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► To cite this version:

Emilios C. C Galariotis, Christophe Villa, Nurmukhammad Yusupov. Recent advances in lending to the poor with asymmetric information. *The Journal of Development Studies*, 2011, pp.1. 10.1080/00220388.2010.527956 . hal-00722838

HAL Id: hal-00722838

<https://hal.science/hal-00722838v1>

Submitted on 5 Aug 2012

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Journal:	<i>Journal of Development Studies</i>
Manuscript ID:	FJDS-2010-Mar-0002.R2
Manuscript Type:	Original Manuscripts
Keywords:	Economics < Economics, Economic development < Economics, Development < Social Issues

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Manuscripts

Recent advances in lending to the poor with asymmetric information

ABSTRACT *Microfinance institutions have successfully extended unsecured small loans to poor and opaque borrowers at the bottom of the economic pyramid. This success is largely due to innovative financial contracts that impose joint liability and create dynamic incentives to mitigate the effects of asymmetric information. Given recent advances in microfinance contracts, there is a need to map the theoretical developments. This paper aims to accomplish that, by performing a critical literature survey of microlending contracts, focusing on joint liability and dynamic incentives, bringing out some of the deficiencies of contract-theoretic propositions that cannot effectively account for the social mission of microfinance.*

Keywords: microfinance, microcredit, microlending contracts, joint liability, dynamic incentives

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I. Introduction

Modern institutional microfinance emerged in the 1970s when socially oriented microfinance institutions (henceforth MFIs) in South Asia and Latin America started financing business endeavours of the poor without securing loans with adequate collateral. The interest of academic scholars, development practitioners and commercial investors in the field has since then grown exponentially. The United Nations declared 2005 as the international year of microcredit. In 2006, the Nobel peace prize was awarded to the Grameen Bank and its founder, Muhammad Yunus, one of the modern microfinance pioneers. Presently, millions of individuals benefit from more than 10,000 MFIs globally (Bellman, 2006), that include government agencies, non-government organisations, credit unions, cooperatives, private and commercial banks and variations of these forms.

MFIs aim at channelling capital from both profit-seeking investors and socially driven donors to the poor that are unable to obtain funds through more conventional channels as a result of collateral requirements and high operational costs for lenders. Collateral, normally used to mitigate agency problems, is even more important for non-standard clientele with little credit history and unknown skill set. High costs are a product of the small size of the loans, and are exacerbated by the inadequacy of conventional financial appraisal tools for poor borrowers.

The dialectic is currently centred around the above issues, their effect on all stakeholders and the viability of the sector. With regard to the costs, successful MFIs have demonstrated that the poor can be creditworthy and that microenterprises can generate enough cash flows to meet microloan obligations, while their decision to borrow appears to be fairly inelastic to microloan interest rates. Karlan and Zinman (2008) find that a 1 per cent increase in monthly interest charges reduces the loan take-up rate with an average of 8.5 per cent by an economically insignificant 0.3 per cent¹. Similarly, a rate decrease from the maximum interest

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3 charged (11.75%) to the minimum one (3.25%), only increases take-up by 2.6 per cent, or 31
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5 per cent of the baseline take-up rate in South Africa. When it comes to the problems of
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7 asymmetric information, the literature suggests that specialised MFIs address them by using
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9 special types of financial contracts. Two distinct features of microloan contracts enable this:
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11 1) joint-liability (Besley and Coate, 1995; Ghatak and Guinnane, 1999; Armendáriz de
12
13 Aghion and Gollier, 2000) and 2) dynamic incentives (Armendáriz de Aghion and Morduch,
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15 2000; Alexander Tedeschi, 2006), with both features normally utilised simultaneously
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17 (Aniket, 2007; Chowdhury, 2005, 2007). More specifically, a popular approach to microcredit
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19 entails lending to jointly liable groups of borrowers. Typically, borrowers take turns in
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21 receiving microloans, and each subsequent loan is subject to successful repayment of the
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23 preceding one, passing on monitoring responsibility to group peers. Furthermore, dynamic
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25 incentives allow for a reputation accumulation effect, where each borrower can progressively
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27 attain higher borrowing margins contingent on successful loan settlement.
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34 The last rigorous academic snapshot of microfinance² was through Morduch (1999)
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36 who discusses a plethora of issues including social impacts and the empowerment of women,
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38 and Ghatak and Guinnane (1999) who focus on joint liability contracts in the context of
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40 cooperative borrowers. Our paper³ looks into more recent advances taking place in a dynamic
41
42 setting contrary to early research that typically compares group to individual loans statically.
43
44 For example, Aniket (2007) argues that unlike static group lending, the dynamic approach
45
46 helps MFIs to separate a borrower's effort and peer-monitoring decisions. Hence, lenders can
47
48 incentivise one task at a time, the more expensive one, and leave less of an information rent to
49
50 borrowers. Additionally, dynamic models have questioned 'assortative matching' as a
51
52 mechanism against adverse selection in the absence of collateral, based on the ability of
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54 borrowers to side contract among themselves (Rai and Sjöström, 2004; Guttman, 2008).
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3 The aforementioned developments and their impact especially on developing nations
4 call for a current mapping of academic knowledge. Research in microfinance is diverse and
5 related to issues such as bottom-up approaches to poverty alleviation, empowerment of the
6 socially excluded especially in the context of gender discrimination, measuring the true
7 impact of microfinance interventions, etc. A comprehensive coverage of all important issues
8 is impossible in one article, so we focus on theoretical and experimental propositions relevant
9 to the two distinct features of microloan contract that is joint liability and dynamic incentives,
10 by discussing models that incorporate both provisions. Our study reveals a vigorously
11 evolving debate that however fails at large to account for the social mission of microfinance
12 in terms of contract enforcement. For example, pressure to achieve sustainability reportedly
13 induces MFIs to practice anti-social or even violent enforcement methods. Some of the
14 literature and results covered in this paper are also discussed in a complementary paper by
15 Chowdhury (2010) in the context of the original Grameen model.
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34 The rest of the paper proceeds as follows: the next section discusses the original group
35 lending model, section III explains dynamic lending arrangements, and section IV focuses on
36 recently developed models of dynamic joint liability. Section V reviews practical and
37 empirical knowledge on microlending contracts, and section VI concludes the paper.
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45 **II. Joint Liability**

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47 Ghatak and Guinnane (1999) discuss how joint liability contracts can mitigate asymmetric
48 information by shifting some risk to borrowers. Such contracts introduce risk sharing through
49 cross-accountability where failure of one member to repay affects all others. The group
50 lending model works via two mechanisms: (i) assortative matching that helps resolve adverse
51 selection and (ii) peer monitoring that deals with moral hazard.
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The model is as follows: a microentrepreneur with insufficient assets faces a project that requires a start-up investment of I unit. She will only borrow to finance her project if the benefits of doing so exceed the costs, i.e. the payoff exceeds her reservation utility u , which can be viewed as her opportunity cost. The uncertain output of the microenterprise Y can take two values: Y^H with probability p and Y^L with probability $1-p$, such that $Y^H > Y^L \geq 0$, for simplicity assume $Y^L=0$ for now. Once the output is realized she has to repay gross interest $\rho > I$ to the MFI for the loan. It is assumed that the MFI aims at breaking even, the microentrepreneur is protected by limited liability, and that all such projects are socially viable with sufficient outputs to cover all social costs, i.e. MFI's cost of capital and microentrepreneur's opportunity cost satisfy $pY^H > \rho + u$. Under the individual lending scheme the gross interest rate ρ equals the conventional rate on the loan r (i.e. $\rho=r$), but with group lending the gross interest rate also includes the cost of joint-liability c that the borrower incurs in the case of her peers defaulting (i.e. $\rho = r + c$).

Assortative Matching

Assume risk neutral borrowers and that the probability of the financed project's success depends on borrower type (s : safe; r : risky), such that $p_s > p_r$. Under a single pooling contract, safe borrowers are forced to subsidise risky ones by paying the same rate. If borrowers are informed of each other's types, potential overcrowding by risky borrowers may lead to adverse selection as safe borrowers will opt out due to the high rates. MFIs can avoid this scenario by asking borrowers to form groups of joint liability.

Considering for simplicity groups of two, the expected utility of a type i borrower under joint liability with a type j partner is $EU_{ij} = p_i p_j (Y^H - r) + p_i (1 - p_j) (Y^H - r - c)$. Joint liability costs of pairing with a risky borrower are higher than those of pairing with a safe one and everyone will want to group with the latter type (assortative matching). More

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specifically, the net expected payoff of a risky borrower's joint liability with a safe one is $EU_{rs} - EU_{rr} = p_r(p_s - p_r)c$, while the net expected cost of a safe borrower's joint liability with a risky one is $EU_{ss} - EU_{rr} = p_s(p_s - p_r)c$. Since $c > 0$ and $p_s > p_r$ nobody will want a risky partner.

Ghatak (2000) shows that voluntary group formation under joint liability can produce assortative matching, serving as a screening tool. The optimal contract in his work is not unique but given by any pair (r, c) such that $r_s < r < r_r$, and $c_s > c > c_r$, so long as $r_s + c_s \leq Y^H$, where (r, c) is the contract that satisfies the MFI's break-even constraint. Ghatak (1999) also shows that such group lending arrangements solve the under-investment problem in the sense of Stiglitz and Weiss (1981) as well as overinvestment in the spirit of De Meza and Webb (1987). Gangopadhyay et al. (2005) further develop this model to find that the parameter region where joint liability contracts Pareto-dominate individual loan contracts, in terms of repayment and welfare, is smaller than suggested by Ghatak (2000).

So far the assumption is that borrowers observe each other's types, but Armendáriz de Aghion and Gollier (2000) verify group lending dominance even when this is not possible. To follow their discussion let us assume that the safe borrower produces $Y^L > 0$ and the risky Y^H such that $p_s = 1$, $0 < p_r < 1$ and $Y^L = p_r Y^H$. Ex ante, the MFI cannot distinguish between borrower types, but ex post it can observe the realization of Y by paying the verification cost v . The distribution of safe vs. risky borrowers is public information: the proportion of the safe type is q with the rest being of the risky type. Thus, under individual lending, the MFI, unable to distinguish between the two types of borrowers, sets the microloan interest rate at:

$$r_{pool} = \frac{\rho + (1-q)(1-p_r)v}{q + (1-q)p_r} \quad (1)$$

In a separating equilibrium, the MFI would charge the risky (safe) type a rate higher (lower) than this level⁴. Assume Y^L is sufficient to service the joint liability, i.e. $Y^L > r$. With the joint liability in 2-person groups the interest rate on microloans is determined as:

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$$r_{jl} = \frac{\rho + (1-q)^2(1-p_r)^2 v}{q + (1-q)^2(1-p_r)^2} \quad (2)$$

It is straightforward to show that (2) < (1). Joint liability generates lower interest rates eradicating credit rationing due to a "collateral effect", where borrower cross subsidisation acts as collateral. Thus, group lending can serve as a risk pooling mechanism even in the absence of complete information about borrowing types amid borrowers. Given that $Y^L < Y^H$, to shield against adverse selection, contracts must enforce higher cross-subsidisation from the risky type to the direction of the safe one. In other words individual interest rates r_i must satisfy $Y^L < 2r_i < Y^H$, therefore the safe type will effectively pay less for the microloan than the risky type by taking on partial insurance against the default of the risky, contrary to the latter who take full insure against the safe types. The lender benefits from the presence of only safe borrowers, unlike the case for individual loans with rate r_{pool} .

According to Guttman (2008), credit availability and weak repayment enforcement by MFIs result in risky borrower overcrowding. This is due to side-payments amid borrowers (risky types pay-off safe types to form joint groups), hence assortative matching will not necessarily hold in the sense of Ghatak (2000). The effectiveness of group lending in dealing with adverse selection is also questioned by Ahlin and Waters (2009). Consider $c \leq r$. It is straightforward to show that the safe borrower's indifference curve is steeper than the MFI's isoprofit line in (r, c) space and the safe borrower's utility maximization for a given level of MFI profit has the corner solution of $c=r$. The borrower's payoff is then equal to $Y - p_i(2 - p_i)r$, and the reservation interest rate is equal to:

$$r = \frac{Y - u}{p_i(2 - p_i)} \quad (3)$$

Given that $0 < p_r < p_s < 1$ and that the denominator is a parabola maximised at $p_i=1$, including safe borrowers is indeed the binding constraint and the MFI's offer must be subject to the safe type's maximization problem. Given the known share of risky borrowers, the MFI's isoprofit

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is then given by $r = \rho / (\overline{p(2-p)})$, where $(\overline{p(2-p)})$ is the population average of $p(2-p)$. This rate will satisfy all borrowers' participation constraints if it is not greater than the safe borrower's reservation rate (or group lending can lead to financing only risky borrowers):

$$r_s = \frac{Y - u}{p_s(2 - p_s)} \quad (4)$$

Thus group lending can efficiently solve adverse selection only for some values of Y , when individual lending cannot.

Peer Monitoring

Besley and Coate (1995) argue that social sanctions by group peers increase the likelihood of repayment. The cost of failure of one member motivates peers to monitor and punish each other. In an earlier paper on community-based informal financial organisations, Banerjee et al. (1994) show that such social sanctions curtail privately optimal behaviour that is detrimental to the common welfare. Similar results are obtained for ROSCAs (rotating savings and credit associations) in Besley et al. (1993).

To develop a theoretical model of group lending in the context of moral hazard we draw from the setup in the previous section, but instead of an ex ante taxonomy of borrower types, the focus is on post-contractual behaviour⁵. Following loan attainment, a borrower can either exert costly effort to succeed, or she can shirk and gain private benefits. The first leads to an uncertain output Y with probability p_h , while the latter leads to an uncertain output Y with probability p_l , such that $p_h > p_l$. The cost of effort can be modelled either directly by assigning a cost function, or by introducing private benefits of shirking B that no one other than the microentrepreneur can enjoy. We resort to the latter.

In the first-best case, with full information, the borrower's choice of effort can be deduced based on a set of observable variables. In the second-best case, with incomplete

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information, the borrower's effort is not observable, hence the MFI has to offer an incentive-compatible contract to induce the borrower to exert sufficient repayment effort. For simplicity, we normalise the borrower's reservation utility to zero. The borrower's participation constraint that the MFI should satisfy is then given by $p_h(Y-r) \geq 0$, which implies that $Y \geq r$. The MFI's own participation constraint is then $p_h r \geq \rho$, based on its break-even condition. Hence the boundaries for the microloan rate are:

$$Y \geq r \geq \frac{\rho}{p_h} \quad (5)$$

In the presence of rational borrowers, this implies that only socially viable projects are financed. A rational borrower then exerts effort only if $(Y-r)p_h \geq (Y-r)p_l + B$, which implies that:

$$r \leq Y - \frac{B}{\Delta p} \quad (6)$$

where $\Delta p = p_h - p_l$. This shows that the maximum rate that can be charged is lower than with full information because the borrower receives information rents reflecting private benefits. In a group lending situation where members possess superior information compared to the MFI about each other, peers can perform monitoring tasks that can reduce the borrower's private benefits. A smaller B implies a higher upper boundary for the incentive compatible level of the interest rate. Under perfect monitoring, private benefits are fully eliminated, and the MFI-microentrepreneur relationship becomes one of full information.

Madajewicz (2004) suggests that joint liability in credit contracts can have a negative incentive effect that can outweigh the effort-inducing property of peer monitoring. More specifically, jointly liable borrowers can exhibit riskier behaviour compared to when entering individual microloan contracts, where each would bear the full cost of the project. To deal with this, MFIs can offer smaller loans under joint-liability compared to individual loans.

Another ex post moral hazard problem of financing under asymmetric information is that borrowers may report failure in case of success to avoid loan repayment. Suppose that

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3 peer monitoring comes at a cost m , and can reveal the true value of the output with probability
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5 p_m . Peer monitoring will take place when the expected gains from prevented liability $p_m Y$
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7 outweigh the cost of monitoring m . If misreporting is found, the guilty borrower faces a fine f .
8
9 Then a borrower will report the true output if $Y - r > Y - p_m (f + r)$, which implies that:

$$r < \frac{p_m}{1 - p_m} f \quad (7)$$

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17 The higher the value of the effective punishment from joint liability (f), the higher the interest
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19 rate the lender can charge without hurting borrower incentives.
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22 Rai and Sjöström (2004) argue that moral hazard in Grameen-style group lending can
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24 arise due to side contracting by borrowers. They solve for the minimisation of the punishment
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26 imposed in equilibrium for non-repayment, essentially seeking mutual insurance to enhance
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28 efficiency. A borrower who fails to yield sufficient output to repay the loan will get a very
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30 low payoff, unless a group peer provides help with repayments. All borrowers are better off
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32 ex ante if successful ones are persuaded to help the unsuccessful, and it pays the MFI to
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34 encourage this.
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38 Rai and Sjöström (2004) also show that by adding a cross-reporting component
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40 (message game) to contracts, harsh punishments are only needed in disequilibrium. The
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42 mechanism at play is similar to blackmail: an unsuccessful borrower i threatens her successful
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44 peer j , that she will report her to the bank if she refuses to help her, exposing (not exposing) j
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46 (i) to a harsh punishment by the bank. This threat, induces the successful borrower to support
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48 borrower i , who can then repay the loan. On the other hand, if both borrowers fail, neither can
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50 impose this type of threat to repay their loan, and in equilibrium no threats are made and no
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52 punishments are executed.
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57 This design is aimed at facilitating microentrepreneurial cooperation, but it is founded
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59 on a threat and can create unnecessary tensions among already tormented and economically
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3 distressed borrowers (see section V). Perhaps, it is for this reason that Grameen bank does not
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5 impose such rules of punishment and cross-reporting and advocates relationships based on
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7 trust and help. As discussed in Chowdhury (2010), although many features of the original
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9 Grameen model continue under Grameen II, its joint liability provisions rule-out cross-
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11 member loan repayments⁶. A recent study by Giné and Karlan (2009) supports such policies,
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13 showing that excessive tension among group borrowers can lead to voluntary dropout.
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17 Another important implication of cross-reporting is that intra-group tensions may
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19 encourage borrowers to hide information. Benefits of intra-borrower transparency are
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21 discussed in Laffont and Rey (2003), who argue that efficiency is enhanced when
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23 entrepreneurs share information about their post-contractual behaviour even in the presence of
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25 collusion⁷. When microentrepreneurs observe each other's efforts, group lending outperforms
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27 individual lending based only on realized outputs even if the shared information is noisy.
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34 **III. Dynamic Incentives**

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36 In the absence of joint liability, creating dynamic incentives seem to be the only viable means
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38 of lending to the poor. This method facilitates the gradual augmentation of the lenders'
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40 information set and incorporating it in microloan contracts boils down to either:
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44 (i) *Threat of termination and/or rewards for timely repayment*, such as increasing the size
45
46 of the loan are used so to alleviate moral hazard problems.
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48 (ii) *Frequent repayment schedules* that also help in addressing moral hazard by acting as
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50 imperfect signals on the progress of borrowers' projects. The regularity and frequency
51
52 of repayments rapidly update lenders' information sets⁸, prompting them to punish or
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54 reward borrowers.
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56 (iii) *Intensive monitoring with relationship development* that allows lenders to gather
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58 information about the use of microloans from borrowers, albeit at a cost.
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Dynamic lending typically entails loan distribution in small instalments subject to performance benchmarks or covenants, that when met they serve as imperfect signals of borrower quality. Instalments can thus be progressively larger, providing borrowers with dynamic incentives, and reducing adverse selection and moral hazard costs for lenders. A limitation in the extant literature is that models focus on moral hazard ignoring adverse selection (Sannikov, 2007).

Threat of termination

Stiglitz and Weiss (1983) first discuss the threat of termination, but we follow the simpler exposition of Armendáriz de Aghion and Morduch (2000). Suppose a borrower takes out a loan at time $t=0$, to be fully repaid at time $t=1$ in order to obtain another loan, that in turn must be repaid in the ensuing period $t=2$. At $t=1$, her project generates output y , out of which she is to repay interest rate r . Her incentive constraint for not defaulting is $y + y\mu p_c < y - r + \mu y$, where μ , is the one-period subjective discount factor of the borrower, and p_c , is the probability of accessing a loan after a default. Here, the MFI operates with two variables: interest rate r , and probability of unconditional financing p_c , which can also be interpreted as the historical frequency of unconditional financing. Setting the latter to zero implies exclusion from further financing in case of default, in which case the incentive compatible interest rate is determined as $r \leq \mu y$. Other than the threat of exclusion, the MFI can leverage on progressive financing. To show that, we introduce a multiplier $\theta > 1$ for the rate of change of the loan size, that renders the borrower's incentive constraint as $y + y\mu p_c < y - r + \mu y \theta$, which has a higher probability of being satisfied compared to the absence of progressive instalments.

Ghosh and Van Tassel (2006) show that failure to repay the loan in a given period can be recovered in ensuing ones. The rationale is that continuing to extend funds to those who fail, induces borrowers to exert more effort as long as successful borrowers are granted more

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3 bargaining power in accessing funds. An argument for more flexibility in group lending is
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5 also provided in Bhole and Ogden (2009), who show that group lending arrangements can be
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7 superior to individual ones, even in the absence of cross-reporting or social sanctions. A
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9 flexible and endogenously determined delay of future loans, at different durations for
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11 defaulting and non-defaulting group members, increases the range of microenterprises that
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13 can be sustainably financed.
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17 Chowdhury (2007) shows that the threat of termination can be critical for assortative
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19 matching and can resolve adverse selection relatively cheaply in a dynamic setting. On the
20
21 other hand, prompt repayments guarantee access to loans; hence the expected utility of
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23 forming safe groups can be very high under sufficiently large discount rates. We discuss this
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25 paper and its implications in more detail in Section IV.
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31 *Regular Repayment Schedules*

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33 Repayments in frequent instalments, introduced above as creditworthiness signals, are one of
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35 the features that are specific to microfinance contracts. It is also common for repayments to
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37 commence almost immediately after taking out microloans, at least partially related to the fact
38
39 that they are backed up by borrower daily cash flows. These two characteristics combined
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41 allow MFIs earlier and enhanced screening-out of misbehaving borrowers. That is, warnings
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43 come progressively but on average earlier, and lenders effectively initiate remedial actions as
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45 their information set improves.
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51 One way to get such signals and to mitigate moral hazard is for the MFI to leverage on
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53 the superior monitoring capability of the local informal lenders as in Jain and Mansuri (2003).
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55 Immediate post-loan repayment schedules force assetless microentrepreneurs to borrow from
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57 informal lenders up to the point that their project starts generating returns. Hence, by
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59 designing a microloan contract with a frequent repayment schedule, MFIs indirectly outsource
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3 monitoring to the superiorly informed informal lenders. This appears to be correct as such
4 contracts are shown to increase the demand for informal lender's business. It should be noted
5 that Jain and Mansuri (2003) employ a two period model with a single loan, but, without loss
6 of generality, their argument can be strengthened by adding a repeated lending condition i.e.
7 that successful repayment of the existing loan gives access to better borrowing conditions
8 strengthening borrower incentive compatibility constraints.
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17 Regular repayment schedules intuitively call for regular meetings with loan officers,
18 reinforcing cooperation and peer monitoring. Feigenberg et al. (2009) empirically support
19 this, as group members who meet weekly are found to be 30% more likely to exhibit
20 increased altruism, greater trust and reciprocity to peers, compared to when meeting monthly.
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22 Although frequent contacts may involve costs, they give MFIs opportunities to develop more
23 personalized relationships with borrowers, which as will be shown below, are important when
24 transacting with opaque entrepreneurs in the absence of collateral and the presence of weak
25 contract enforcement.
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36 37 38 *Monitoring and Relationship Building*

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41 Relationship building and lending (through regular meetings) and underwriting loans
42 based on soft information, can effectively reduce credit default risks. Soft information is
43 mostly qualitative and collected over time (Udell, 2008). Its quality can be improved "through
44 multiple interactions with the borrower" (Boot, 2000), performed by microloan officers as
45 they operate in the field with potential and existing borrowers, i.e. quality largely depends on
46 collection techniques and subjective judgements that are not easily passed on without
47 discrepancies (Petersen, 2004). This is costly and may render MFI business less attractive, or
48 if the cost is passed on to micro borrowers it could result in higher borrowing costs in
49 equilibrium. Nonetheless, relationship lending is perhaps the most important financing tool
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3 for such opaque borrowers and is the only one based exclusively on soft information.
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5 Contrary to soft information, hard information such as financial ratios and third-party credit
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7 reports is easily quantifiable and transmittable both within and across institutions⁹. Lending
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9 on hard information can take many forms (credit scoring, financial statement analysis etc.)
10
11 and is termed in the literature as “transactions-based lending” (Berger and Udell, 2006;
12
13 Udell). Obviously, for the poor that are excluded from the services of the mainstream
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15 financial institutions, such information is usually not available.
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20 According to Sharpe (1990) if relationship lending allows superior knowledge, lenders
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22 can become monopolistic financiers in a dynamic setting. Following the recent exposition of
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24 Freixas and Rochet (2008), consider a 2-period economy with entrepreneurs in need of
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26 outside financing. At the very beginning, lenders provide capital for start-up costs of
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28 borrowers and commit to monitoring, which in the second period is either costless, or
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30 unnecessary by construction. Following the first period, the borrower can choose to repay or
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32 default. In default she has to switch to a competing lender for the second period financing, but
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34 if she repays she can choose. If the borrower switches, she signs a new contract with a new
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36 lender that offers conditions identical to those with the incumbent lender initially, including
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38 costly monitoring. Knowing that, incumbent lenders can take advantage of the ex post
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40 monopoly power over information about their lenders, and charge interest rates in excess of
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42 the borrower’s level of risk, bounded above only by the borrower’s switching costs. Thus
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44 lenders invest in information collection through costly monitoring in the initial period to use
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46 the resulting monopolistic power in the subsequent period(s), which can lead to a hold-up
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48 situation for the borrower.
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55 Contrary to this, Petersen and Rajan (1995) suggest that as the relationship develops,
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57 borrowers gain access to better credit conditions. Recently Berg and Schrader (2009) look at
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59 the effects of volcanic eruptions on defaults and interest rates of microfinance clients in
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Ecuador. Although loans approved after eruptions have an elevated default probability, for microentrepreneurs with existing MFI links, relationship lending increases credit availability and lowers interest rates.

IV. Joint Liability Contracts with Dynamic Incentives

To discuss the implications of a dynamic lending model with joint liability we rely on the setup of Chowdhury (2005) with some modifications for simplicity. Consider a 2-period economy with a monopolistic MFI and a continuum of borrowers who are to form 2-person groups to become eligible for microloans. At the beginning of *period 1*, at time $t=0$, the MFI offers a contract consisting of two microloans, 1 unit of microloan in each period. The first instalment is made to a randomly chosen member of the group (*borrower 1*), who has to repay the microloan at the end of *period 1*, time $t=1$. The second instalment is given to the other group member (*borrower 2*) in *period 2* subject to successful repayment of the first instalment. In *period 1*, the MFI can invest the amount of the second microloan and earn gross interest ρ .

Prior to the start of the contract, both *borrowers 1* and *2* decide simultaneously on their level of monitoring m_1 and m_2 , that comes at costs equal to $m_1^2/2$ and $m_2^2/2$ respectively. For the MFI to perform the monitoring itself, it would have to spend $\lambda m^2/2$, with $\lambda \geq 1$. *Borrower 1*, after getting the microloan chooses to invest in project P^1 or P^2 . Project P^1 can be taken as exerting effort to successfully repay the loan, while P^2 can be viewed as shirking (Stiglitz, 1990; Tirole, 2006). Monitoring by any party allows it to obtain information on which project will be chosen with probability m , thus monitoring by peers is more efficient than MFI monitoring.

Investment in P^2 yields no tangible outcome that can be used to repay the loan, but produces private benefits b for *borrower 1*. Thus, if *borrower 1* chooses to undertake P^2 she is

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3 unable to repay the loan and *borrower 2* is denied her microloan in *period 2*. If *borrower 1*
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5 invests in P^1 , then she generates a verifiable return H , out of which the bank is repaid r , and
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7 the remaining $H-r$ yields $(H-r)\rho$ in *period 2*. Assume that the group cannot self-finance in
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9 *period 2*. In a simple individual lending model the MFI would solve $\max\{mr-\lambda m^2/2\}$ with
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11 respect to the level of monitoring m , which yields $m^*=r/\lambda$ and individual lending is only
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13 feasible if $2\lambda < r^2$. In *period 2*, the MFI lends to *borrower 2* only if her group-mate has
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15 successfully repaid at the end of *period 1*. *Borrower 2* then chooses whether to invest in P^1 or
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17 P^2 with payoffs similar to those of *borrower 1* in the first period and has to repay the loan at
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19 time $t=2$. The sequence of events and each player's respective payoff, are given in Figure 1¹⁰.
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25 < Insert Figure 1 About Here >
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30 Chowdhury (2005) shows that in this setting, borrowers always monitor. With certain
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32 assumptions this can be deduced from Figure 1. For example, the realization of H by
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34 *borrower 1's* project P^1 is verified by the MFI at $t=1$. So, the MFI knows that at $t=2$, *borrower*
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36 *1* will have $(H-r)\rho$, and if *borrower 2* defaults, the MFI seizes $(H-r)\rho$ at $t=2$ to partially recover
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38 the microloan. Then if initially *borrower 1* does not monitor *borrower 2's* microloan financed
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40 project, *borrower 2* can divert the investment and *borrower 1* would have a payoff of zero. By
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42 monitoring, *borrower 1* may force *borrower 2* to invest in the appropriate project, so that the
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44 microloan is repaid, leading to the sequential microloan for *borrower 1*. Then the game is
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46 repeated with *borrower 1* getting the loan and *borrower 2* monitoring.
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51 Chowdhury (2005) also shows that monitoring with joint liability is higher than with
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53 individual contracts in a dynamic setting due to additional incentives. In the presence of
54
55 suboptimal peer-monitoring, lender monitoring can solve the problem. Aniket (2007)
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57 investigates a similar problem, and shows that dynamic group lending alleviates borrower
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59 collusion allowing MFIs increased sustainable outreach compared to static group lending. If
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3 the MFI wants to incentivise high effort and prevent collective non-performance, dynamic
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5 group lending can reduce information rents left to the borrowers due to the MFIs inability to
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7 observe the borrowers' effort choices. The borrowers, in addition to choosing their effort
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9 level, also choose the level of peer-monitoring. A borrower selects the value of the monitoring
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11 cost, c_m , while the level of peer-monitoring is a deterministic function of its cost $B(c_m)$. If
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13 microloans are allocated sequentially, in addition to lowering rents, group lending also
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15 increases the range of projects that can be sustainably financed.
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20 A similar result is obtained by Chowdhury (2007) where in dynamic group lending
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22 with a significant discount factor, borrowers should not collude and collectively default.
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24 Dynamic group lending also serves as a partial screening mechanism here. More specifically,
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26 for certain discount factor levels (not too low or high), safe borrowers exert effort while risky
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28 ones shirk rendering safe-safe groups highly profitable. The risky-risky duets are likely to be
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30 denied loans after the first instalment as they usually fail due to shirking. In the absence of the
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32 threat of termination, default would not be costly; hence assortative lending would not take
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34 place. Therefore, randomly choosing the first instalment recipient leads to assortative
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36 matching. Safe borrowers are defined as those with social capital: a private non-tangible asset,
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38 such as reputation, that is not transferable to another person, and can be lost in case of default.
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40 The central result in Chowdhury (2007) suggests that positive assortative matching in
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42 voluntarily formed groups occurs if, and only if, the following holds:
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$$48 \quad \frac{b - H + r}{b + H - r} < \delta < \frac{b - H + r}{b} \quad (8)$$

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50
51 where δ , is the publicly known discount factor. Assortative matching is obvious here. The
52
53 upper boundary of the discount factor ensures that the safe type invest in P^1 to avoid losing
54
55 their social capital, while the risky type with no social capital invest in P^2 . The lower
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57 boundary ensures that the safe-safe groups are very profitable. In other groups, if *borrower 1*
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3 is risky she invests in P^2 and defaults, hence in the second period such groups are excluded,
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5 and dynamic joint liability serves as a partial screening device.
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8 Gutmann (2008) questions the result of assortative matching in dynamic group lending
9
10 if borrowers are able to side contract with each other. While until recently the literature has
11
12 largely ignored this possibility, in reality, borrowers do side contract to some extent. More
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14 specifically if the group is denied future loans only when both members' projects fail, a risky
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16 borrower with a higher probability of failure may be willing to pay the safe one to form a
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18 group.
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22 An efficient solution to information problems requires that dynamic group lending
23
24 doesn't only resort to blocking future microloan access as a punishment for non-performance.
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26 Bond and Rai (2009) suggest that MFIs can increase repayment incentives by either financing
27
28 more profitable projects or by lowering microloan interest rates. In the first case, MFIs
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30 improve both their balance sheet and borrowers' expectations with respect to future financing
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32 opportunities of successful borrowers, while in the second case, they reduce borrowers'
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34 financing costs. Hence, MFIs will always use at least one of these two repayment incentives
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36 to address potential borrower collusion and collective default.
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43 **V. Microloan Contracts in Practice**

44 Successful implementation of microlending contracts under group lending is conditional on a
45
46 number of factors, a summary of which is given in Table 1.
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50 < Insert Table 1 About Here >
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55 For example, group members should know each other fairly well and share strong social ties.
56
57 This constitutes "social capital" and can be used as "social collateral". However, with time,
58
59 successful group members build up their asset base and are likely to terminate their
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3 membership in order to avoid peer monitoring costs. In fact, when given the choice between
4
5 individual or group loans, borrowers prefer the first (Madajewicz, 2004), which is the usual
6
7 practice in Europe (Calidoni and Fedele, 2009; Armendáriz de Aghion and Morduch, 2000).
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9 Hence, even if group lending is efficient, it may have a short lifetime, because MFIs that want
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11 to retain successful borrowers are forced to offer supplemental individual lending schemes.
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15 Empirical studies suggest that group lending contracts perform better than individual
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17 ones in terms of outreach than in terms of repayment rates (Cull et al., 2007). Chowdhury
18
19 (2005) shows that group lending without proper monitoring arrangements can provoke serious
20
21 moral hazard problems. Bond and Rai (2008) argue that under intra-group power imbalances,
22
23 lending arrangements that punish all members of the group equally in failure, are suboptimal.
24
25 In such situations, they maintain that co-signed loans perform better. Since co-signers are
26
27 usually more affluent than borrowers themselves and able to provide some repayment
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29 guarantees should the borrower fail, the borrower can take out a larger loan in the presence of
30
31 a co-signer. Hermes and Lensink (2007) provide a synopsis of empirical findings on
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33 microfinance¹¹. Ahlin (2007) finds that under the assortative group mechanism, borrowers
34
35 tend to group homogenously by class of risk. Essentially, this encourages low diversification
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37 while also limiting effective liability for the lender. Consequently, the lender should intervene
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39 in the group formation process to avoid groupings consisting exclusively of risky borrowers.
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46 Giné and Karlan's (2009) empirical analysis reveals some pitfalls of group lending
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48 contracts. First, joint liability can create intra-group tensions that can lead to voluntary
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50 dropouts as well as harm members' social capital, which is critical for the existence of safety
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52 nets. Second, free-riding by bad clients can increase default rates¹². Third, the cost of joint
53
54 liability can be too much of a burden for safer borrowers, also leading to higher default rates.
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58 While, theoretically, safer borrowers are expected to provide insurance to their not-so-
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60 safe peers with joint liability, Fischer's (2009) experimental study shows that actual informal

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3 insurance falls sufficiently short of a full risk-sharing benchmark. This may explain semi-
4 formal risk-sharing mechanisms, such as the state-contingent loans and supports the
5 theoretical proposition of Majadewicz (2004) on the increased risk of borrower post-
6 contractual choices under joint liability. Fischer's (2009) study also confirms the free-riding
7 problem potential under joint liability, and that increased risk-taking is not caused by
8 cooperative insurance. He finds that existing microloan contracts do not sufficiently
9 incentivise borrowers to undertake risky but high-return projects. Jacobsen (2008) provides
10 empirical evidence that the poor are conservative when making investments because of
11 precautionary motives. Sufficient health and death insurance could encourage them to become
12 less risk averse and more ambitious in their business endeavours.

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27 Entrepreneurial risk taking can also be enhanced through joint liability contracts. For
28 example, Giné et al. (2009) find experimentally that group lending increases risk-taking by
29 pushing risk-averse borrowers to take greater risks than when borrowing individually.
30 Conversely, their study of Peruvian microentrepreneurs, finds evidence of assortative
31 matching under voluntary group formation that can reduce excessive risk taking by group
32 members in line with a number of theories discussed here. While according to the experiment,
33 joint liability improves repayment rates by providing insurance to borrowers, at the same
34 time, the costs of joint liability burdens mostly the risk averse individuals. Additionally, group
35 lending can lead to higher loan frequencies and monitoring and improved repayment rates as
36 suggested by Cason et al. (2009). This is robust to whether loans are paid out sequentially or
37 simultaneously, but dwells on the assumption that peer monitoring is less costly (more
38 effective) than lender monitoring¹³.

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Another way to improve repayment rates is by making the payment schedules more flexible (Ghosh and Van Tassel, 2006). Shoji (2009) performs an empirical study of such contracts for Bangladesh in 2004, finding that rescheduling repayments is welfare improving

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3 for the borrowers, especially for the more deprived, such as landless and females. Consistent
4
5 with the above, Mullainathan and Karlan (2006) acknowledge that although a flexible
6
7 payment stream may generate operational headaches, it helps increase client retention and
8
9 outreach, which is an important pro-social component in the mission of microfinance.
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13 The extant literature has not given enough attention to flexibility in the context of
14
15 microloan contract pro-sociality. For instance, although contract-theoretic models of
16
17 microfinance have so far assumed that lenders aim at breaking even at best, there is evidence
18
19 that pressures to achieve sustainability can hinder the social mission¹⁴ of microfinance
20
21 inducing repayment by means of anti-social and even violent methods. Dixon et al. (2007)
22
23 report the case of a Zambian MFI that operated such inappropriate methods damaging client
24
25 loyalty and trust with detrimental results. In India, MFI policies have been reported to cause
26
27 loan-defaulter suicides¹⁵, while Marr (2002) reports violent conflicts among peer borrowers
28
29 related to loan defaults in Peru. In Bangladesh, women that default are scolded in public
30
31 places. Group members, encouraged by MFI officers, seize the defaulter's belongings even
32
33 taking away her nose-ring, a symbol of marriage whose removal is associated with divorce or
34
35 widowhood, further adding to the shame (Karim, 2008). These evidence can question the
36
37 validity of the borrowers' limited liability assumption prevalent in existing models.
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44 Further research on pro-social contract enforcement could be promising if focused on
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46 the recently emerged theory of motivated agents. More specifically, the MFI agency literature
47
48 has ignored credit officer intrinsic motivations, yet it is reasonable to expect that at least some
49
50 officers have important non-pecuniary motivations for performing their job. According to
51
52 Besley and Ghatak (2005) agents are more productive when their "ideal" mission vision
53
54 coincides with the principal's mission, which in turn is affected by competition between
55
56 organizations, as is the design of incentives. The latter point is studied in Dixit (2001) in a
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58 multi-product environment, with one "main" and valuable product, and by-product(s) that are
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3 not necessarily valuable for the principal. Nonetheless, involvement of motivated agents can
4
5 be suboptimal in the case of differing priors (Van den Steen, 2005). More recently, Roy and
6
7 Chowdhury (2009) have questioned the idea of extensive involvement of motivated agents in
8
9 microfinance. A comprehensive survey of the literature on pro-social motivation is conducted
10
11 in Francois and Vlassopoulos (2008).
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15 The comparative analysis of both schemes shows that both group and individual
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17 lending perform better on some fronts. This can explain why MFIs appear to be shifting away
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19 from only group or individual lending towards mixing the two approaches (see Table 2).
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22 < Insert Table 2 About Here >
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24 **VI. Conclusion**

25
26 Both profit seeking and socially oriented MFIs need lending models capable of alleviating
27
28 asymmetric information. Innovative microfinance lending schemes have proven the feasibility
29
30 of sustainable financing of the poor despite the absence of collateral. This paper presented a
31
32 critical literature survey of lending models with joint liability and dynamic incentives that
33
34 encourage unsecured loan repayment.
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38 Early papers focus almost exclusively on joint liability, however, sustainable group
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40 lending hinges on the existence of social collateral rooted in intra-communal ties. In the
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42 absence of collateral for individual loans, progressive lending schemes seem to be the only
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44 viable solution for information problems. A note of caution arises from the evidence of anti-
45
46 social contract enforcement methods practiced by MFIs under the pressure to achieve
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48 sustainability. Prioritising repayment rates over social impact leads to undue punishment of
49
50 borrowers that fail to make repayments regardless of the reasons. Given the
51
52 commercialization of contemporary microfinance, this issue is becoming ever more important
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54 and research must address it. Recent research trends also include so called mission drift:
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56 financial sustainability at the expense of social impact. The empirical evidence so far has been
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3 relatively mixed. In single country studies, increased competition among MFIs exacerbates
4 information asymmetries and leads to multiple lending relationships resulting in higher
5 default rates (McIntosh et al., 2005; McIntosh and Wydick, 2005). However, cross-country
6 analysis suggests that mission drift is not present because of increased competition and the
7 resulting drive for financial results (Cull et al., 2007; Mersland and Strøm, 2010). A broader
8 debate of financial vs. development approaches to microfinance delivery is presented in Roy
9 (2010).

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20 Unfortunately, the difficulty in finding whether financial and social objectives are in
21 conflict or whether MFIs are indeed generating the socio-economic impact expected of them
22 stems largely from the lack of data¹⁶. The existing databases on MFIs suffer from selection
23 biases and contain few social indicators (Bauchet and Morduch, 2009), while experimental
24 studies based on randomized control trials, or RCTs, that can be free of such biases, are
25 expensive (Banerjee and Duflo, 2009). Although RCTs are gaining ground in empirical
26 research of the impact of microfinance interventions it should be noted that they are liable to
27 internal and external validity problems as well as ethical concerns (Duflo et al., 2007; Karlan
28 et al., 2009). Namely, RCT intervention itself may cause the involved borrowers to behave
29 differently than they would under normal circumstances. For example, the treatment group's
30 behaviour may be altered simply because the group is grateful to receive the treatment and
31 aware of being studied (Hawthorne effect). In contrast, their peers from the comparison group
32 who do not receive the treatment may also behave differently if they feel offended (John
33 Henry effect). Deprivation of the control group from positive benefits of the intervention also
34 raises an ethical issue. Additionally, validity can also be compromised by other factors such
35 as possible lobbying by potential participants to gain access to preferred treatment, self-
36 selection of MFIs for participation in RCTs or limitation of RCTs to pipeline approaches.
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3 The growing inflow of private capital into the industry and the novelty of financing
4 techniques, raise the likelihood of microfinance becoming an asset class of its own. There is
5 mounting evidence that private investors may view microfinance not only as a good risk-
6 return opportunity, but also as a good asset for portfolio diversification (Krauss and Walter,
7 2008; Cull et al., 2009). This interest is further stimulated by the present financial crisis that
8 compels investors to seek new hedging and investment opportunities, as part of their quest for
9 more efficient mechanisms and prudent investment strategies. At the same time, the fact that
10 MFIs seek to align profitability and pro-sociality so as to attract investors and to serve the
11 poor, may involve new subprime frontiers of capital accumulation which is a concern for the
12 development community (Roy, 2010).
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27 With the crisis, competition among investors is likely to loosen, and bargaining power
28 is likely to shift from MFIs to private investors. Still, in the future, microfinance should be
29 able to accommodate both commercial investors and socially oriented donors. In
30 industrialized countries microcredit is already offered in syndication by both commercial
31 banks and socially oriented MFIs (Villa and Yusupov, 2010). Ultimately, the theory of
32 microfinance will have to facilitate both sustainability and social impact. Research efforts
33 toward this goal will be beneficial for both practitioners and theorists.
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Table 1. Determinants of repayment rates under group lending

Positive effect	Negative effect
<ul style="list-style-type: none"> • Written formal rules on group members behaviour • Remoteness of the location of the group • The degree of credit rationing of the borrowers • Self-selection of the group by members • Strength of the social ties¹ and social pressure within a group • Knowledge of peer income streams by group members • The quality of the group leader monitoring and social ties in running the group • Correlations of cross-borrower returns • Trust between group members • Duration of the loan • Group size 	<ul style="list-style-type: none"> • Number of relatives within a group • Average distance between group members • Homogeneity of the group in terms of ethnicity, occupation, income etc. • Loan size

¹ Positive correlation of social ties with repayment rates is somewhat ambiguous as there is also evidence to the contrary in the literature (see for example Ahlin and Townsend, 2007).

Table 2. MFIs by lending methodology

	Number (%) of MFIs by Lending Methodology		
	Individual	Individual/Small group	Group Lending
2005	177 (36.3%)	209 (42.9%)	101 (20.7%)
2006	178 (36.6%)	224 (46.0%)	85 (17.5%)
2007	164 (33.7%)	245 (50.3%)	78 (17.5%)

Source: The Microbanking Bulletin 18, Spring 2009, available at themix.org

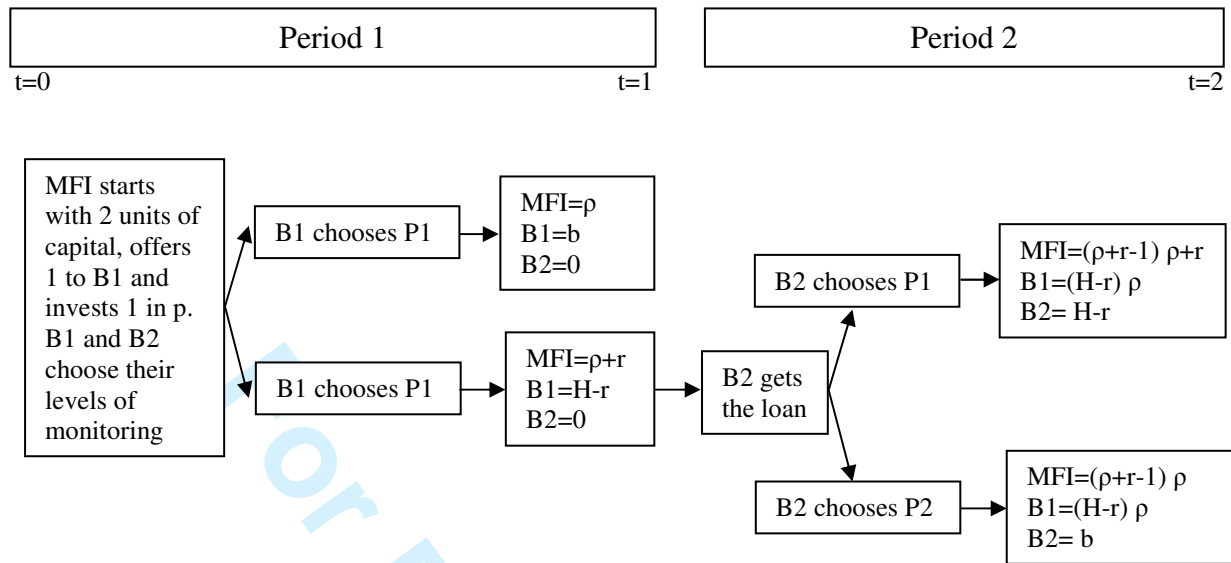


Figure 1. Sequence of events in dynamic group lending. *Note:* B1 and B2 are borrowers 1 and 2 respectively. Equality signs denote the payoff of a given player.

Notes

- 1 Nonetheless, Karlan and Zinman (2008) show that rate sensitivity increases at higher rates, e.g. the levels of
2 loan take-up were up to six times greater for interest rate levels higher than the lender's standard rate.
- 3 Many issues of the microfinance industry are discussed at introductory level by Armendáriz and Morduch
4 (2005), which to our knowledge is the only textbook on microfinance to date.
- 5 Hermes and Lensink (2007) provide a survey of empirical evidence. Their paper can be seen as
6 complementary to our work that focuses on the underlying theoretical developments.
- 7 Given $Y^L > \rho$ and the zero-profit condition, the safe types always repay, so they would be charged $r_s = \rho$. The
8 risky types allow the MFI to break even if $r_r = [\rho + (1-q)v] / p_r$.
- 9 Following Stiglitz (1980), the choice of actions or behaviour can be viewed as a choice of projects. Tirole
10 (2006), section 4.6, follows this approach.
- 11 Chowdhury (2010) shows that microlending contracts à la Grameen (with features like joint liability
12 lending, sequential lending, contingent renewal, etc.) can harness market efficiency in places where formal
13 and conventional contracts may fail.
- 14 In Laffont and Rey (2003), while MFIs do not benefit directly from borrowers' collusion, information-
15 sharing among microentrepreneurs is better for repayment, even if the entrepreneurs collude. The first best
16 is achievable if borrowers share information about each other's efforts and do not collude.
- 17 In the extreme case of continuous repayment, lenders receive signals about the borrower's progress at every
18 moment in time.
- 19 See Petersen (2004) for a conceptual discussion of soft vs. hard information.
- 20 In Chowdhury (2005) in case of successful repayment by both borrowers the group's total payoff is shared
21 by the two borrowers. One gets share a and the other gets $1-a$. Our presentation corresponds to $a=1/(1+\rho)$.
22 In any case, results of Chowdhury (2005) are robust with respect to a .
- 23 Notice that our review has a different focus to that of Hermes and Lensink (2007).
- 24 Consider, for example, a group of two, where each member shirks thinking that the other one will repay. In
25 this case, the chances of group default rise.
- 26 Theoretical models accept that group members do not share the same monitoring ability as in Bond and Rai
27 (2008). Weaker borrowers have a higher willingness to repay, since they are threatened with tougher
28 sanctions ex post. Even when both borrower types have viable investment opportunities, co-signed loans
29 are preferred to group loans if the power relation within the group is sufficiently unequal.
- 30 Research into pro-social mission versus preference for financial sustainability of MFIs has led to new
31 literature on potential mission drift. Much of this literature is empirical and does not directly relate to
32 microlending contracts, therefore, covering it extensively is beyond our scope. Nonetheless, it has
33 governance implications for MFIs and we discuss it briefly at the end of the paper.
- 34 See "Microsharks. Rapid expansion of Indian microcredit leads to a turf war with the government" in The
35 Economist, Aug 17th 2006.
- 36 Karlan and Morduch (2009) provide an excellent survey of issues related to the socio-economic impact
37 expected of microfinance.