ETK to the pot. If at least three members from your group contribute, the game proceeds to the second round. Otherwise, the game ends. If all the members in a group contribute, each member will get 6 ETK back from the experimenter. If any four members contribute, each contributing member will get 4.5 ETK back from the experimenter. If any three members contribute, each contributing member will get 2 ETK back. If less than three members contribute, the contributing members will receive 12 ETK back, but the game will end.

The second round of the game will be played the same way. That is, if at least three members in a group contribute to the pot, the game will proceed to the third round, and so on. Please remember that the money you receive in any round of this game cannot be used in the subsequent rounds.

(At this point, the subjects are taken to another room one by one, where they draw one ball from the jar and reveal decision to contribute to the pot. The experimenter records their individual decisions. After this, they return to the first room, and wait quietly for the next round to begin.)