

From Group Lending to Lending by a Group*

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Abstract

Theoretical models of microcredit have focused on single lender settings with monopolistic MFIs. In practice however, multiple banking relationships are ubiquitous. In this paper we develop a theoretical model with multiple players on the supply side of microcredit to explain the workings of modern microcredit industry.

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By now it is clear that microcredit works in practice and the role of academics is now to understand why microcredit works in theory

Professor Robert Townsend, University of Chicago, 2005

1. Introduction

Extensive empirical evidence suggests that multiple banking relationships are ubiquitous. This is true both geographically and across the spectrum of firm sizes. Over 80 percent of firms obtain capital from multiple financial institutions in Europe (Ongena and Smith (2000)) and the United States (Petersen and Rajan (1994)). Studies by Detragiache et al. (2000) and Farinha and Santos (2002) observe multiplicity of lenders for small and medium-sized firms as well. Even in the microenterprise setting, Neuberger and R athke (2009) report evidence of multiplicity of financiers based on a survey of microentrepreneurs in Germany.

However, theoretical models of microcredit have traditionally considered only one service supplier: a specialized microfinance institution, MFI, equipped to assess the creditworthiness of the borrower without collateralization or sufficient credit history. Such setting may have been appropriate for traditional microcredit schemes, particularly in the developing countries of the South, while, at present, especially in the developed countries of the North, arrangements employed in delivering microcredit services are more complex. For example, in France, microcredit is being offered in syndication by the local governmental agencies, commercial banks and specialized microfinance institutions at the same time. A good example is specialized microfinance institution Adie which offers microcredit in alliance with the local governments. Another notable example is Fondes that facilitates microcredit by issuing guarantees on the loans extended by commercial banks.

This paper develops a theoretical model, within the framework of incentive

theory, of microcredit with multiple financial institutions to offer an explanation for the complexity of microcredit services in the developed economies. In contrast to much of the theoretical literature that has focused on the absence of collateral, we allow for some but insufficient collateral. Microcredit in our model can be partially collateralized because of better developed market infrastructure and better verifiability of information. We argue that syndication of capital by a specialized MFI and a traditional financial institution constitutes pareto improvement for all participating lenders seeking to offer microcredit services as opposed to a single MFI as presumed in most of the theoretical literature on microcredit. The specialized MFI here acts as a lead lender with extensive monitoring functions and the traditional financial institution can be a public donor with social goals or a profit-seeking financial institution like a traditional bank. We analyze a model where a specialized MFI has informational advantage in offering microcredit services over non-specialized financial institutions. The assumptions of our model are consistent with how the problem of financing small entrepreneurs is being addressed in reality. Our paper contributes to the growing literature on microfinance in particular and financing under asymmetric information in general.

Asymmetric information in financing micro-entrepreneurs, assetless individuals with access to primitive low-tech production technologies, is the driving force of repayment problems¹. Theoretical literature on financing under asymmetric information offers a number of solutions. *Collateral* mitigates information problems by affecting the borrower's incentives to exert effort, for example via a threat to seize the collateral in case of default (Boot and Thakor (1994)). Also, it can serve as a screening mechanism (Bester (1985)) given that borrowers possess full

¹Theory suggests equity financing for high-growth ventures (i.e., classic startups) and debt financing for lifestyle ventures (e.g., restaurants, hair salons, etc.). See for example de Bettignies (2008).

information about their type. In that case, good borrowers who are very likely to succeed will pledge collateral because of low probability that it will be seized by the lender. At the same time, collateral in excess of the minimum level that is sufficient to resolve information problems to can be socially suboptimal because with too much collateral the lender can be tempted to finance negative NPV projects for predatory motives (Bond, Musto and Yilmaz (2005)). In the absence of sufficient collateral, financiers can specify contractual conditions which will serve as imperfect signals of the likelihood of due repayment of the loan. Such conditions are called *covenants*. They enable the investor to create a credible threat of punishment in the case of unacceptable progress (Rajan and Winton (1995)) to resolve post-contractual moral hazard. If the investor has no access to a marketable collateral and faces restrictions in the use of covenants, perhaps due to the regulatory frameworks, she can resort to financing projects (borrowers) about which (whom) she has *superior information*, which can be obtained by research or personal experience (De Meza and Southey (1996), Garmaise 2007). In the opposite cases where borrowers possess superior information, a widely discussed tool is *relationship lending* under which investors form long term relationships with their borrowers in order to extract information from them and thus reduce its asymmetry (Petersen and Rajan (1994)).

The latter two are especially relevant to microcredit theory, where collateralization of debt is assumed to be unavaliabe or insufficient (see Armendariz and Morduch (2005) for an extensive survey of these issues). The success of microcredit is largely attributed to innovative contractual agreements such as joint-liability lending, dynamic incentive schemes and mobilization of self-help groups. However, Fischer (2008) argues that the structure of existing microfinance contracts may discourage risky but high-expected return investments and produce a tension between mechanisms that tend to reduce risk-taking, such as peer monitoring,

and those that tend to encourage risk-taking, such as risk-pooling. Additionally, venture-capital type equity financing of small entrepreneurs emerged largely as a response for the failure of many microcredit programs to meet the full needs of their clients. But in this paper we focus on debt contracts, which often require active involvement of microloan officers due to absence or insufficiency of collateralizable physical assets, who have to resort to more flexible appraisal criteria. Often it implies significant use of soft information that is difficult to quantify and subject to heavy subjectivity². A celebrated example is the Nobel Prize winning Grameen Bank³ where microloan officers meet with the borrowers on a weekly basis to review loan applications, collect repayments and discuss the borrowers social conduct. The most recognized roles of such microloan officers include the collection of information on the repayment quality of the potential borrowers, the monitoring of the existing ones, and also the provision of entrepreneurial advice. Thus, specialized microcredit institutions have advantage in offering microcredit services over traditional financial institutions such as banks.

In our model, the MFI offers a contract to a non-specialized bank and by bringing it in to participate in microcredit, the MFI is able to ease its budget constraints. Additionally by taking on junior debt, the MFI is able to increase the interest rate earned on microcredit by lending to the same types of borrowers. The resulting increase in the MFI's profit can be attributed to the value of its superior information and monitoring abilities. We consider the case where the MFI is able to screen out good micro-entrepreneurs and the problem facing the lenders is that of moral hazard.

From the bank's standpoint, the questions raised in the paper is: Why should the bank accept the contract offered by the MFI to finance microentrepreneurs

²See Petersen (2004) for the discussion of soft vs. hard types of information.

³See Hulme (2008) for the history of Grameen bank.

rather than offer microcredit directly? How the participation of a specialized MFI reduces the credit default risk for the bank? We show that by teaming up with the MFI the bank is able to efficiently outsource monitoring tasks by taking on senior debt and letting the MFI take on a junior debt. The bank with access to significant financial capital gains private benefits by lending to poor but lacks technical expertise in mitigating asymmetric information. The bank's private benefits may come from a potential leverage in their public relations, lower taxes set by a regulator to financial institutions involved in social projects, etc.

This paper provides a theory for the syndicated microcredit. We argue that syndication of capital by multiple non-homogenous lenders constitutes pareto improvement for all participating lenders seeking to offer microcredit services as opposed to a single MFI as presumed in most of the theoretical literature on microcredit. We also show that the optimal contract implies a specialized MFI holding junior debt and non-specialized financial institution holding senior debt. We analyze a model where a specialized MFI has informational advantage in offering microcredit services over non-specialized financial institutions. The latter can be a public donor with social goals or a profit-seeking financial institution like a traditional bank. Although we discuss certain types of players in terms of the financial inputs they provide to microcredit operations, in reality participation in microcredit goes beyond simple provision of capital. For example, there are institutions that participate by providing their expertise (Micromentor⁴ in the US) or loan guarantees (Fondes in France). Underlying theory for microcredit with third-party guarantees is related to the models with co-signed loans, where a group of borrowers is formed with each member taking out a loan but only some being liable for the loans of their partners. Such arrangement can enable to implement

⁴www.micromentor.org

the full information outcome (Bond and Rai (2008), Gangopadhyay and Lensink (2009)).

In a broader perspective, our paper is related to the finance literature with multiple lenders and contract theory with multiple principals. It is closest in nature to Rajan (1992), where two lenders differ in terms of access to information about the borrower and, consequently, cost of monitoring. However, in Rajan (1992) an assetless entrepreneur offers the contract to competing financiers and in our model it is the specialized lender, MFI, who offers a contract to a large institutional bank. Thus, we discuss the problem of an MFI and not an assetless borrower. Diamond (1984) argues that a multiple lender arrangement is inefficient for investors in terms of monitoring costs. Results of Petersen and Rajan (1995) imply that multiplicity of lenders can also be suboptimal for informationally opaque borrowers who could prefer to build a long-term relationship with and provide superior information to a single financier to avoid credit rationing. Theoretical results suggest that multiplicity of lenders can reduce the borrower's incentives for strategic default and serve as a signal of higher borrower quality (Bolton and Scharfstein (1996)). If one lender has constrained financing capacity multiplicity of lenders can increase financial discipline (Dewatripont and Maskin (1995)). The reverse prediction follows from Bannier (2007) and Carletti (2004). Bannier (2007) shows that a heterogeneous multiple bank relationship, where a housebank is combined with several arm's length lenders, is advantageous for financially distressed borrowers. It combines the advantage of a housebank to reduce the likelihood of an inefficient liquidation with the improvement of credit availability by arm's length lenders. Carletti (2004) analyzes how banks' monitoring incentives change with the number of banking relationships and how this affects firms' optimal borrowing choice. She shows that the attractiveness of two-bank lending is increasing in the cost of monitoring, the firm's private benefit and expected profitability.

The paper proceeds as follows: Section 2 develops the model to demonstrate superiority of multiple banking relationships in mitigating information problems in microcredit as opposed to a single lender arrangement. Section 3 discusses real-life cases as extensions of the model. Section 4 concludes the paper with suggestions for further theoretical research of this topic.

2. The Model

2.1. The Benchmark Case of a Single Provider

For ease of exposition let us start by discussing simple cases of microcredit delivery by a single firm: a social MFI and a commercial bank. This is consistent with the main body of theoretical literature on microfinance. In the later sections we will extend these models to incorporate multiplicity of providers.

2.1.1. Commercial Bank

Financing of an assetless entrepreneur by a lender with financial sustainability requirement in a one-period world with asymmetric information is a stylized model of corporate finance⁵. Consider a risk-neutral bank facing an assetless entrepreneur with a risky project that requires investment I at time $t = 0$ and generates random output \tilde{Y} at time $t = 1$. After launching the business, but prior to the realization of the output, the entrepreneur chooses to exert effort and work hard or not to do so. If she chooses to exert effort, then the output equals positive $Y > I$ with probability p_H and zero with probability $1 - p_H$. If she decides to shirk, then the project is successful, i.e. yields Y , with probability p_L and fails, yields zero output, with probability $1 - p_L$, such that $p_L < p_H$. The value of Y is perfectly

⁵See Tirole (2006) for extensive textbook treatment.

observable at time $t = 1$. When she does not exert effort, the entrepreneur gets private benefits B that cannot be consumed or extracted by other parties.

Let us assume that entrepreneurial misbehaviour, shirking, makes the expected social value of her business negative, while sufficient effort makes it positive:

$$\begin{cases} p_L Y + B - I < 0 \\ p_H Y - I > 0 \end{cases}$$

The commercial bank in our model is motivated to get into microcredit business out of social motivations. It does not seek profit maximization function but, without the loss of generality, we can assume that it gets private benefits in terms of reputation, its position in the corporate social responsibility scene, etc. However, it does require financial sustainability due to its budget constraint, so, in line with the literature, the lender's break-even condition holds⁶ and it chooses to finance project with positive social values. The bank offers debt contract to the entrepreneur subject to her incentive constraints to induce her to exert effort towards the successful outcome of her project. The microentrepreneur's incentive compatibility constraint is:

$$p_H (Y - Y_B) \geq p_L (Y - Y_B) + B$$

where Y_B is the value of the cash-flow that goes to payoff the microloan to the bank. If we denote $\Delta p = p_H - p_L$, this inequality simplifies to:

$$Y - \frac{B}{\Delta p} \geq Y_B$$

where the equality signifies the maximum level of debt that the lender can demand

⁶In literature break-even condition is usually motivated by perfect competition premise, meaning that lender's are competitive and can only earn zero profit.

to be repaid upon the completion of the entrepreneur's project. From the standpoint of the bank the borrower's project evolves as in Figure 1. In expectation, because the bank chooses to finance only socially viable projects, it gets:

$$p_H \left(Y - \frac{B}{\Delta p} \right) \geq I - A$$

The case of equality signifies maximum amount of loan that can be issued by the bank to a microentrepreneur, who is endowed with own assets A . At the same time, the minimum level of A required by such a bank, A^* , to offer financing is

$$A^* = I + p_H \frac{B}{\Delta \pi} - p_H Y$$

According to the bank's credit analysis, only entrepreneurs that can commit their own assets higher than this level will be inclined to exert sufficient effort in order to succeed in their projects. Thus, a commercial bank or a similar financial institution seeking financially sustainable enterprises will not serve entrepreneurs that are poorer than that. A bank aiming to serve the excluded entrepreneurs for the sake of corporate social responsibility would accept an arrangement where they can access poorer individuals.

INSERT FIGURE 1 ABOUT HERE!

2.1.2. Socially oriented MFI

Consider a socially oriented MFI endowed with financial capital, K , that it can use to offer microcredit services to the poor, and a community of poor entrepreneurs excluded from the mainstream financial services. Financial exclusion of

these entrepreneurs grants their lenders bargaining power. Thus, contrary to the traditional approach to entrepreneurial finance where the entrepreneur offers the contract to the lender⁷, in this case it is the financier who offers financial contracts to the entrepreneurs. For now we ignore the screening and monitoring functions of the MFI and focus on its social objective.

Assume that the MFI sells microcredit contracts of a fixed size, $I - A$. For simplicity, let us assume that entrepreneurs, potential borrowers, are heterogenous in terms of their asset endowments, A , and capital requirements of the projects they are facing, I . Information problems play less important role for such an MFI than for a commercial bank discussed above because even in the case of non-repayment of the loan the MFI gets private benefits for financing the poor excluded from the mainstream financial services. A natural optimization problem for a socially oriented MFI is outreach maximization subject to a budget constraint⁸:

$$\max N(I, K) \quad s.t. \quad N(I - A) \leq K$$

where N is the number of microloans to be offered. In the absence of transaction costs and monotonicity of the MFI's objective function this problem yields a boundary solution, although in practice, the implementation may require sufficiently large population of potential borrowers. That is the MFI will use up all of its resources to extend microloans. Therefore the MFI faces limited production capacity and cannot offer more than a number of contracts \bar{N} .

Clearly if the decision variable were the size of the loan this optimization problem would be identical to the case where the MFI chooses to offer loans in

⁷Give some background info and references here! For example: venture capitalists compete for entrepreneurs.

⁸See Armendariz and Szafarz (2009) for a simple and thought-provoking theoretical discussion.

smallest possible amounts, i.e. solve $\min I - A$. Thus, any contractual arrangement designed to offer microcredit services involving the budget-constrained MFI that enables it to offer smaller loans satisfies the MFI's incentive constraints, meaning that the MFI would accept such arrangement. Thus, attraction of more capital is an important issue for MFIs, especially in light of the current financial crisis and the resulting credit crunch.

In the following we depart from homogeneity assumption in the wealth of microentrepreneurs, but it does not change the reasoning of the preceding discussion of a monopolistic MFI.

2.2. Microcredit by multiple providers

2.2.1. The Setup

Consider the case where two players simultaneously participate in the delivery of microcredit to the target community. Assume one is a traditional institution, such as a bank for example, and the other is a specialized firm with superior knowledge about the target community than the former. Suppose that the former offers can only offer loans based on hard information, indexed by HI , and the latter has capacity to process soft information, indexed by SI . The two players lend I_{HI} and I_{SI} to the microentrepreneur at time $t = 0$, where $I_{HI} + I_{SI} = I - A$, and ask to be repaid Y_{HI} and Y_{SI} respectively at the end. The following feasibility conditions are assumed to hold: $I_{HI} < Y_{HI}$ and $I_{SI} < Y_{SI}$. We also make the assumption that the cost of capital of such microentrepreneur is publicly known. We presume that both lenders are knowledgeable about project quality and implementation details. This is in line with literature on informed financing (Garmaise 2007). However, as was noted above, the two lenders in our model differ in terms of the level of informedness (with specialized financial institution having superior information in

comparison with the bank).

The problem here stems from the choice of the borrower's actions which is her private information. Thus, the cost of capital and, therefore, the interest rate that the lenders want to charge on their syndicated loan that is $(Y_{HI} + Y_{SI}) / (I_{HI} + I_{SI})$, is predetermined. What is allowed to be endogenously chosen is the four components of the loan: Y_{HI}, Y_{SI}, I_{HI} and I_{SI} . The bank's motivation to lend to the poor can come from social objectives: it can be used by the bank to position itself properly in the corporate social responsibility scene or perhaps, to seek more favorable taxation scheme by the government that could be pursuing the mainstream financial institutions to more actively support social programs. In any case the decision to be involved in financially sustainable micro-credit has already been made. The question under consideration is the contract design.

Between the times $t = 0$ and $t = 1$, say $t = 0, 5$, the value of the microentrepreneur's project can be observed by a soft-information lender. This value can take one of two values: Y_u or Y_d , where $Y_u > I - A > Y_d$. If the intermediary value of the project is Y_u , then at date $t = 1$ it yields Y_{uu} if successful or Y_{ud} if otherwise, such that $Y_{uu} > Y_u > Y_{ud}$. If the intermediary value of the project is Y_d , then at date $t = 1$ it yields Y_{ud} if successful or Y_{dd} if otherwise, such that $Y_{ud} > Y_d > Y_{dd}$. In state Y_{dd} , neither the bank nor the MFI are repaid. For simplicity we also assume that a lender receives either the full amount of the debt or nothing. That is residual claims rest with the microentrepreneur and she gets to keep whatever is left after full value of each individual debt claim is repaid. If the bank were to finance the microentrepreneur by itself, it would only be repaid the full amount of debt $Y_{HI} + Y_{SI}$ with probability $p_H + p_L$. and with probability $1 - p_H - p_L$ it would not be able to recover the loan. Nor would it be able to incentivize the borrower to exert effort. Also, in that case the problem would look

like a classical one-period moral hazard problem, where the principal only has access to collateralization to resolve the problem.

From the MFI's viewpoint, extensive professional capacity to deal with poor entrepreneurs and lack of financial capital to expand their operations to more excluded micro-entrepreneurs are taken as the motivational premises in our model. These two conditions serve as a serious impediment in the MFIs efforts to increase outreach as seen in the previous section. Therefore, the MFIs with superior knowledge about the target community leverage on their informational advantage by offering loan guarantees to the more traditional financial institutions that are willing to offer microloans to the poor. This is exactly what Fondes does in France. Guarantee by specialized institutions as Fondes often serve as a necessary condition to obtain the loan by microentrepreneurs. To mitigate the information problems such institutions with special knowledge about the target community resort to extensive monitoring and screening, both of which come at a cost.

Let us assume that monitoring enables the MFI to reduce the borrower's private benefits from shirking, B , and also increase the probabilities of success when the microentrepreneur exerts effort and shirks by θ_H and θ_L respectively. In reality, it is not unusual for MFIs offer the poor advice on how to run their businesses and to make intelligent decisions. For example, Karlan and Valdivia (2006) argue, based on empirical tests, that such practice leads to improved business results both for the microentrepreneurs, who generate higher revenues, and the MFIs, who have direct benefits through higher repayment and client retention rates.

We denote $\theta = \theta_H + \theta_L$, and by C we denote the MFI's cost of monitoring. We also denote the MFI's private benefits when at least the bank, the traditional institution, is repaid by Z . The value of Z can come in particular from future dealings with the bank. This is straightforward in infinite-horizon dynamic setting where the MFI and the bank have repeated transactions in offering microcredit.

The bank will have incentives to opt out from dealing with a given MFI if in the previous deal the bank was not repaid. Thus, repayment of the bank's part of the loan is in the interests of the MFI.

2.2.2. Microentrepreneur's incentives under monitoring

Microentrepreneur's actions are subject to monitoring by a soft-information lender only. Let us assume that the soft-information lender is MFI and the hard-information lender is bank. Microentrepreneur's behaviour can only be affected at time $t = 0, 5$ as we assume that prior to that her project evolves due to exogenous factors. If her project yields Y_{uu} at the end the borrower can pay off all of the debt $Y_B + Y_{MFI}$ and keep the rest, that is $Y_{uu} - Y_B - Y_{MFI}$. If her project yields Y_{ud} at the end the borrower can pay off only the bank's debt Y_B and keep the rest, that is $Y_{ud} - Y_B$. Also, we assume that the MFI prefers that at least the bank is repaid to the case of full default by the borrower. This could be for example due to a reputation effect that the MFI receives that reflects on its abilities to raise funds in the future. If her project yields Y_{dd} at the end the borrower cannot pay off any debt and gets to keep all of Y_{dd} . Interpretation of this can be that microcredit, in case of non-performance, does not allow the lenders to seize assets that are necessary for the borrower's basic living needs. In some countries, for example, pledging a house as a collateral is prohibited so that the poor borrowers do not become homeless as well, in case of default.

In state Y_u , the microentrepreneur's incentive compatibility constraint that needs to be satisfied in order to induce her to exert effort is

$$p_H (Y_{uu} - Y_B - Y_{MFI}) + (1 - p_H) (Y_{ud} - Y_B) \geq p_L (Y_{uu} - Y_B - Y_{MFI}) + (1 - p_L) (Y_{ud} - Y_B) + B$$

which simplifies to

$$\Delta p (Y_{uu} - Y_{ud} - Y_{MFI}) \geq B$$

Similarly, in state Y_d , the microentrepreneur's incentive constraint is

$$p_H (Y_{ud} - Y_B) + (1 - p_H) Y_{dd} \geq p_L (Y_{ud} - Y_B) + (1 - p_L) Y_{dd} + B$$

which simplifies to

$$\Delta p (Y_{ud} - Y_{dd} - Y_B) \geq B$$

With monitoring by the MFI, the value of B can be reduced which means that when the microentrepreneur is monitored the probability of her incentive constraint being satisfied increases. Hence, the following corollary.

Corollary 1. *Monitoring by the MFI increases strengthens the incentives of the microentrepreneur.*

Proof. Follows from the text. ■

Moreover, in the following discussion we assume that under monitoring the borrower always exerts high level of effort.

2.2.3. A Commercial Bank and an MFI

The model under this scenario evolves as in Figure 4.

INSERT FIGURE 4 HERE!

In state Y_u , the MFI's incentive compatibility constraint that needs to be satisfied in order to induce it to monitor is

$$Z + (p_H + p_L + \theta) Y_{MFI} - C \geq Z + (p_H + p_L) Y_{MFI}$$

which simplifies to

$$Z + \theta Y_{MFI} \geq C$$

Similarly, in state Y_d , the MFI's monitoring incentives have to satisfy

$$(p_H + p_L + \theta) Z - C \geq (p_H + p_L) Z$$

which yields

$$\theta Z \geq C$$

MFI's incentive constraints imply that the value of the reputational benefit when the bank is repaid must be sufficiently high or cost of monitoring sufficiently low. Additionally, higher value of the MFI's claim reflects positively on its monitoring motivation. Thus, because the gross interest rate on the loan is fixed, increase in Y_{MFI} should be set off by an equivalent decrease in Y_B . That would mean that **the bank pays to the MFI in the form of the interest rate for it to do the monitoring**. This is one possible explanation why in France banks are financing microcredit transaction with interest rate lower than the usual rate on microloans.

These discussions lead directly to the following proposition.

Proposition 3: *Syndication of microcredit by a commercial bank and a social MFI as described in our model yields superior results both in terms of increasing outreach and generating higher risk-adjusted returns for respective lenders than in the case of microcredit delivered by a single lender.*

Proof: basically follows from the text. Operating on its own, the MFI would have to lend $I_B + I_{MFI}$, while with the bank it only lends I_{MFI} and, thus, potentially increases outreach. By monitoring it is able to induce the borrower to behave properly, so moral hazard is solved, and financial sustainability is not di-

minished. Without the MFI, the bank on its own would only be able to finance borrowers with asset endowment of at least A^* . With the MFI which resolves information problems it is able to reach poorer borrowers.

3. Extensions

In this section we discuss the real-life cases of microcredit delivery involving multiple institutions. These cases can be viewed as extensions of the model discussed above.

3.0.4. Types of players

While in the previous sections we distinguish between institutions pursuing social goals (outreach maximization) and those with commercial goals (profit maximization) in reality types of players in modern microcredit industry are so diverse that it is not an overstatement to say that they are located in the continuum between purely social and commercial players. Helms (2006) discusses various players within the context of financial systems in general. In addition to socially oriented institutions such as NGOs and formal financial institutions such as banks she also distinguishes between informal financiers (informal lenders, pawnbrokers, etc.) and member-owned organizations (roscas and similar self-help groups). This classification is based on the motivation behind their decisions to finance the poor.

In reality however, participation in microcredit goes beyond simple provision of capital. Some players in the developed world participate by providing their expertise, loan guarantees and other non-financial inputs. They can be modeled by introducing additional input variables in the entrepreneur's production function $Y(\cdot)$. The loan guarantees in microcredit are somewhat similar to the so called cosigned loans, where a loan is made to a group of borrowers but, unlike

in traditional group lending, group members are assigned asymmetric liabilities: one borrower guarantees her groupmate's loan. Thus, the guarantor has to perform some monitoring tasks in order to mitigate her own risks of having to repay her partner's loan. It has been shown in literature that sometimes cosigned loan contracts allow to implement the first-best, that is the full information scenario (Bond and Rai (2008), Gangopadhyay and Lensink (2009)). In the case of loan guarantees by a third party as Fondes in France, the guarantor does not benefit from the loan but facilitates the microcredit as part of its social mission. So in theory such a case would be close to a social MFI in our model but with a zero loan.

3.0.5. Commercial bank and loan guarantor

Microcredit scheme where a specialized MFI does not provide capital but guarantees microloans issued by commercial banks is widely practiced in France: to extend a microloan banks require that a special loan guarantee agency, Fondes, guarantees repayment of sufficient part, usually about 70%, of the loan amount. Thus, the borrower has to pledge collateralizable assets for only 30% of the loan at most. In this case, similar to the models with cosigned loans, the bank can implement the first best given that Fondes has superior information about the borrower and able to screen out the better entrepreneurs. The project under this scenario evolves as in Figure 2.

INSERT FIGURE 2 HERE!

Let us simplify the model by assuming that the guarantor guarantees only a part of the loan and break the amount of the loan into two arbitrary parts without the loss of generality. The bank can lend I_B based on the net wealth of the en-

trepreneur, that is based on hard information. However, the microentrepreneur's project requires $I - A > I_B$. The bank only lends the full amount if the MFI issues a guarantee for the soft-information part of the loan. Let us denote it by I_{MFI} and the claim under guarantee by Y_{MFI} . In the best case scenario, when the project yields Y_{uu} , the guarantor does not face any obligations as the outcome is sufficient to repay the loan. In the middle case scenario, where the project yields Y_{ud} , the guarantor has to repay Y_{MFI} to the bank.

At time $t = 0,5$, in the case when the microenterprise's value is Y_u , the microentrepreneur exerts effort if the following condition holds:

$$p_L (Y - Y_{MFI} - Y_B) + (1 - p_L) (Y_{ud} - Y_B) + B \leq p_H (Y - Y_{MFI} - Y_B) + (1 - p_H) (Y_{ud} - Y_B)$$

which simplifies to

$$B \leq \Delta p (Y - Y_{MFI} - Y_{ud}) \quad (3.1)$$

So, for the borrowers for whom this inequality holds the MFI opts not to monitor. For other types of borrowers, the MFI will monitor if its own incentive constraint holds:

$$(p_H + \theta_H) Z + (1 - p_H - \theta_H) (Z - Y_{MFI}) - C > p_L Z + (1 - p_L) (Z - Y_{MFI})$$

which yields

$$(\Delta p + \theta_H) Y_{MFI} - C > 0 \quad (3.2)$$

This implies cost-benefit analysis: incentive compatibility constraint holds if the benefits from monitoring exceed costs of monitoring. Notice, that the first term in the brackets implies the difference in probabilities of success with and without monitoring. We assume that this condition holds.

Having established the conditions under which the MFI is able to resolve the information problems, conditions (3.1) and (3.2), it is straightforward to show the benefits of such for the MFI is straightforward: it does not pay out anything a priori and facilitates microcredit. The bank is able to finance borrowers that he would not be willing to finance solely based on hard-information. If it were to do so, it would have to charge higher interest to accurately reflect the level of involved risks. This leads to our next proposition.

Proposition 1. *Provision of microcredit services by a commercial bank, as the capital provider, and a specialized MFI, as the guarantor, yields superior results both in terms of increasing outreach and generating higher risk-adjusted returns for respective lenders than microcredit delivered by the two institutions separately.*

Proof. Follows from the text. ■

3.0.6. Public agency and a lender MFI

Consider a situation where a public agency and a specialized microcredit organization together contribute capital to microcredit. Such practice is extensively practiced in France in the recent years. Under this scheme, the local government supplies low-rate (zero interest in France) subordinated financing, I_G , and the MFI offers I_{MFI} as a senior loan to the borrower. The total amount of the loan issued to the borrower equals $I_G + I_{MFI}$ of which I_G is junior debt and I_{MFI} is senior debt.

This scheme is basically a risk-free game for the MFI and a departure from the previous setting with a bank and loan guarantor in the sense that the MFI which performs monitoring tasks in addition to financing holds senior debt instruments. This signifies that the government assigns high utility to the fact that microcredit is delivered to the population of the target community. Factually, the government

outsources microcredit services to the specialized Microcredit firm and pays for its services in terms of the subsidized capital. The project evolves as in Figure 3.

INSERT FIGURE 3 HERE!

The government gets additional utility from signing the contract in terms of reduced poverty (a poor and excluded individual gets money with repayment condition, that otherwise the government would have give away as a grant to reduce poverty). Without the MFI the government would not be able to solve adverse selection problem. The MFI, in turn, is able to reduce the size of its loan, which is in line with its social objective function. Thus this arrangement constitutes Pareto improvement than if the government and MFI were offering microloans separately. This is the result of the next Proposition.

Proposition 2. *Provision of microcredit services by a public agency, as the capital provider, and a specialized social MFI, as the guarantor, yields superior results both in terms of increasing outreach and generating higher risk-adjusted returns for respective lenders than microcredit delivered by a single lender.*

Proof. Follows from the text. ■

In the following we model the multi-agent setting of provision of microcredit with a commercial bank and a social MFI and discuss why such arrangeent also constitutes Pareto improvement as opposed to a single lender arrangement.

4. Conclusion

The way contemporary microcredit is offered to the poor differs sufficiently from how it was done in the past. Theoretical literature so far has focused on a single MFI as the delivery channel based on how microcredit is done in many developing

countries. In reality, there are multiple players on the supply side of modern microcredit industry. In this paper we developed a theoretical model of microcredit with multiple banking relationships which reflects how contemporary microcredit is offered. There are three types of participants of the supply chain: large socially oriented institutions, such as public agencies, international donors, etc., specialized MFI with superior information about the target community and commercial financial institutions, such as traditional banks. Coordination of efforts to mitigate information problems by these various participants of the microcredit supply chain enables them to efficiently facilitate financing of socially excluded assetless entrepreneurs.

We show that specialized MFIs by teaming up with a large institution capable of supplying capital, can increase its social performance measured by outreach, i.e. number of individual borrowers served. In order for such a large institution to have sufficient incentives to participate in such microcredit scheme, the specialized MFI has to take on screening and monitoring tasks. By doing so MFI enables the large financier to cut its operating costs related to servicing microloans and can charge premium over the level of the interest rate that it would charge if it were offering microloans by itself. This premium can be interpreted as the price of the MFIs services to large investors. This arrangement constitutes Pareto improvement for both types of institutions and, therefore, social Pareto improvement. We argue that our model explains well why in Europe and the North America extension of microloans involves multiple parties each assigned with specific tasks: provision of capital, screening, monitoring, advice, etc.

Future theoretical research in modeling financing arrangements for microentrepreneurs can consider dynamic setting that takes into account learning potential predatory competition amongst borrowers. The latter rises from the fact that microcredit is designed to support projects that employ low-tech primitive produc-

tion technologies and, therefore, are subject to perfect competition. Consequently, outreach maximization problem of socially oriented microfinance programs under financial sustainability requirement must have another constraint in addition to budget satiation condition. This issue seems to be an important and promising avenue for further theoretical investigation.

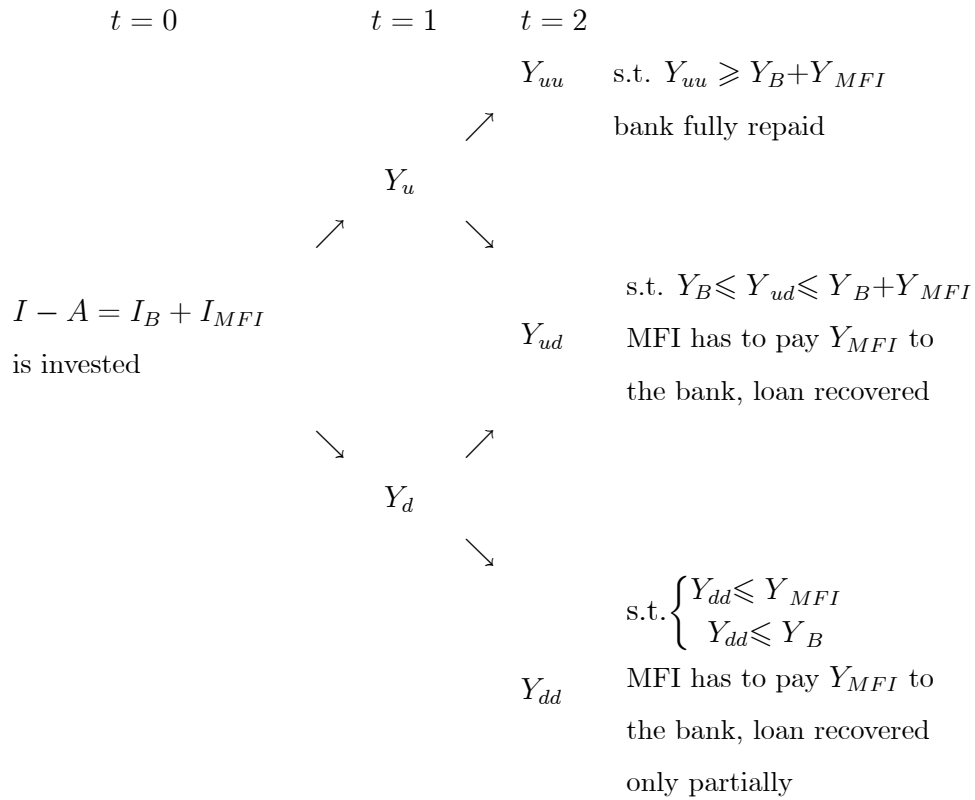
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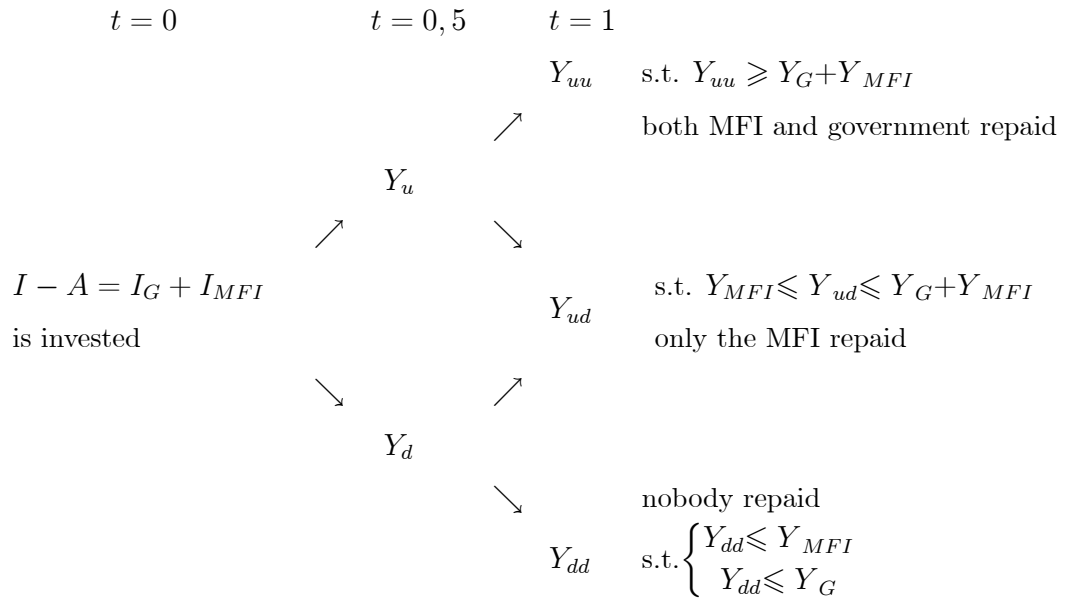
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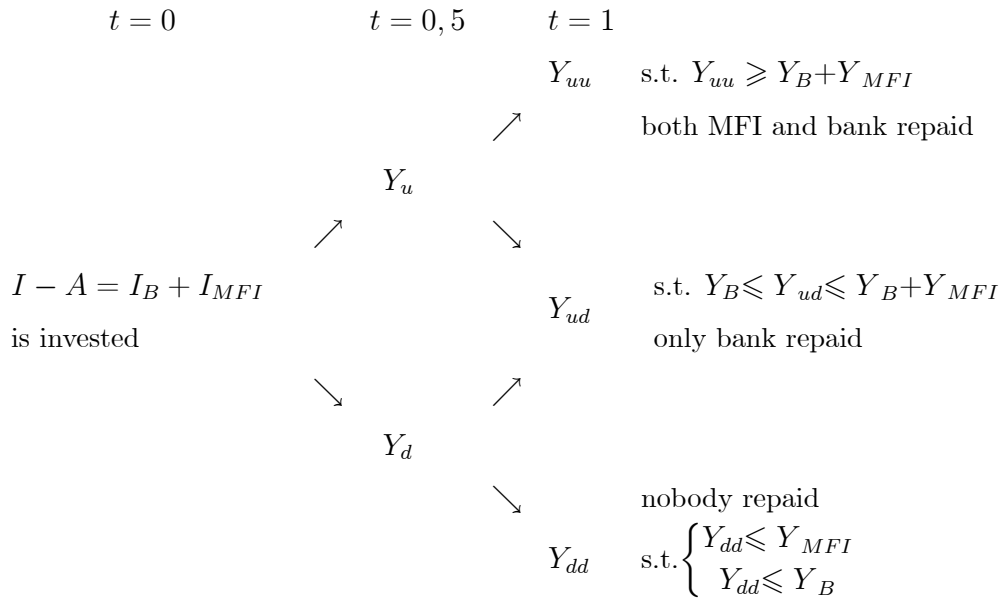
Values at $t=0,5$ are only observable to the guarantor.

Figure 3. Evolution of the microenterprise: the case of government and MFI



Values at $t=0,5$ are only observable to the MFI.

Figure 4. Evolution of the microenterprise: the case of MFI and bank



Values at $t=0,5$ are only observable to the MFI.