ELSEVIER

Journal of Development Economics
Vol. 60 (1999) 51–77

JOURNAL OF
Development
ECONOMICS

www.elsevier.com/locate/econbase

Outreach, sustainability and leverage in monitored and peer-monitored lending

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Abstract

I study the contract design problem facing microfinance-lending organizations (MFOs) that want to maximize the impact and outreach of their lending activities to a target population of poor borrowers while remaining financially sustainable. Tradeoffs between outreach, sustainability and financial leverage are shaped by the endogenous monitoring and delegation costs that arise within a chain of agency relationships subject to moral hazard between borrowers, loan staff, MFO equity-owners, and outside investors. All else equal, sustainable MFOs that target poorer borrowers must charge higher interest rates, have higher staff costs per dollar loaned, and are less leveraged. Analysis of data for 72 MFOs tends to support the findings.

PACS: O160; N20; D23; D82; G30
Keywords: Microfinance; Financial intermediation; Group lending; Credit constrained borrowers

1. Introduction

The remarkable success that pioneer microfinance organizations (MFOs) such as the Grameen Bank of Bangladesh and Banco Solidario of Bolivia have had at extending and recovering millions of loans to small firms and poor households has attracted worldwide attention. Donors, governments, non-governmental organizations (NGOs), community activists, and now even some large commercial banks

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0304-3878/99/$ - see front matter
PII: S0304-3878(99)00036-X

have all enthusiastically redirected efforts and resources toward new microfinance and microenterprise development projects.

Despite this remarkable convergence of interest in microfinance as a tool to fight world poverty, significant policy debates have stirred in recent years over the appropriate role, objectives, and methods of microfinance (Morduch, 1997, 1998; Rhyne, 1998). At the heart of the debate are important disagreements over the nature and scope of potential tradeoffs between outreach, impact, and sustainability in microfinance lending, and what to do about them. The term *outreach* is typically used to refer to the effort by MFOs to extend loans and financial services to an ever-wider audience (breadth of outreach) and especially toward the poorest of the poor (depth of outreach). *Impact* refers to the extent to which the incomes and welfare of those so reached is raised. In most discussions *sustainability* is taken to mean full cost recovery or profit making, and is associated with the aim of building microfinance institutions that can last into the future without continued reliance on government subsidies or donor funds.

The ''institutionist'' or ''financial systems'' approach that has become increasingly dominant (at least officially) at the World Bank and in much of the donor community, exhorts microfinance providers to aggressively pursue sustainability through raising interest rates and lowering costs. [1] In this view, as MFOs begin to wean themselves from a reliance on donor funds and subsidies and adopt the practices of good banking they will be compelled to further innovate and lower costs. Profits are viewed as being not only acceptable, but also quite essential because profits are expected to attract private investment to the sector. This suggests that commercial microfinance lenders ought to achieve much better *leverage* on their equity than subsidized microlenders, allowing them to greatly multiply the *scale* of outreach that is achieved from each extra dollar contributed by donors to equity in the sector. [2] The Consultative Group to Assist the Poorest (CGAP), a donor consortium housed at the World Bank, and the United States Agency for International Development (USAID), have been particularly resolute in urging this approach in their guidelines and literature, and increasingly, by conditioning further grants and loan guarantees on the attainment of specific performance and sustainability targets.

Advocates of what has been labeled the ''poverty'' or ''welfarist'' approach disagree. They argue for a focus on targeted outreach rather than scale or

[1] See for example in Otero and Rhyne (1994), Christen et al. (1995), CGAP (1996) and Gonzalez-Vega et al. (1997). The rural finance group at The Ohio State University, which for decades chronicled the dismal performance of directed credit and state-subsidized loan programs in developing countries other components of financial repression, has been particularly influential in shaping support for this approach. For an interesting personal account of the development of this approach by a key participant see Von Pischke (1997).

[2] On the question of leverage see for example Otero and Rhyne (1994), Microfinance Network (1998), Christen (1997), and particularly Rosenberg (1994).

sustainability. They contend that a narrow insistence on cost recovery and the elimination of subsidies would only force MFOs to shed the poorest from their portfolios of borrowers because they are precisely the most difficult and costly to attend (Hulme and Mosley, 1996). Some argue that many micro-borrowers simply cannot repay at the high interest rates often calculated for full cost recovery, [3] yet argue that society should nonetheless be willing to consider subsidizing MFOs because they can effectively target and positively affect the livelihood of very poor households (Morduch, 1998). Some NGOs also argue that adoption of a financial systems approach would divert energy and attention away from other important social and political objectives such as empowering the poorest and most vulnerable (Dichter, 1997). A small but growing dissent movement has also argued that microfinance in general, and sustainable microfinance in particular, may be doing more harm than good by increasing the indebtedness and vulnerability of the poor (Dichter, 1997; Johnson and Rogaly, 1997).

The issue of contract design and the cost of providing incentives would seem to lie at the heart of many of these policy debates, yet the topic is treated only lightly in most policy discussions. Although a number of recent theoretical papers explain the logic of incentives behind interesting contractual mechanisms in microfinance lending, such as joint liability clauses, few studies have offered clear guidance for sorting through these policy debates, nor the question of financial leverage. The purpose of the paper is to provide a policy-relevant framework for explaining patterns in the wide diversity of different lending modalities and intermediary structures that appear to be used in practice to target different segments of the very heterogenous market for microfinance. Tradeoffs between outreach, sustainability and impact, and the possibilities and limits leverage of arise from the endogenous monitoring and delegation costs associated with reaching different segments of borrowers. [4] The main predictions of the model are examined in light of empirical evidence from a recent survey of 72 sustainable or near-sustainable microfinance providers (Christen and McDonald, 1998).

The framework builds upon and extends recent models of financial intermediation, and the role of delegated monitoring such as Diamond (1984), Banerjee et al. (1994), Holmstrom and Tirole (1997) and others. [5] The launching point of the analysis is that microfinance lending is almost everywhere and always information-intensive lending. Compared to conventional bank loans which are typically

[3] It is not at all uncommon for ''sustainable'' MFOs to charge real effective interest rates well in excess of 40% per year (Christen, 1997; Christen and McDonald, 1998).

[4] Recent theoretical papers include Stiglitz (1990), Varian (1990), Itoh (1991), Banerjee et al. (1994), Rashid and Townsend (1994), Besley and Coate (1995), Wenner (1995), Aghion and Gollier (1996), Conning (1996), Ghatak (1997), Madajewicz (1997) and Sadoulet (1997).

[5] Related papers on moral hazard and monitored lending include Hoshi et al. (1993), Madajewicz (1997) and Repullo and Suarez (1995). Conning (1996) employs a similar model to explore peer-monitoring and joint liability clauses.

secured, microfinance lenders typically require much less collateral per dollar loaned, or none at all. Loan ''monitoring'' is fundamental and takes place via many channels, perhaps most obviously via the requirement that borrowers make very many (e.g., weekly) interim repayments even on loans of relatively short maturity. The slightest delay in repayment typically triggers a quick intervention by lending staff who will visit borrowers at their homes, workplace or social gathering places to gather facts or exert pressure. Such monitoring and control activities serve to reduce collateral requirements by reducing the scope for moral hazard in the use of borrowed funds or project cashflows.

Monitoring and social sanctions are, however, costly substitutes for collateral. Rising monitoring and delegation costs within MFOs can easily mount as outreach is extended to poorer and poorer segments of borrowers. This leads to the prediction of upward sloping — and possibly backward-bending — individual loan supply schedules, and provides a basis for mapping a tradeoff between outreach, sustainability and impact.

Many policy debates appear to stem from disagreements and possible misunderstandings over the nature of the costs associated with lending to the poor. If high fixed costs of initiating small loan transactions are the primary obstacle impeding further lending to the poor, then the financial systems approach of raising interest rates and increasing scale could indeed provide the elements of a ''win–win'' strategy to help outreach, sustainability, and impact simultaneously (CGAP, 1996; Christen and McDonald, 1997). If, however, much of the cost of lending to the poor is due to variable monitoring and delegation costs, then raising interest rates could easily backfire. By considering both fixed costs and variable agency costs together the model helps clarify issues that may ultimately have to be settled empirically.

The paper also sheds light on the important question of how incentives and governance structures for proper loan monitoring and recovery (including peer-monitoring) can be provided to loan staff and other delegated monitors *within* MFOs. Since monitoring is an activity that is itself subject to moral hazard, MFO management and staff must also be provided with incentives and/or be monitored to maintain the quality of the overall MFO loan portfolio that outside investors — including savings depositors and commercial lenders — may partly own. Performance-based pay to staff is an important incentive device in practice. Staff costs per dollar loaned will in general be higher the poorer is the MFO's target population, and these costs can quickly mount as outreach is extended.

The cost of providing incentives for delegated monitors also clarifies the limits of leverage for sustainable MFOs, and therefore the question of whether, and how fast, the microfinance sector will be integrated into the larger network of financial markets. All else equal, microfinance providers that work with the poor will have a more difficult time mobilizing voluntary savings deposits and obtaining credit from outside sources, even if their operation is entirely self-sufficient or even very profitable. All else equal, the poorer the target population of borrowers, the more

heavily monitored the loan portfolio must be, and thus the larger the minimum equity stake that MFO managers and staff must retain to have incentives to diligently preserve the quality their loan portfolio. Thus, contrary to frequently heard claims in policy forums, profitability is neither a necessary nor a sufficient condition for leverage.

The rest of the paper is organized as follows. Section 2 presents the basic model, showing how costly monitored lending can serve to lower collateral requirements and/or increase loan sizes. The marginal cost of extending outreach and impact to the poor is analyzed and basic tradeoffs between outreach, impact and sustainability derived when there are both fixed and variable costs to lending. Section 3 extends the analysis to consider more complex financial intermediary structures, involving MFO equity owners as delegated monitors for outside investors, and hired staff as delegated monitors for owners. The shape of staff renumeration contracts and the possibilities of leverage are discussed. The costs and benefits of using peer-monitors are also analyzed. Section 4 discusses the model's predictions in light of findings from a recent survey of MFOs. Section 5 spells out further policy implications and concludes.

2. The basic model

Consider a population risk neutral micro-entrepreneurs [6] each needing to purchase inputs for variable scale production or trading project that will yield a stochastic returns after a fixed gestation period. Each entrepreneur employs a non-tradable input z, a variable amount of a tradable factor I, and a chosen level of diligence or effort on the project. The non-marketed factor input z, is interpreted as the entrepreneur's skill or ability level in production, and is assumed to be unevenly distributed in the population. Entrepreneurs also differ in regard to their initial asset holding of cash K and collateralizable assets (such as land, property, or pledgable cashflows). For convenience K is measured in current dollars, and collateral assets A by their second period value. The vector $\boldsymbol{v} = (z, K, A)$ fully summarizes an entrepreneur's characteristics.

A potential problem of hazard emerges when an entrepreneur tries to obtain outside finance for his project. The problem is that the promise to make loan repayments out of eventual project cashflow might dilute the borrower's incentive to diligently work to insure that the project succeeds if part of the cost of project failure can be passed onto the lender.

[6] The assumption of risk neutrality is adopted primarily for expositional purposes. Sharper results, clearer intuition and simpler diagrams emerge for this case. See below for how to extend the model to risk averse borrowers. An earlier draft of this paper, available upon request, examines how the analysis can be modified to the case of risk-averse borrowers.

To capture this problem simply, assume that an entrepreneur of ability z who borrows a loan of size $I-K$ has only two ways to use the borrowed funds. The diligent way is to use the loan together with own cash K to carry the project at production scale I. In this case the project is assumed to succeed with probability $\overline{\pi}$ for an expected project return of $\overline{\pi}zf(I)$, where $f(I)$ is a twice differentiable and concave production function. The other possibility is to not be diligent and instead divert a fraction $B(c)$ borrowed funds toward other activities for a private benefit $B(c)(I-K)$. Here c is the level of expense that a lender or her delegated monitor dedicate to monitoring and controlling the borrower's behavior. The non-diligent borrower might for example purchase fewer, or lower quality inputs, with the effect of lowering the probability of project success from $\overline{\pi}$ to $\underline{\pi}$, for an expected return of $\underline{\pi}zf(I)$. [7]

The monitoring function $B(c)$ is assumed to be a continuous and twice differentiable function with $B'(c)<0$ and $B''(c)>0$. This captures the idea that the more resources that are spent on monitoring by a lender or her delegate, the fewer are the fewer the rewards to the borrower from diverting resources to private uses, but that there are diminishing returns to monitoring. The separable form for the monitoring technology $B(c,I)=B(c)I$ is adopted mainly as a matter of convenience. Most of the results below follow so long as larger loan sizes provide more scope for diverting funds to private uses, and that it becomes more difficult to divert resources the more heavily one is monitored. [8]

The moral hazard problem can lead lenders to defensively insist upon collateral guarantees, refuse to lend, or to attempt to ameliorate the problem by using contracts that provide a less than first-best level of financing. The lender may also threaten to use social sanctions, or attempt to monitor and control the borrower's behavior directly or via delegates.

Under the assumption that the loan market is competitive — or equivalently that the MFO wants to maximize borrower welfare — the contract design problem involves determining an optimal investment scale $I_v=I(z,K,A)$ and a rule for allocating possible project returns x_i ($x_s=zf(I)$ or $x_f=0$) between repayments R_i to the MFO owner, payments w_i to a (potential) delegated monitor, and residual returns $s_i=x_i-r_i-w_i$ to the borrower, in such a way as to maximize the borrower's expected return. To be feasible, the contract must allow the lender to break even, must provide both the borrower and delegated monitors with

[7] For example a farmer who obtains an $I-K=$ US$100 loan to buy fertilizer and pesticides might decide to economize on pesticide applications and use $B(c)(I-K)=$ US$30 for his daughter's school fees. The resulting crop project is more likely to fail and is therefore riskier. Unless the loan is fully collateralized part of increased risk of crop failure is passed onto the lender.

[8] The separable form also suggests a powerful monitoring technology since each dollar of monitoring has the same proportional effect on the fraction of the loan a borrower can divert, regardless of loan size. A less powerful monitoring technology would only reinforce the results in the paper below about the limits and rising costs of monitored finance.

incentives to participate and choose appropriate levels of diligence and monitoring, and must satisfy the borrower's limited liability constraints. The contract design problem for a borrower of characteristics $\boldsymbol{\nu} = (z, K, A)$ can be written:

$$\max_{s_i, w_i, I, c} E(s_i|\overline{\pi})$$

$$E(R_i|\overline{\pi}) \geq \gamma(I - K) + c_0 \quad (1)$$

$$E(s_i|\overline{\pi}) \geq E(s_i|\underline{\pi}) + B(c)(I - K) \quad (2)$$

$$E(w_i|\overline{\pi}) - c \geq E(w_i|\underline{\pi}) \quad (3)$$

$$R_i + w_i \leq x_i + A \quad i = s, f \quad (4)$$

where $R_i = x_i - w_i - s_i$. The expectation operator is defined such that for example $E(s_i|\pi) = \pi s_s + (1 - \pi)s_f$ is the borrower's expected return when his action choice is π. Inequality (1) is the bank's break-even condition requiring that the value of expected repayments on a loan of size $(I - K)$ equal or exceed the opportunity cost of funds plus any fixed costs c_0 of handling loans. Inequality (2) is the borrower's incentive compatibility constraint that given the size of the loan and the chosen monitoring intensity c, the borrower prefers to be diligent rather than non-diligent, even though diligence remains un-verifiable by outsiders. Inequality (3) is the delegated monitor's incentive compatibility constraint that requires she earn at least as much from monitoring at as from not monitoring. Finally (4) are the limited liability constraints that state that the borrower cannot be forced in any state to pay more than the full value of the project outcome x_i plus whatever collateral A has been pledged. Using the fact that $R_i + w_i = x_i - s_i$, another way to write these constraints is $s_i \geq -A$. As discussed in Section 3 below, it will make an important difference whether the delegated monitor is assumed to have wealth to post as bond (in which case we could consider them an equity holder) or not, in which case we will call them hired staff. There are also participation constraints for the borrower and monitor to keep track of, but that are omitted. For convenience I normalize these outside reservation incomes to zero. [9]

Since γ (one plus the interest rate on bank deposits) is assumed to be both the bank's opportunity cost of funds and the highest return an entrepreneur could earn by placing his cash K in its next best use, borrowers will use all of their cash K before borrowing the possibly more expensive monitored loan funds, up to the optimal investment scale I_z^*, given by $\overline{\pi} z f'(I_z^*) = \gamma$. An entrepreneur of skill level z and cash level K who wants to attain investment scale I will therefore approach the market for a loan of size $(I - K)$.

[9] If the borrower had an outside reservation income of $U > 0$ it is easy to see that there would be a minimum loan demand size I_z. The higher the borrower's outside opportunity U, the larger the minimum scale of production for the borrower to participate.

Assume for the moment (until Section 3) that there are no agency costs to delegated monitoring so incentive constraint (3) is suppressed, and $w_f = w_s = 0$. The monitoring expense c is then chosen and implemented directly by the MFO owners who have their own money at risk. The total cost of providing a loan of size $I-K$ therefore becomes $\gamma(I-K)+c+c_0$ on the RHS of (1).

A borrower who receives a loan of size $(I-K)$ will have incentive to be diligent only if incentive compatibility constraint (2) is met. Writing out $E(s_i|\overline{\pi})$ and $E(s_i|\underline{\pi})$ and rearranging this inequality yields:

$$(s_s - s_f) \geq \frac{B(c)}{\Delta\pi}(I-K) \tag{5}$$

where $\Delta = (\overline{\pi} - \underline{\pi})$. This rewriting underscores the fact that an optimal contract must reward the borrower sufficiently more for successful outcomes than for failures to provide an incentive to want to raise the probability of success via diligence. Since by assumption the entrepreneur will have zero output in the failure or default state the most the lender can recover is the borrower's collateral pledge, or $R_f \leq A$ in that state. Because limited liability thus places a ceiling on how much the borrower can be forced to lose when the project fails $(s_f \geq -A)$, incentives to be diligent for collateral-poor borrowers may have to be provided instead by better rewards to successful outcomes, s_s. But this requires *lowering* the borrower's repayment to the lender following successful outcomes. Since little or nothing can be collected from asset poor borrowers in the failure state and repayments cannot be raised too high in the success state without destroying incentives, a large *enforcement rent* — a larger share of the expected project returns — must be left with poorer borrowers than with rich for a given size loan. [10]

From the limited liability constraint, maximum repayment in the failure state is $R_f = A$, and $s_f = -A$. Substituting this last expression into the binding incentive constraint [11] (5) we can solve for $s_s = [B(c)/(\Delta\pi)](I-K) - A$, which is the minimum return the borrower must be promised for successful outcomes if limited liability and incentives are to be maintained. Thus for a loan of size $(I-K)$ the borrower has to earn an *enforcement rent* at least equal to

$$E(s_i|\overline{\pi}) = \overline{\pi}\frac{B(c)}{\Delta\pi}(I-K) - A. \tag{6}$$

How large a loan can a borrower of characteristics $\boldsymbol{\nu} = (z, K, A)$ obtain? From Eq. (1) lenders will only be willing to participate if the expected returns on the project

[10] This rent arises because of the interaction of incentive constraint and limited liability. It is not a rent in the conventional sense that can be eroded through increased entry or competition.

[11] If the incentive compatibility constraint were not binding, then s_s could be lowered and repayment R_s could be raised without upsetting incentives. Thus the enforcement rent will be lowest when the constraint binds.

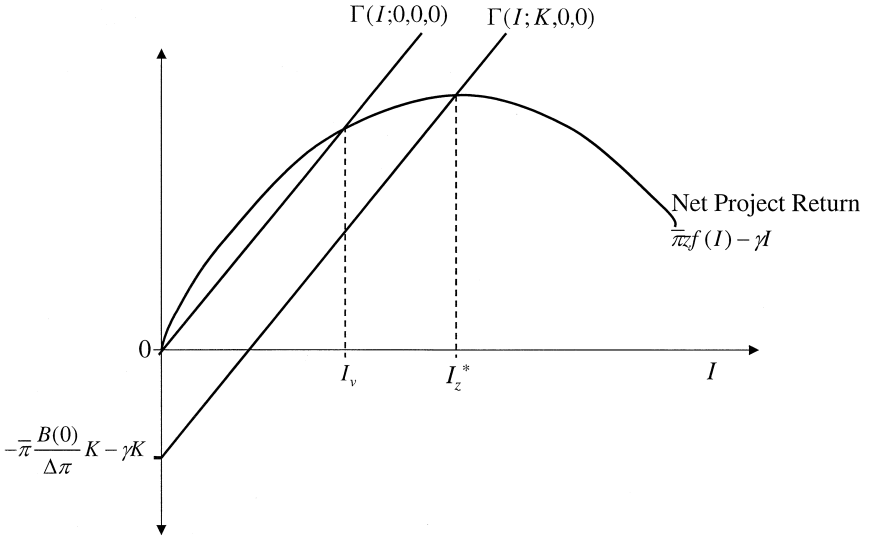

Fig. 1. Cash equity stake and attainable investment scale.

are sufficient to pay the enforcement rent plus the opportunity cost of funds and any monitoring expense c. Therefore, a loan will be made only if the net project returns (expected returns less the lenders cost of funds) exceed the required enforcement rent $E(s_i|\overline{\pi})$ plus any monitoring costs c and fixed loan handling costs c_0. Substituting Eq. (6) into Eq. (1), rearranging and noting that the borrower's cash has opportunity cost γK we obtain:

$$\begin{aligned}&(\text{Net Project Returns}) \geq (\text{Borrower Enforcement Rent})\\ &\qquad\qquad + (\text{Monitoring costs}) + (\text{Fixed costs})\\ &\overline{\pi} zf(I) - \gamma I \geq \left(\frac{\overline{\pi}}{\Delta\pi} B(c)(I-K) - A - \gamma K\right) + c + c_0 \qquad (7)\\ &\overline{\pi} zf(I) - \gamma I \geq \Gamma(I;K,A,c)\end{aligned}$$

Fig. 1 plots both the net project returns for a borrower of ability z and the enforcement rent plus monitoring and fixed costs line $\Gamma(I;K,A,c)$, as a function of the chosen investment scale. By definition, net returns peak at the optimal investment scale I_z^* given by $\overline{\pi} zf'(I_z^*) = \gamma$. The top diagonal line [12] $\Gamma(I;0,0,0)$ is drawn for the case of no fixed costs and a borrower who has no cash ($K = 0$), no collateral ($A = 0$), and is not monitored. As drawn the largest attainable

[12] A more general non-linear monitoring technology $B(c,I)$ or risk-averse borrowers would have led to a different shape function Γ, but the graphical analysis that follows would remain essentially the same.

investment scale at which Eq. (7) is still satisfied is $I_v < I_z^*$, where $\boldsymbol{v} = (z,0,0)$. Note that since the loan market is assumed to be competitive (and/or MFOs care about borrower welfare), borrowers will receive all project returns net of the lender's opportunity cost of funds and monitoring expense, or $E(s_i|\overline{\pi}) = \overline{\pi} z f(I_v) - \gamma I_v - c - c_0$.

At any investment scale I above I_v the enforcement rent exceeds net project returns, so the borrower would divert funds toward private uses. In order to expect to break even, the lender will only enter into contracts that keep the borrower at or below that investment scale. The lower diagonal line in Fig. 1 is the enforcement rent plus monitoring costs line [13] Γ associated with a borrower with just enough own cash $K > 0$ at stake in the project to convince a lender to participate and provide a loan that allows the borrower to attain the first-best investment scale I_z^*.

More general comparative static analysis is straightforward: anything that raises net project returns (for example a higher z or lower γ) or lowers the enforcement rent (for example higher cash stake K, collateral A, or a safer class of projects) [14] helps the borrower attain a larger investment scale and welfare. Starting from $I_v < I_z^*$, it is easy to show that $\mathrm{d}I/\mathrm{d}K > 1$ and $\mathrm{d}I/\mathrm{d}A > 0$. To show this, note that the maximum attainable scale I_v is implicitly defined by a binding condition (7). Totally differentiating both sides and rearranging would yield, respectively:

$$\mathrm{d}I/\mathrm{d}K = \left[\overline{\pi} B(c)/\Delta\pi\right]/\Phi > 1$$

$$\mathrm{d}I/\mathrm{d}A = 1/\Phi > 0$$

where $\Phi = [\overline{\pi} B(c)/\Delta\pi - (\overline{\pi} z f'(I) - \gamma)]$. The denominator Φ will be positive so long as the slope of the enforcement rent line cuts the net project returns line from below, which is always the case if they intersect at all. [15] Thus, $\mathrm{d}I/\mathrm{d}A > 0$. If the entrepreneur is credit constrained to start with at $I_v < I_z^*$, then $\overline{\pi} z f'(I_v) > \gamma$, and it is also clear that $\mathrm{d}I/\mathrm{d}K > 1$. Thus each extra dollar cash or collateral that a borrower puts at stake in the project helps him to leverage more than a dollar of outside finance: loan size is increasing in both K and A.

Note, however, that while collateral assets and cash both allow borrowers to increase loan size and attainable investment scale by lowering enforcement rents, the mechanism is not the same. Whether in a dynamic model borrowers would prefer to accumulate wealth in the form of collateral assets or cash (retained earnings) will depend on the return on assets that can be used as collateral and on the parameters in $\overline{\pi} B(c)/\Delta\pi$. All else equal collateral becomes a preferable

[13] For a more general loan monitoring technology $B(c, I-K)$ the line would not be a straight line. The graphical analysis to follow would be very similar however.

[14] Fixing $\underline{\pi}$ where diligence is associated with higher probability of success $\overline{\pi}$ would be labeled safer projects. Safer projects are better financed even if we are comparing across classes of projects with mean preserving spreads (Stiglitz and Weiss, 1981; Holmstrom, 1996).

[15] If the enforcement rent line cuts the net project return line at some point from above it would have to cut the net project return line again at a higher investment scale, this time from below.

instrument to cash the lower is the scope for moral hazard as captured by $B(c)$, the safer is the project, and the higher is the marginal product of investment relative to the cost of funds γ.

Aside from lowering fixed loan handling costs, all efforts to raise the sustainability, and increase the depth and breadth of microfinance outreach boil down to an effort to lower the enforcement rents associated with lending.

2.1. Monitoring and the marginal cost of lending to the poor

The discussion thus far has taken the monitoring intensity c as given. This section considers how it would be chosen along with other terms of an optimal contract. Monitoring may be worthwhile if it lowers the borrower's scope for moral hazard in the use of borrowed funds via a reduction in $B(c)$. With less of an incentive problem there is less need for indirect incentives and thus less need for collateral.

Each additional dollar of monitoring c works to lower the enforcement rent associated with any investment scale by flattening the slope of the line $\Gamma(I;K,A,c)$ by $\bar{\pi}B'(c)/\Delta\pi$, as depicted in Fig. 2. Monitoring uses up real resources however. As the line rotates it also shifts up — by a dollar for every dollar of new monitoring — because the extra monitoring expense reduces the size of expected project returns to be divided. The condition for an extra dollar of monitoring to be effective in lowering the enforcement rent, and therefore raising the attainable

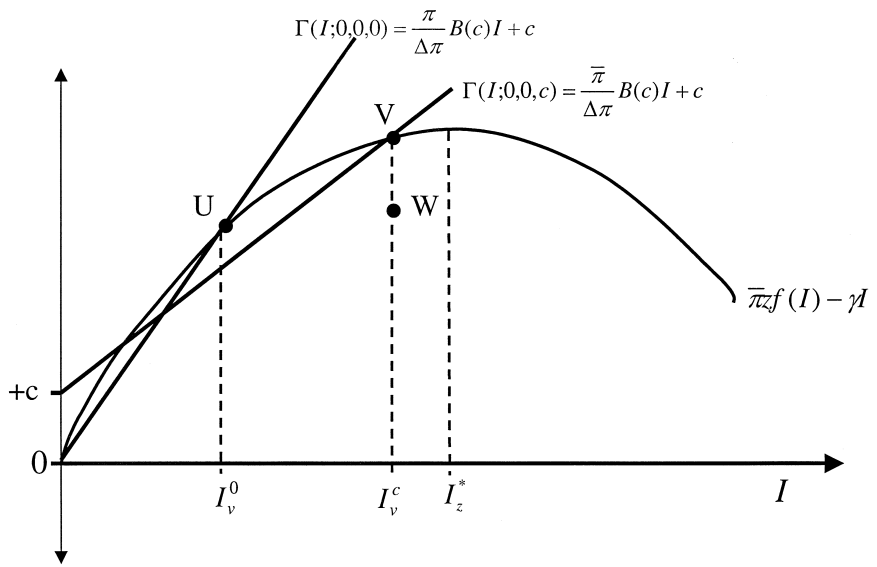

Fig. 2. Monitoring may increase credit access and loan size.

investment scale is therefore $\bar{\pi}B'(c)(I-K)/\Delta\pi + 1 \leq 0$. Depending on the shape of the monitoring and production technologies, monitoring may at first be useful at increasing the attainable investment scale, but may become increasingly expensive and eventually even counterproductive.

The figure illustrates the case of an asset-poor borrower of characteristics $\boldsymbol{v} = (z,0,0)$. Without monitoring the largest attainable investment (and loan size) is I_v^0. By using a monitored loan the borrower increases the attainable investment scale to $I_v^c > I_v^0$ with which he earns an expected return $\bar{\pi}zf(I_v^c) - \gamma I_v^c - c$, depicted by the height *W*, where *W* is *c* units below *V*. As depicted, although the investment scale and project returns are substantially higher than under the no-monitored contract, the borrower takes home only slightly more than what he would have from the smaller non-monitored loan I_v^0. The costs of monitoring have eaten into most of the gain in expected net project returns.

2.2. The marginal cost of extending outreach

What is the marginal cost of reaching the poor? It will be useful to separate this question into two related component parts: (1) the marginal cost of increasing *outreach* to new borrowers, and (2) the marginal cost of increasing the *impact* of lending to existing borrowers. The first answers the question of how much more it costs to extend a *given size loan* to a *new* borrower with less collateral or cash wealth. The second answers how much more it costs to *raise the attainable investment scale or loan size* to an *existing* constrained borrower.

To answer the first question, we fix a loan size I and use binding condition (7) to find the optimal level of monitoring $c_v(I)$ as a function of $\boldsymbol{v} = (z,K,A)$ that would allow us to achieve that loan size. Totally differentiating a binding condition (7) yields expressions which indicate how the cost of lending due to monitoring costs changes in response to changes in asset ownership of A, and K, respectively:

$$\frac{\mathrm{d}c}{\mathrm{d}A} = \frac{1}{\Lambda} \quad \text{and} \quad \frac{\mathrm{d}c}{\mathrm{d}K} = \frac{(\bar{\pi}/\Delta\pi)B(c)(I-K)+\gamma}{\Lambda}$$

Where $\Lambda = (\bar{\pi}/\Delta\pi)B'(c)(I-K)+1$. The numerator in each expression is always positive. The sign of each expression will therefore depend on the sign of the common denominator Λ. This is in turn will be negative as long as $(\bar{\pi}/\Delta\pi)B'(c)(I-K) < -1$, which is just the condition that we identified earlier for monitoring to be worthwhile. The condition requires that the positive benefit of monitoring on reducing the enforcement rent exceed the cost of an additional unit of monitoring. Both expressions are negative and therefore monitoring *substitutes* for cash or collateral. This is quite intuitive: for each dollar less of collateral (cash) that a borrower has to place at stake, more and more monitoring must be employed to maintain incentives.

2.3. The marginal cost of extending impact

Rather than set the loan size I arbitrarily, MFOs that care about borrower's welfare should try to maximize the impact of their lending by helping borrowers to attain the investment scale I_v^c that yields the borrower the highest return and allows the MFO to break even. At the optimal I_v^c borrowers have set the expected marginal product of investment $\overline{\pi} zf'(I)$ equal to the marginal cost of funds $\gamma + c_v(I)$. This also means that borrowers will always post as large a collateral or a cash equity stake as possible to borrow as much non-monitored finance as possible at constant marginal cost γ before turning to increasingly expensive forms of monitored lending. [16]

Although they do not attain the first-best investment scale I_z^* and their wealth position conditions access, borrowers who attain scale $I_v^c < I_z^*$ cannot be labeled *credit rationed* as the term has been used in the literature. That's because borrowers are *choosing* as large a loan as they desire at the offered interest rate $\gamma + c_v(I)$ (see Freixas (1997) for a further discussion of this distinction). Borrowers would be classified as credit rationed only if the best available contracting and monitoring technology is not being fully employed.

An expression for the marginal cost of extending impact $\mathrm{d}c/\mathrm{d}I$ is again found by implicit differentiation of a binding condition (7) to obtain:

$$\frac{\mathrm{d}c}{\mathrm{d}I} = \frac{\overline{\pi} zf'(I) - \gamma - (\overline{\pi}/\Delta\pi) B(c)}{\Lambda}$$

As argued above, the denominator remains negative as long as monitoring is worthwhile. The numerator represents the difference in slope between the net project returns line $\overline{\pi} zf(I) - \gamma$ and the enforcement rent plus monitoring line Γ. Thus, $\mathrm{d}c/\mathrm{d}I$ will be positive so long as the curve Γ cuts the curve $\overline{\pi} zf(I) - \gamma$ from below.

Fig. 3 shows individual loan supply and demand schedules for two target groups of borrowers. Each target group has the same ability z and hence the same demand for credit, but each faces a different loan supply schedule because of their differing levels of asset wealth (both have zero cash but different collateral wealth holdings). Schedule GJD indicates the borrowers' shared investment demand as a function of the costs of funds. Entrepreneurs with $\boldsymbol{v}_0 = (z, K, A_0)$ can borrow up to $I_{v_0}^0$ of non-monitored credit at fixed marginal cost γ. To borrow more they must turn to the monitored loan market where they face an upward sloping individual

[16] I am assuming that the opportunity cost of the borrower's cash and collateral is the same as that of the bank. In practice the entrepreneur may have other more valuable uses for collateral assets and cash in other projects, so the opportunity cost could exceed γ. The borrower would then draw cash and collateral wealth out of these other projects to obtain more financing on the project under consideration only up to the point where the shadow price of capital were equalized across all activities.

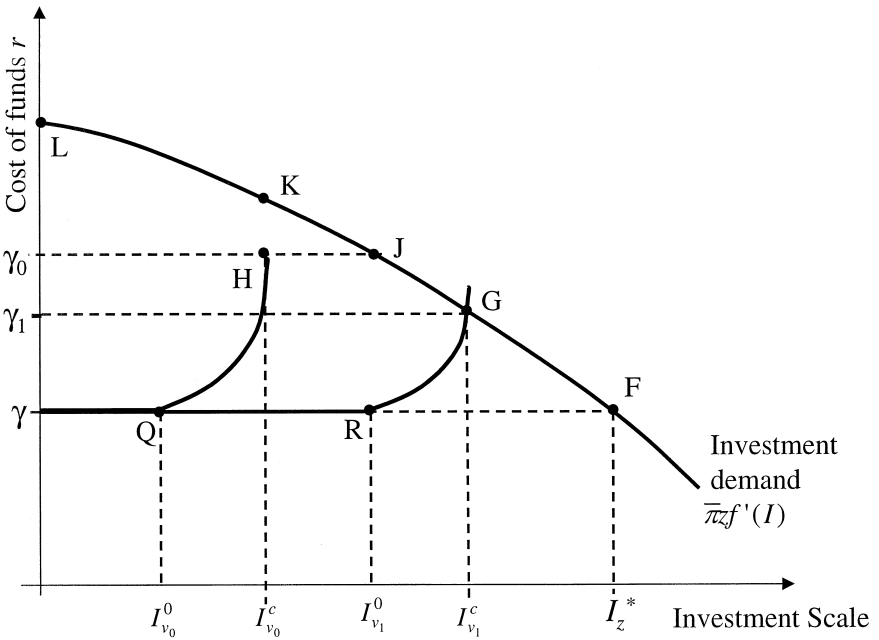

Fig. 3. The marginal cost of funds.

loan supply $\gamma + c_{v_0}(I)$ associated with that target group. They can borrow up to investment scale $I^c_{v_0}$, where $\overline{\pi} zf'(I^0_{v_0}) = \gamma + c_{v_0}(I^c_{v_0})$. The loan supply schedule in effect becomes *backward bending* at this point: entrepreneurs cannot borrow more at *any* interest rate because further monitoring would only raise enforcement rents. The entrepreneur in target group $\boldsymbol{v}_1 = (z, K, A_1)$ have access to more and cheaper credit because their collateral wealth $A_1 > A_0$.

2.4. Loan handling fees and minimum loan sizes

Many discussions of microfinance lending explicitly or implicitly point to fixed costs of handling loans as an important reason for explaining the continued marginalization of small borrowers from the formal loan market. Suppose fixed handling fee c_0 must be paid on all loans, regardless of size and whether or not the loan is monitored. Expected project returns must now pay for the processing fees c_0 as well as the usual enforcement rent plus any variable monitoring. Higher handling fees naturally reduce the attainable scale (according to $\mathrm{d}I/\mathrm{d}c_0 = 1/(\overline{\pi} zf'(I) - \gamma) < 0$) and establish minimum loan sizes $I^{\min}_{z'}$ which can easily exclude asset poor and less able borrowers.

3. Financial intermediaries and delegated monitoring

Despite the attention microfinance has received in recent years, it is estimated that today's MFOs reach perhaps no more than 1% of the world's poorest household's (Rosenberg, 1994). If better access to financial services is to become an important avenue for raising the incomes and welfare of the poor, then the only way that MFOs will ever be able to make a significant and lasting dent on world poverty is for the sector to vastly increase its *scale* of operations. To many observers the only way to generate financing on such a truly massive scale is by borrowing on private capital markets, and/or via massive new savings mobilization (Rhyne and Otero, 1992; Otero and Rhyne, 1994; Rosenberg, 1994; Schneider, 1997; Rhyne, 1998).

Delegated monitoring is important to microfinance lending for several reasons. In many ways the key to the sector's success has rested on finding new cost-effective lending modalities and intermediary structures to better harness local information and enforcement mechanisms. This has included, but is by no means limited to using peer-monitors in group-loan arrangements. A cursory glance at the empirical record suggests a wide variety of alternative intermediary structures used in practice for different target groups. Section 3.1 explores how the mechanisms and costs of providing incentives to delegated monitors within the MFO might be best adapted to provide incentives to delegates to monitor different target groups, and how this might modify the policy tradeoffs identified above.

A focus on delegated monitoring also provides a lens for understanding the question of maximum leverage. When MFOs borrow on commercial capital markets, the MFO owners, managers and staff in effect become delegated monitors on behalf of outside investors. They too need incentives to protect the value of the loan portfolios they monitor. Section 1 explores this issue, suggesting some reasons for questioning the conventional wisdom that more profitable MFOs will in practice become more highly leveraged.

3.1. Delegation costs inside the MFO: staff salaries and incentives

Consider first the costs of contracting with delegated staff monitors within a non-leveraged MFO. The analysis will extend easily to an MFO that wants to obtain outside funding. Project returns x_i from each financed project are now divided between returns to the borrower s_i, repayments R_i to the microfinance equity holders (assumed for now to be management) and state-contingent compensation w_i to MFO staff who act as delegated monitors for equity owners. The returns to the delegated monitor can be thought of as performance-contingent remuneration (e.g., base salary plus bonuses).

Property claims add up such that $x_i = s_i + w_i + R_i$. There are two nested moral hazard problems now since both the entrepreneur's and the delegates actions

cannot be observed by the MFO owners. The hired staff must be given proper incentives to diligently monitor the entrepreneurs in such a way that the entrepreneurs in turn have the right incentives to diligently work on their projects and generate the ability to repay their loans.

The entrepreneur $\boldsymbol{v} = (z, K, A)$ is still subject to the same incentive compatibility and limited liability conditions as before. Now, however, financial contracts must satisfy an additional incentive compatibility constraint for the delegated monitor:

$$\overline{\pi} w_s + (1 - \overline{\pi}) w_f - c \geq \underline{\pi} w_s + (1 - \underline{\pi}) w_f$$

Noting that $\Delta\pi = (\overline{\pi} - \underline{\pi})$ this can be rearranged to yield:

$$w_s - w_f \geq \frac{c}{\Delta\pi} \tag{8}$$

The constraint states that in order to have an incentive to carry out the optimal level of monitoring c (just enough to make the entrepreneur act diligently) the delegate must expect to earn at least as much from monitoring as from not monitoring. For this to happen, the delegate must have a large enough stake in the borrower's project to expect to earn a reward when the entrepreneur succeeds and to lose something when the project fails.

A hired staff member typically would not be assumed to post bond or collateral to commit herself to conducting the monitoring activity on behalf of the MFO. The staff member is therefore also assumed to face a limited liability constraint of the form $w_f \geq 0$. [17] Incentives to monitor have to therefore be provided via performance bonuses paid each time a borrower's project succeeds. The case study literature seems quite clear that bonus pay constitutes the main part of staff remuneration in the more successful MFOs and such schemes are frequently placed well at the top of ''best practice'' guides (Christen and McDonald, 1997; Microfinance Network, 1998). Evidence discussed below also suggests that such schemes are more prevalent for poorer target groups.

If staff pay is to be kept at the minimum level consistent with providing incentives then w_s will be raised only so high as is just required for the incentive compatibility constraint to bind exactly. From Eq. (8) this means that $w_s = c/\Delta\pi$ and the staff member's minimum expected pay for diligently monitoring each borrower is $\overline{\pi}\frac{c}{\Delta\pi}$. This minimum delegation cost is exactly analogous to the enforcement rent that the borrower had to receive to have incentives in his production activity. For the lending operation to be sustainable the returns from the borrower's project must now not only cover the lender's opportunity cost of

[17] Or $w_i \geq W$ where W is a minimum wage payment.

funds and the borrower's own enforcement rent, but also the minimum payment to the hired staff monitor:

$$\begin{aligned}&(\text{Net Project Returns}) \geq (\text{Borrower Enforcement Rent})\\ &\qquad + (\text{Delegation Enforcement Rent}) + (\text{Fixed Costs})\\ &\overline{\pi}zf(I) - \gamma I \geq \left(\frac{\overline{\pi}}{\Delta\pi}B(c)(I-K) - A\right) + \overline{\pi}\frac{c}{\Delta\pi} + c_0 \qquad (9)\\ &\overline{\pi}zf(I) - \gamma I \geq \Gamma^{D}(I;K,A,c)\end{aligned}$$

Comparing this expression to Eq. (7), and noting that $\overline{\pi}\frac{c}{\Delta\pi} > c$ holds as long as $\pi > 0$, the added cost of providing staff incentives has reduced the feasible set of financial contracts. A constrained borrower with cash K and collateral A now attains a smaller investment scale for any given level of monitoring, or equivalently, he must now pay a higher implicit interest rate to attain a given investment scale. As before lending costs per dollar loaned are higher for MFOs that lend to the poorer segments of the borrowing population, but the marginal cost of extending outreach and impact is now higher.

The costs of delegation seem inevitable. Several things might help lower the costs of delegated monitoring, however. As discussed below, using borrowers as peer-monitors can be one avenue for economizing on delegation costs, but the analysis also shows the effect is limited and will benefit only certain segments of the borrowing population. Non-pecuniary sanctions such as the threat of firing, demotions or ostracism for having a bad portfolio compared to other staff (relative performance monitoring) are of course also options, but these too are only imperfect and costly substitutes.

In a seminal paper Diamond (1984) argued that delegation costs can be diminished via diversification. Although Diamond's context was somewhat different, the intuition can be adapted to argue that the more diversified are the project returns in a MFO staff member's portfolio of borrowers, the lower the delegation rents. This argument lends strength to the idea that scale and diversification are important for lowering costs, as the institutionists have argued, except that the reasons are different. The fact that the bonus component of staff salaries is very high for many of the more successful MFOs — staff typically can as much as double or triple their base salary by meeting performance targets — suggests, however, that the effect may be limited in practice. Even if delegation costs could be completely eliminated via diversification, the direct monitoring costs and all the tradeoffs established earlier would remain.

3.2. Maximum leverage

The analysis of a financial intermediary is very similar to the analysis of a hired staff member for an MFO. Suppose the parties to the contract are now the borrowers, the MFO management, and outside investors. Hired staff are removed from the analysis to keep things simple, but it is straightforward to add them back.

Project returns are now to be divided between returns to the borrower s_i, repayments R_i to outside investors and the return w_i to MFO management who act both as delegated monitors and as lenders-cum-equity holders. The key difference in the analysis of MFO managers as delegated monitors compared to hired staff is that while hired staff could not be assumed to have resources to post as bond or collateral. MFO owner/managers can use their equity to establish a stake in the borrower's project. Formally, this is equivalent to assuming that the limited liability constraint $w_f \geq 0$ has been removed — the MFO/monitor can commit to losing money when the project fails.

A useful way to think about the problem is to think of the borrower's loan as made up of two parts. One part of the loan, L^{m}, is the part that comes out of the microfinance lender's own equity or capital. The other part are funds L^{u} that uninformed financing sources put at risk. The two components must add up to the total loan: $(I-K)=L^{\mathrm{m}}+L^{\mathrm{u}}$ and the *leverage ratio* is $L^{\mathrm{u}}/L^{\mathrm{m}}$.

When the borrower's project fails the monitoring lender is assumed to lose the full opportunity cost of her investment or $w_f=-\gamma L^{\mathrm{m}}$. To have proper incentives to monitor constraint (8) must be met, from which it follows that $w_s=-\gamma L^{\mathrm{m}}+\frac{c}{\Delta\pi}$, or larger. Under the maintained assumption that the market for microfinance is competitive, the MFO earns zero economic profits, or $E(w|\overline{\pi})=-\gamma L^{\mathrm{m}}+\overline{\pi}\frac{c}{\Delta\pi}=0$. To have incentives to monitor at optimum intensity c, the financial intermediary's own investment L^{m} must therefore satisfy:

$$\gamma L^{\mathrm{m}}=\overline{\pi}\frac{c}{\Delta\pi}-c \tag{10}$$

This means that the financial intermediary's *minimum stake in the borrower's project* I^{m} is increasing in the required level of monitoring c. It immediately follows that microfinance lenders that specialize in serving poorer borrowers — borrowers who require more heavily monitored credit — will be able to leverage *less* from depositors and outside sources.

The intuition is straightforward. Lending to the poor requires a lot of costly monitoring and this establishes scope for moral hazard on the part of the MFO monitor. The outside investor will be prepared to put her own money at risk only once she has made sure that the delegated monitor has enough of her own capital L^{m} involved.

Note that unlike the analysis with hired staff, adding an incentive constraint for the delegated monitor has not affected the borrower's cost of borrowing. This can be seen from Eq. (10) which makes clear that the amount of equity that the investor puts at stake is exactly equal to the monitors delegation costs. [18]

[18] The MFO adopts a large enough stake L^{m} in the borrower's project to wipe out any delegation cost associated with monitoring. The value of the borrowers enforcement rent plus monitoring costs is thus again as in Eq. (7) so the terms of loan access are the same.

Note that there may come a point where the loan equity stake L^m required of the MFO rises as high as the borrower's entire demand for credit $(I-K)$. Further monitoring may still be useful, but zero outside funds can be leveraged, so the MFO has been forced to become de-facto a direct lender who depends on own equity and donor gifts. A great majority of MFO lenders would seem to find themselves in these circumstances.

3.3. Peer monitored loans

Much of the buzz and excitement that has surrounded discussions of microfinance has been due in part to the public's fascination with solidarity group lending, or joint-liability loans. The framework and many of the results of the previous sections readily extend to include peer-monitored loans. Due to space considerations the discussion is condensed. A more detailed analysis can be found in Conning (1996). [19]

In a peer-monitored loan contract each borrower must be provided with incentives to act diligently in two capacities: as a producer on a financed production project and as a delegated monitor. Since both choices are subject to moral hazard, the structure of the problem is a multi-task principal-multi agent problem (Holmstrom and Milgrom, 1991).

For the purposes of this section, I focus on symmetric two-member group loan contracts and assume that production returns are independent. Let s_{ij} denote the return left to borrower one after outcome x_i^1 is observed on his own project and outcome x_i^2 on his partner's project. Since there are now four possible joint outcomes, the return schedule for each borrower is given by $\{s_{ss}, s_{sf}, s_{fs}, s_{ff}\}$.

The function $B(c)$ now describes how monitoring by one group member might lower the private benefit that distracts effort and attention of the other borrower in the group, and vice-versa. To facilitate comparison to the individual liability loans considered thus far, it is assumed that the same monitoring technology is available to an outside MFO or its delegated monitor. In the peer-group context, c might measure the amount of extra time and resources group members devote to attending group meetings, hiring a group supervisor, pressuring each other to behave responsibly, etc.

The assumed timing of the game is as follows. First a contract is chosen. Given these terms, borrowers then play a simultaneous game in monitoring intensities, followed by a simultaneous game in the level of diligence to be exerted on their respective projects. An optimal contract, if it exists, induces diligent effort at minimum cost as a subgame-perfect Nash equilibrium to this sequential game.

The logic of joint-liability clauses is revealed very starkly for the case of risk neutral borrowers. As explained in more detail elsewhere the optimal way to

[19] See also Madajewicz (1997) for a related treatment.

provide incentives to both activities is a joint-liability contract that heavily rewards both borrowers when both projects succeed but makes borrowers assume maximum liability (make repayment $x_i + A$) when either projects fails (Innes, 1990; Conning, 1996). Rewarding the joint outcome success–success in effect works double time by helping to satisfy both the incentive constraint to borrowers as producers and as monitors as well. To see this, note that a candidate contract must implement diligence as a Nash equilibrium to the subgame in production activities, so the following condition must be met in equilibrium:

$$\bar{\pi}\bar{\pi}s_{ss} - (1 - \bar{\pi}\bar{\pi})A - c \geq \underline{\pi}\bar{\pi}s_{ss} - (1 - \underline{\pi}\bar{\pi})A + B(c)(I - K) - c \tag{11}$$

This condition requires that each borrower expect to earn at least as much from being diligent than non-diligent, when the other borrower is being diligent and each is monitoring the other at the optimal intensity c chosen in the first stage game in monitoring intensities. Rearranging Eq. (11) to solve for s_{ss} yields: $s_{ss} = -A + B(c)(I - K)/\bar{\pi}\Delta\pi$. Applying the logic of making borrowers assume full liability for any outcome in which either they or their partner fails, $s_{sf} = s_{fs} = s_{ff} = -A$. In similar manner to the procedure used to arrive at Eq. (6), we find that the enforcement rent, or minimum expected return that must be left with each borrower if limited liability and diligence incentives are to be met, is $E(s_{ij}|\bar{\pi},\bar{\pi}) = \bar{\pi}B(c)(I - K)/\Delta\pi - A$. This is exactly the amount we found in Eq. (6) for the individual loan contract. Substituting this into the lender's participation constraint we arrive at a modified version of Eq. (7):

$$\bar{\pi}zf(I) - \gamma I \geq \left(\frac{\bar{\pi}}{\Delta\pi}B(c)(I - K) - A - \gamma K\right) + c_0$$

$$\bar{\pi}zf(I) - \gamma I \geq \Gamma^{G}(I;K,A,c)$$

The key difference between this expressions and Eq. (7) is the absence of a monitoring cost $-c$ on the right hand side. Recall that in an individual monitored lending contract each borrower must credibly commit to making repayments to cover not only the lender's opportunity cost of funds but also the costs of any monitoring (and delegation) costs borne by the MFO. In a group contract by contrast monitoring is done within the group and borrowers must only pledge to cover the lenders' opportunity cost of funds — incentives to do monitoring are provided by the same contract terms that reward diligence.

For the same monitoring technology $B(c)$, peer-monitored joint liability contracts would therefore appear to offer a decided advantage over other types of monitored lending, since $\Gamma^{G}(I;K,A,c) < \Gamma(I;K,A,c) < \Gamma^{D}(I;K,A,c)$ for all c, where Γ and Γ^{D} are respectively the enforcement rent plus delegation and monitoring costs associated with non-delegated and delegated monitoring. Why then are group loans not more ubiquitous?

The answer lies partly in the fact that lenders must guard against collusion between borrowers, and this concern places an additional constraint on the problem that limits the amount of monitoring that can be employed. As argued in more detail in Conning (1996), the lender must guard against the possibility that peer-monitoring expense within the group rise so high as to lead the borrowers to decide to collude to accept the contract but then default with higher probability by choosing zero monitoring and no diligence. To guard against this possibility, an optimal contract must satisfy the following no-collusion constraint:

$$E\left(s_{ij}|\bar{\pi},\bar{\pi}\right) - c \geq E\left(s_{ij}|\underline{\pi},\underline{\pi}\right) + B(0)$$

$$\bar{\pi}B(c)(I-K)/\Delta\pi - A - c \geq \underline{\pi}^2 B(c)(I-K)/\bar{\pi}\Delta\pi - A + B(0)$$

$$\left((\bar{\pi}+\underline{\pi})/\bar{\pi}\right)B(c) \geq B(0) + c$$

This expression will always be met for $c = 0$, but it is clear that there will be an upper limit on the level of monitoring, beyond which the inequality is reversed and borrowers prefer to collude at the expense of the lender. The conclusion is that peer-monitored loans will be preferred over individual monitored loans for small loan sizes, but if the borrower remains credit constrained at the maximum loan size available under group lending he will switch or ''graduate'' to a more expensive individual monitored loans. Evidence appears to support this conclusion: borrowers do tend to graduate from group loans to individual loans to reach larger scales. It is also the case that even MFOs such as the Grameen Bank that delegate many important monitoring tasks to peer-groups, also rely on hired staff to monitor the groups (Fuglesang et al., 1993). A hybrid variety of the model to capture this possibility would be quite straightforward.

4. Empirical evidence

How well do the model predictions fit the growing record of actual MFO performance? It is difficult to find quality statistics on the matter since MFOs now span the globe and operate in such a range of different circumstances that comparisons become difficult. The best available data on comparative MFO lending statistics is collected in the *Microbanking Bulletin*, a semi-annual bulletin published in 1998 by the Economics Institute, and ''dedicated to the financial performance of organizations that provide banking services for the poor.'' The July 1998 bulletin presents comparative statistics on 72 participating organizations from around the world. The list includes large Asian MFOs such as Indonesia's BRI and BKD units, Thailand's BAAC cooperatives, the much celebrated BancoSol and other Bolivian MFOs, as well as many FINCA village banks. It does not include data on Grameen Bank.

The compilers of the bulletin point out the sample over-represents the ''stronger'' or most financially sustainable or near-sustainable programs in the field, since these are the programs that are more likely to self-report their performance results. This actually turns out to be convenient in some ways for our purposes because the main implications of the paper were derived for MFOs subject to a sustainability or break even constraint.

Table 1 provides a summary of several of the indicators presented in the bulletin arranged by target group and lending methodology. Target group cutoffs are defined primarily by the size of the average loan size as a percent of GNP per capita. [20] Low-end MFOs reach populations with loans that are on average less than 20% of GNP per capita, High-end MFOs reach populations with loans that are on average greater than 85% of GNP per capita, and ''Broad based'' MFOs are in between these two categories. Of the 72 lending programs examined, the bulletin editors deemed only 34 to be fully financially self-sufficient in the sense that operating income is covering operating expenses, including ''the cost of maintaining the value of equity, and adjustments that fully account for subsidies received and the appropriate write-offs for non-recoverable loans (p. 18).'' However, many more programs were judged to be ''operationally self-sufficient'' by the lower hurdle that cash operating income was enough to cover cash operating expense. The exact number of MFOs in this category is not reported.

Imperfect as this data is, the table provides some clear confirming patterns for many of the predictions made about interest rates, salary expenses, and leverage made in this paper. Consider first staff *expense per average loan* (column 3 in the table). Even though the low-end MFOs appear on average to be as self-sufficient as high-end MFOs, their staff costs per dollar loaned are more than three times higher (30 cents per dollar loaned vs. 9 cents). As expected, the broad target group lies somewhere in between (16 cents per dollar loaned). Without further empirical work it is impossible to say whether these high average costs are due to fixed costs vs. variable agency costs. Ample anecdotal evidence exists however, to suggest that low-end MFOs are much more likely to employ high-powered incentives and use heavy monitoring than broad and high end MFOs (Stearns, 1993). It seems plausible to speculate therefore that a significant portion of these high costs are due to variable monitoring and delegation costs.

The evidence on *interest rates* is also broadly consistent with the model predictions. Consider the average interest rate charged of borrowers, as proxied by portfolio yield or total interest income from the portfolio divided by the size of the portfolio. Low-end and Broad-based MFOs are reported as charging interest rates (around 40%) that are on average nearly twice as high as the High-end target

[20] This is clearly a very imperfect proxy for client poverty, but was the only proxy available for this data.

Table 1
Comparative MFO performance by target group (figures reported in US$ or in percent)
Source: The Microbanking Bulletin, Issue No. 2, July, 1998. Tables 1–14.
''Low End Target Group'': MFOs whose average loan balance is less than US$150 or whose average loan balance is less than 20% of GNP per capita. ''Broad Target Group'': average loan balance between 20% and 85% of GNP per capita, and ''High End Group'': average loan balance is greater than 85% of GNP per capita.

	n	Average loan balance		Salary expense	Operational self-sufficiency	Financial self-sufficiency	''Market'' based funding	Capital/assets	Adj. return on equity	Portfolio yield	Portfolio at risk
		In US$	As % of GNP per capita	Staff expense/avg loan portfolio	Operating income/operating expense	Adj. operating income/operating expense	Market price' liabilities/avg loan portfolio	Total capital/total assets	Adj. net operating income/avg equity	Total interest income portfolio/avg loan portfolio	>90 days overdue/avg loan portfolio
All MFIs	72	415.0	34.3	21.1	105.1	83.0	36.2	58.2	−8.5	39.1	3.3
Target group											
Low End	37	74.4	13.4	29.5	88.0	71.7	27.5	64.9	−16.2	41.3	3.8
Broad	28	60.1	47.9	16.5	121.6	99.8	49.3	43.7	1.2	41.4	3.0
High End	7	34.0	258.7	9.2	120.5	75.7	12.7	77.4	−6.2	20.7	1.9
Methodology											
Individual	30	842.0	76.2	12.7	120.1	91.8	47.4	48.2	−5.0	34.6	3.1
Group	20	451.0	35.0	26.2	103.2	89.2	36.0	51.3	−3.0	40.8	4.1
Village	22	94.0	11.4	33.6	90.5	69.0	5.2	75.2	−17.4	45.3	2.8
Fin. Self-Sufficient	34	428.0	39.3	15.9	139.3	112.5	37.3	45.7	9.3	24.8	2.6

group lenders, as they should be if these MFOs are trying to recover their higher lending costs from lending to poorer target groups.

Some of the most interesting evidence is on leverage. The Bulletin editors highlight that ''fully financially self-sufficient peer groups generate return on assets well above that earned by commercial banks in developing countries.'' They go on to point out, however, that these MFOs generate lower return on equity compared to commercial banks in developing countries, a fact which they explain as being ''due to their very low levels of leverage (Christen and McDonald, 1998, p. 15).'' They don't indicate why leverage has remained low, despite the fact that many MFOs would appear to be highly profitable.

Two indicators of leverage are the proportion of ''market'' priced liabilities over the average loan portfolio, which is meant to capture the amount of commercial borrowing by MFOs, and the ratio of capital (equity) to total assets which measures leverage. The evidence is somewhat more mixed here. As the model would predict, low-end MFOs are less leveraged than broad-end lenders, as summarized by lower capital-asset ratios (65% vs. 44%). However, high end lenders in this sample are on average less leveraged than either group by this measure (77%). Amongst the 34 fully financially self-sufficient MFOs, the ratio is 46%. This means that for approximately every US$100 of loan assets, the MFO has 46 dollars of equity. Compare this to a regulated commercial bank which by the Basle accord on capital adequacy standards requires banks to have as little as US$8 of equity for every US$100 or risk-weighted assets. Broad-based MFOs use a higher proportion of market based funding than low-end MFOs — 49% vs. 28% — but high-end MFOs in the sample again break the pattern by using only 13%.

The experience of the US banking sector offers some further useful lessons about the limits of leverage in monitored loan markets. Since 1970 a securitization revolution has swept through the markets for new homes, auto loans, and credit card receivables. Today nearly 45% of total residential debt outstanding is securitized. Yet scarcely one-half of 1% of loans of the estimated US$155 billion market for small business loans has ever been securitized, despite the existence of substantial government guarantees and incentives. The reason seems quite evident: small business loans are information intensive loans whose value would be greatly diminished if banks tried to sell them to less informed outsiders. Feldman (1995) offers persuasive support for this interpretation.

5. Conclusion

The analysis of this paper may come as somewhat unpleasant news for those who like to believe that the microfinance sector is on the cusp of a period of explosive growth fueled by increased leverage and commercial borrowing. I have *not* argued that lending poor segments of the population cannot become a

self-sustaining proposition nor that the sector cannot or should not grow. I have in fact imposed sustainability as a condition for most of the MFOs considered in the analysis: MFOs that reached the poor where able to preserve the value of their equity base. I have simply argued that reaching the poorest of the poor is more costly than reaching other segments of the market even when there are no fixed lending costs, and that leverage may be much harder to achieve for MFOs that target the ''low-end'' of the market. This seems to be a reality amply held to be true by most practitioners but that donors and policymakers have, as of late, been reluctant to accept.

This is not to deny the importance of leverage. The institutionists are correct that microfinance will never amount to more than a drop in the bucket of poverty alleviation efforts unless vastly larger sums of money can be mobilized from private sources. But, are higher profits a sufficient condition for greater leverage? The paper suggests one important reason to suspect not: because heavily monitored debt cannot be easily sold or leveraged. Sustainability is surely not even a necessary condition for achieving leverage. Subsidized Grameen Bank can and does borrow on a commercial basis, as do a large number of other MFOs that are not yet fully sustainable (Christen and McDonald, 1998). What outside lenders surely care about are credibly and hard budgets pledged cashflows, and not profits.

The next interesting question is whether policy can help increase leverage. Properly designed loan guarantee funds, regulatory and supervisory frameworks adapted to microfinance banking, and creative contracting may offer some hope, but also pose obvious risks and costs of their own, for many of the same reasons considered in this paper. This is still an imperfectly understood area.

A natural next direction to take this analysis is toward the further development of a framework within which to evaluate the social benefits and costs of donor-sponsored interventions that takes the identified tradeoffs between outreach, impact, sustainability and leverage. In recent years donors and policymakers have been increasingly using sustainability indexes as one of the most heavily weighted factors upon which further access to donor capital is conditioned. This has spawned a mini cottage industry of subsidy dependence indexes, or SDIs (Morduch, 1997; Yaron et al., 1997; Schreiner, 1998). Impact measures have of course also been considered in allocating donor funds but the weight of official opinion seems to have steadily shifted toward valuing sustainability over outreach and impact (toward Bancosols and away from Grameens), largely on the reasoning that sustainability today will mean more leverage, outreach and impact tomorrow.

Given the huge level of resources being pledged to microfinance support it seems important to develop better frameworks within which to measure ''performance'' and ''impact'' of funding and interventions. It seems especially important to develop measures that properly take into account the question of contract design and incentives, which appear to be the very defining characteristic of the sector. The framework of this paper is one small step in that direction, but very much still remains to be explored.

Acknowledgements

The author would like to thank Roger Bolton, Gabriel Fuentes, Claudio Gonzalez-Vega, Tim Guinnane, Jonathan Morduch, Sergio Navajas, Ashok Rai, Mark Schreiner and two anonymous referees for useful comments and discussion. I was stimulated to write a first draft of this paper while visiting The Ohio State University's Rural Finance Program in the summer of 1998.

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