Mission Drift in Microcredit: A Contract Theory Approach

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This version: October 2018.

Abstract

We analyze the relationship between Microfinance Institutions (MFIs) and external funding institutions, with the aim of contributing to the debate on "mission drift" (the tendency for MFIs to lend money to wealthier borrower rather than to the very poor). We suggest that funding institutions build incentives for MFIs to choose the adequate share of poorer borrowers and to exert effort to increase the quality of the funded projects. We show that asymmetric information on both the effort level and its cost may increase the share of richer borrowers. However the unobservability of the cost of effort has an ambiguous effect. It pushes efficient MFIs to serve a higher share of poorer borrowers, while less efficient ones decrease their poor outreach.
JEL codes: O12, O16, G21.
Keywords: Microfinance, Funding Institutions, Mission Drift, Contract Theory.

*We would like to thank Emmanuelle Auriol, François Bourguignon, Marek Hudon, Marc Labie, Ariane Szafarz, Régis Renault, Attila Tasnádi and seminar participants at Oligo Workshop in Paris, the Canadian Economic Association Conference in Ottawa, the European Development Network Conference in Bonn, CERMi Seminar in Bruxelles, the European Microfinance Conference in Portsmouth, the DIAL Development Conference and the THEMA Seminar in Cergy-Pontoise for helpful comments. David Ettinger would like to thank the Governance and Regulation Chair for its support.
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1 Introduction

Over the last 30 years, the microfinance industry has been responsible for a massive growth of pro-poor financial services. The growth of the sector and the increasing financial flows into Microfinance Institutions (MFIs) have stimulated a debate on the evolution of the sector. The main recent developments are the explosion of for-profit and profit-oriented MFIs and the change in the nature of some funding institutions (private vs. public). Both these issues have contributed to fuel the debate on so-called "mission drift" in microfinance. Armendáriz et al. (2011) state that "mission drift arises when an MFI increases its average loan size by reaching out to wealthier clients neither for progressive lending nor for cross-subsidization reasons. Mission drift in microfinance arises when an MFI finds it profitable to reach out to unbanked wealthier individuals while at the same time crowding out poor clients". In this paper, we present a theoretical analysis aimed at increasing our understanding of the role of funding institutions in affecting mission drift tendencies in microfinance. From its origins, microfinance has been about a 'double bottom-line': a mix of commercial and social concerns. MFIs need to run their *businesses* in a way that allows for costs to be recovered while at the same time achieving social goals. But the success of a MFI has long been associated with financial performance outcomes measured by loan portfolio quality, operating efficiency and profitability. There is a widespread fear that microfinance might be drifting away from its original 'double bottom line'. The fact that funding institutions may want to encourage financial sustainability is not necessarily a sign of abandoning the pro-poor orientation of microfinance. This clearly appears in Yunus (2007), when in his well-known book "Banker to the Poor" he states, "If Grameen does not make a profit, if our employees are not motivated and do not work hard, we will be out of business. (...) In any case, it cannot be organized and run purely on the basis of greed. In Grameen we always try to make a profit so we can cover all our costs, protect ourselves from future shocks, and continue to expand. Our concerns are focused on the welfare of our shareholders, not on the immediate cash return on their investment dollar" (chapter 11, p. 204). Similarly, in the Key Principles in microfinance published by the Consultative Group to Assist the Poor (CGAP) in 2004, financial sustainability is evoked as the 4th principle and defined as "necessary to reach significant numbers of poor people". In this spirit, observers and policymakers have increasingly put the accent on the necessity for microfinance institutions to be profitable, or "financially" sustainable, raising interest rates and going through commercialisation to be able to attract private investors (see Cull et al., 2009).

Nonetheless, a report commissioned by Deutschebank showed that, in 2007, 70% of MFIs were small "start-ups MFIs", mostly unprofitable, while only the top 150 MFIs were fully sustainable mature enterprizes (Dieckmann et al., 2007). More recently, focusing on MFIs' costs on a sample of 1,355 MFIs between 2005 and 2009, Cull et al. (2016) find that, while most firms earn positive accounting profits, only a minority make an economic profit (which accounts fully for the opportunity costs of inputs): 67 percent of institutions were profitable on an accounting basis, but only 36 percent were profitable. They also show that implicit grants and subsidies are widespread and persist in older institutions.

At the same time, the positive view of commercialization and profitability has been challenged in recent years by critics, following the news that the largest microfinance bank in Latin America, the Mexican Compartamos, was offering returns on equity of 53%, while charging interest rates exceeding 100% to the poor. In a famous column appearing in the New York Times on January 14, 2011, Yunus reacted to this debate denouncing a tendency towards "sacrificing microcredit for megaprofits".

The main difficulty when trying to assess the extent of "mission drift" is that it is a complicated matter to empirically establish whether a microfinance institution has indeed deviated from its social mission. One widely used proxy for poverty is average loan size, but as Armendáriz et al. (2011) point out, the relationship between mission drift and loan size is not easy to tackle, so that socially responsible investors should be cautious when interpreting empirical evidence on loan size. Another possible sign of mission drift could be a tendency to practice higher interest rates. However, Roberts (2013) shows that, although profit-oriented MFIs do usually charge higher interest rates, they are not significantly more profitable, because they tend to have higher costs. He concludes that his analysis finds "no obvious indication of a mission drift".

We believe that additional theoretical work is needed to understand the phenomenon and to be able to interpret the empirical facts. We propose a model in which both the funding institution and the MFI are pro-poor, although they can put different weights on the aim of providing credit to the poorest borrowers. Incentives have to be provided to the MFI to exert costly effort to identify the more valuable projects and to choose the right share of poorer borrowers (the optimal level of poor outreach). We characterize the optimal contract proposed to MFIs with the aim of balancing outreach, budget considerations and MFIs' survival.

Our main finding is that asymmetric information on both the effort exerted by the MFI and on its cost may increase the share of richer borrowers financed by MFIs, thereby increasing the mission drift. However, different types of information asymmetries give rise to different results. In particular, we distinguish between the effects of hidden actions (effort is not observable) and hidden types (MFIs have unobservable cost heterogeneity). In the first case, we show that asymmetric information can reduce the share of very poor borrowers reached by loans, thus increasing the mission drift. The intuition lying behind this result is that, if the pro-poor orientation of the MFI is weaker than that of the donor, then the contract with the funding institution has to provide incentives to exert costly effort. This requires increasing the share of richer borrowers, in order to ensure sufficiently high revenue to the MFI. In the second case, the existence of asymmetric information between the funding institution and the heterogeneous MFIs tends to increase the poor outreach of the more efficient MFIs while decreasing it for the less efficient. As a result, in some cases asymmetric information has the effect of lowering the average level of mission drift (i.e. the share of richer borrowers who are granted a loan). The intuition in this case is different. When the MFIs have heterogeneous costs, it is necessary to propose different social missions to different types of MFIs in order to provide incentives to the MFI facing a lower cost of effort to reveal their true costs. In this context, the pro-poor orientation of low-cost MFIs can be enhanced, sometimes producing a virtuous effect on the mission drift.

The two cases are relevant for microfinance. For instance, the report "Microfinance in Africa" produced for the United Nations by OSAA and NEPAD (2013), puts the accent on the difficulties of operating in a context of lack of transparency and weak institutions, an environment which favors hidden-action problems. In addition, the same report also points out that the funding institutions should promote the diversification of institutions to "improve range and quality of services, and reduce costs". This suggests the importance of the role of funding institutions in proposing differentiated contracts in a context of heterogeneous institutions, as in our framework with hidden types. Hidden-type problems are also likely to be very relevant in contexts like Latin America, where microcredit providers present a wide range of institutional diversity and performances (see for instance the recent Report of Trujillo and Navajas, 2014).

The paper proceeds as follows. Section 2 describes the related literature. Section 3 presents the basic model. Section 4 describes the case in which MFI's effort is not observable by the funding institution. Section 5 considers the case in which the type of MFI (her cost of providing effort) is not observable. Finally, Section 6 concludes.

2 Related literature

Although the economic issue of the relationship between MFIs and external funding institutions has gained importance in recent years, as Ghosh and Van Tassel (2013) point out, the literature on microfinance has not paid much attention to this question.[1] An indirectly related body of literature has considered the broader question of the relationship between external funding institutions and other recipients (such as NGOs). For instance, Besley and Ghatak (2001) consider the issue of the optimal contract between a government and an NGO in order to carry out a development project, showing how hold-up problems shape the optimal way to delegate responsibility to NGOs for providing social welfare and development services. Aldashev and Verdier (2009, 2010) examine the effects of international competition between NGOs in raising funds. They show that if the level of outside options for NGO entrepreneurs is low enough, increased competition among NGOs can lead to higher fund diversion, despite the fact that they care about the impact of their projects.

More recently, the literature has concentrated on issues arising in contracting environments related specifically to microfinance. For instance, Aubert, de Janvry, and Sadoulet (2009) focus on the internal organization of MFIs and highlight the importance of the incentives given to the credit agents. They analyze the optimal contract in the presence of moral hazard and investigate the issue of mission drift in this context. In their model, the credit agents are not pro-poor, and can under-report repayments, so that they have to be given the right incentives to investigate the ability and wealth of borrowers. The MFI can monitor agents. However, when monitoring is costly, a pro-poor MFI can be obliged to provide the agent with incentives based on repayments, thus generating mission drift. In another recent paper, Baland et al. (2013) concentrate instead on borrowers' incentives to repay their credits. They compare individual loans to joint liability contracts and show that wealthier borrower can pool risk more efficiently, have higher reimbursement rates and get higher benefits from group lending. While Aubert, de Janvry, and Sadoulet (2009) concentrate on the incentives provided to agents and Baland et al. (2013) look at repayment incentives, we concentrate instead on the contractual relationship between MFIs and external funding institutions. To simplify the analysis, we do not consider joint liability issues (thus differently from Baland et al., 2013 and as in Aubert, de Janvry, and Sadoulet, 2009). In our context, we find it reasonable to assume that both the MFI and the funding institutions are pro-poor, at least to some extent. Although we do not allow the MFI

[1] Most papers are dedicated to the process of contracting between MFIs and their clients: see Ghatak and Guinnane (1999), Rai and Sjöström (2004), Jeon and Menicucci (2011) or Shapiro (2015).

to under-report repayments, incentives in our framework need to be provided in order that the MFI will exert costly effort to discover valuable clients' investment projects[2] (while wealth is easily observable by the MFIs, which have better knowledge of the local conditions than the funding institutions do). In this context, in addition to moral hazard problems we also consider adverse selection issues. MFIs are heterogeneous and the funding institution cannot perfectly observe their characteristics. In our context, asymmetric information and contract distortions can have different impacts on mission drift.

Closer to our approach, Ghosh and Van Tassel (2011, 2013) were the first to focus on the relationship between funding institutions and MFIs. In their first paper, they present a model in which *socially responsible* MFIs (their main goal is to reduce poverty) must be funded by a profit-seeking investor. They find that competition among MFIs to obtain external funds has two opposite effects: on the one hand, having to pay a high rate of return to the external funder raises the interest rates charged to borrowers; on the other hand, it is also a way to make the funding more efficient by redirecting funding from inefficient MFIs to more efficient ones. If the average increase in the quality of MFIs more than compensates for the higher interest rates, the competition for external funds is pro-poor. In our paper, we do not consider competition and assume that the funding institution also has a social objective. In this framework, the optimal contract proposed to heterogeneous MFIs does not necessarily exclude inefficient MFIs, unless there are very few of them. We characterize separating contracts in which efficient and inefficient MFIs are optimally proposed different contracts. Moreover, we consider asymmetric information.

Our approach is thus similar to Ghosh and Van Tassel (2013), who extend the previous analysis by introducing asymmetric information and socially motivated funding institutions. In their analysis they compare two alternative types of contract: the first is a pure grant, the second requires paying an interest rate sufficiently high to dissuade high-cost MFIs applying for funding. We generalize their approach by allowing the funding institution to propose different types of contracts to different types of MFIs. Moreover, we allow the weights put on the poverty outreach objective by the MFI and the funding institutions to vary. In our framework, exclusion of the less efficient MFIs occurs only if their number is small. Otherwise, the funding institution may offer the MFIs contracts which have different poverty outreach objectives, thus having different impacts on the mission drift. Incentives will not be provided to squeeze out the less efficient MFIs, but to promote effort and to screen among the otherwise heterogeneous

[2] This can also be interpreted as a cost of helping borrowers improve the quality of their projects.

MFIs. In addition, we assume that the funding institution cares about the survival and long-term viability of MFIs, placing a positive weight on the MFI's profit. This captures the idea that leaving some money to an MFI is not completely wasteful for the funding institution, because it allows the MFI to survive in the future.

3 The basic model

We consider the relationship between a funding institution (the principal, "he") and an MFI (the agent, "she"). The MFI lends a mass 1 of money to a local population of borrowers. The population of borrowers contains an infinity of borrowers, who don't have access to bank lending. Borrowers are heterogeneous: some of them are richer (they are unbanked but less poor, with a positive initial wealth level that is not pledgeable and does not allow them to access bank lending) and some of them are poorer (they have no wealth whatsoever). The MFI chooses the proportion α of the money lent to richer borrowers in her loans portfolio.

In addition, the MFI has to exert effort to screen out valuable projects, when examining the project proposed by both richer and poorer borrowers. This effort level e can be interpreted as the share of loans for which the MFI makes costly effort in order to identify the quality of the project. Without any screening effort on the MFI side, the expected reimbursement of richer borrowers, R_R, is strictly higher than the expected reimbursement of poorer borrowers, R_P. This assumption can be justified on different grounds: first, we can assume that richer borrowers have higher collaterals;[3] second, following the empirical findings of Sharma and Zeller (1997) in Bangladesh or Zeller (1998) in Madagascar, we can consider that repayment performance is an increasing function of wealth because the poorest may invest more in low-return activities, since they have a low ability to bear risk. This assumption simply aims to capture the idea that financing richer borrowers might guarantee larger revenues to the MFI, so that the latter might be tempted to abandon the mission of serving poorer borrowers to increase profitability. This might well depend on the fact that less poor borrowers have access to better education, land, and/or social capital (see also Aubert et al., 2009).

We also assume that the screening effort increases the loans return by a parameter ΔR, and for simplicity we assume that this parameter is identical for richer and poorer borrowers.

The expected reimbursement for the projects financed by the MFI is therefore equal to:

[3] These collaterals might not be easily pledgeable or may be insufficient to guarantee a standard banking loan, but MFIs can use it to put pressure on the borrowers. Alternatively, this can be interpreted as higher social collateral.

$$\theta(\alpha, e) = R_P + \alpha(R_R - R_P) + \Delta R e \tag{1}$$

with e the fraction of loans for which the MFI exerts an effort. We assume that the cost associated to the effort e is linear and does not depend on the type of borrowers, so that we can denote it μe with $\mu > 0$. This effort translates into a monetary cost, because the MFI has to pay credit officers who study the quality of the projects. The effort provided by the MFI can thus be simply interpreted as an effort necessary to examine projects and screen in the good ones with higher repayment potentials. Alternatively, this can be interpreted as the effort and the cost necessary to provide additional services and support to the borrowers, thus increasing the potential of their investment projects.

The MFI has no direct access to the financial market to finance her loans, so that she has to contract with a funding institution (the principal). The funding institution proposes a contract or a menu of contracts to the MFI. The contract specifies the refund, T, that the MFI is supposed to pay to the funding institution in exchange for the funding and, depending on the informational context that we will specify, the effort level e.

The funding institution's utility is an increasing function of the refund he receives from the MFI, but the funding institution is also concerned with loan allocations going to the *right* borrowers as well as with the survival of the MFI. More precisely, we represent his preferences with the following utility function:

$$V = T - 1 + \lambda_1 \Big(1 - (\frac{\alpha - \alpha^*}{1 - \alpha^*})^2\Big) + \lambda_2(\theta(\alpha, e) - \mu e - T) \tag{2}$$

$T - 1$ is the budget balance of the lending process for the funding institution. $\lambda_1 > 0$ is the weight that the funding institution puts on the distribution of the loans to the *right* borrowers. α^* is the optimal fraction of loans granted to richer borrowers. α^* is not necessarily equal to 0. For several reasons, the funding institution may prefer that some richer borrowers may also be financed.[4]

[4]Different values for the optimal share of poorer borrowers can derive from natural welfare functions in which the funding institution cares for the welfare of the poorest borrowers, while taking into account that richer unbanked borrowers generate higher expected income. For instance, even if the funding institution only cares about poorer households, she might take into account that lending to some richer individuals might generate a trickle-down effect, for instance creating local jobs and increasing the living condition of the poorer borrowers. On the other hand, even if richer households produce higher expected revenue, the funding institution would want to finance a certain ratio of poorer borrowers to achieve a better distribution of wealth. In addition, the unbanked wealthier are relatively more abundant than the unbanked poor in many middle-income regions. As noted in Armendáriz et al. (2011) the fact that many MFIs in these regions serve a higher share of less poor borrowers does not necessarily mean that they have all deviated from their mission.

We choose the formula $(1-(\frac{\alpha-\alpha^*}{1-\alpha^*})^2)$ to represent the utility that the funding institution derives from lending money to borrowers with a fraction of richer borrowers, because we wanted to make it clear that the funding institution derives a positive utility from lending this money. This element that we incorporate in the utility function is always positive. However, after some normalization, we can show that this is equivalent to considering $-(\alpha-\alpha^*)^2$ which is simpler to interpret. $(\theta(\alpha, e)-\mu e-T)$ is the amount of money left to the MFI and $\lambda_2 \geq 0$ is a parameter representing the interest of the funding institution in the survival of the MFI. The higher $\theta(\alpha, e)-\mu e-T$, the higher the net income of the MFI and her probability of surviving. We assume that $\lambda_2 < 1$, otherwise the funding institution could increase his utility by simply transferring money to the MFI.

The MFI also cares about the ratio of poorer and richer borrowers to whom she grants loans. For the sake of simplicity, we assume that the preferred fraction of richer borrowers for the MFI is the same as for the funding institution, α^*.[5] However, the weight that the MFI gives to this dimension of his utility, $\beta_1 > 0$, may differ from the λ_1 of the funding institution. Eventually, the MFI's utility function is defined as follows.

$$U=\theta(\alpha, e)-T-\mu e+\beta_1\Big(1-(\frac{\alpha-\alpha^*}{1-\alpha^*})^2\Big) \tag{3}$$

Besides this, we assume that the MFI has no other external funds at the time she accepts the contract with the funding institution so that she also faces a budget constraint:

$$\theta(\alpha, e)-T-\mu e \geq 0 \tag{4}$$

The MFI does not accept a contract such that this constraint is not satisfied (perfectly anticipating her own behavior after having accepted the contract).

4 First case: the funding institution cannot observe effort, e (Hidden action)

In this section, we assume that the funding institution can observe neither the effort level chosen by the MFI e, nor the fraction of richer borrowers α. However, the funding institution discovers the reimbursement level, θ, obtained by the MFI (the MFI cannot hide the money). We also

[5] We could alternatively set different ideal levels α^*_{MFI} and an α^*_F and $\alpha^*_M \neq \alpha^*_F$. However, we choose to consider a unique α^* in order to show that our results cannot be explained by the different view about the optimal fraction of richer borrowers between the MFI and the funding institution.

assume that e can take any value in the interval $[0, 1]$ and that the value of μ is common knowledge. The timing of the game is the following:

- Step 0: The funding institution makes an offer (θ^c, T^c) to the MFI. The offer may be interpreted as: I propose you a capital of 1 in order to lend money to local borrowers. If I observe that you obtain a reimbursement rate equal to θ^c, I ask for a repayment T^c. If I observe a reimbursement rate different from θ^c, I ask for a repayment $T > \theta(1, 1)$ and you go bankrupt.

- Step 1: The MFI accepts the offer or refuses it. If she refuses it, the game is over without any lending or transfers. If she accepts it, the game continues.

- Step 2: The MFI chooses e and α.

- Step 3: Borrowers reimburse the loan. $\theta(e, \alpha)$ is common knowledge and the MFI makes her payment to the funding institution in accordance with the initial contract and the actual value of θ.

This game is aimed at representing, in a simple framework, a situation in which the funding institution can observe neither the actual effort made by the MFI to discover good projects (or to propose valuable services to borrower) nor the actual wealth of the borrowers. On the other hand, we may think that the funding institution can more easily observe the total revenue of the MFI and so proposes a reimbursement of the funds which is a function of the realized revenues, that, for simplicity, we assume to be perfectly observable.

Before focusing on the contract and the decisions of the MFI, we first observe that it is not necessary to consider values of θ^c such that $\theta^c < R_P + \alpha^*(R_R - R_P)$ since both the funding institution and the MFI agree that $\alpha < \alpha^*$ gives a lower utility and a lower reimbursement level than choosing $\alpha = \alpha^*$.

Now, let us consider the MFI's decision. Since the contract only specifies θ^c, the reimbursement level, if she accepts this she will choose among all the pairs (e, α) such that $\theta(e, \alpha) = \theta^c$. In order to increase the size of the reimbursement rate, increasing the share of rich borrowers is a substitute for higher effort.

If $\theta^c \geq R_P + \alpha^*(R_R - R_P)$, the MFI will choose an α such that $\alpha \geq \alpha^*$, so that the marginal cost of increasing θ by raising the fraction of richer borrowers is $\frac{2\beta_1}{R_R - R_P} \frac{\alpha - \alpha^*}{(1-\alpha^*)^2}$ which is strictly increasing in α. The MFI increases α up to the point when further increasing the share of richer borrowers becomes more costly than increasing effort. The marginal cost of increasing

θ by a rise in the effort level is equal to $\frac{\mu}{\Delta R}$ which is a constant. The two costs are equal when $\alpha = \alpha^* + \frac{(1-\alpha^*)^2(R_R-R_P)\mu}{2\beta_1 \Delta R} \equiv \alpha^M$. Therefore, there are 3 cases (assuming that T^c is small enough, otherwise the MFI will refuse the contract):

- If $\theta^c < R_P + \alpha^M(R_R - R_P)$, the MFI will choose an effort level 0 and an α equal to $\frac{\theta^c - R_P}{R_R - R_P}$ in order to obtain θ^c.
- If $R_P + \alpha^M(R_R - R_P) \leq \theta^c \leq R_P + \alpha^M(R_R - R_P) + \Delta R$, the MFI will choose $\alpha = \alpha^M$ and an effort level $e \in [0, 1]$ such that the reimbursement level is equal to θ^c.
- If $\theta^c > R_P + \alpha^M(R_R - R_P) + \Delta R$, the MFI will choose an effort level 1 and an α equal to $\frac{\theta^c - R_P - \Delta R}{R_R - R_P}$ in order to obtain θ^c.

This result appears in Figure 4 which represents all the pairs (α, e) chosen by the MFI depending on the θ^c proposed by the funding institution. When the graph goes northeast, this coincides with a higher θ^c chosen by the funding institution. The graph is uniquely characterized by the value of α^M.

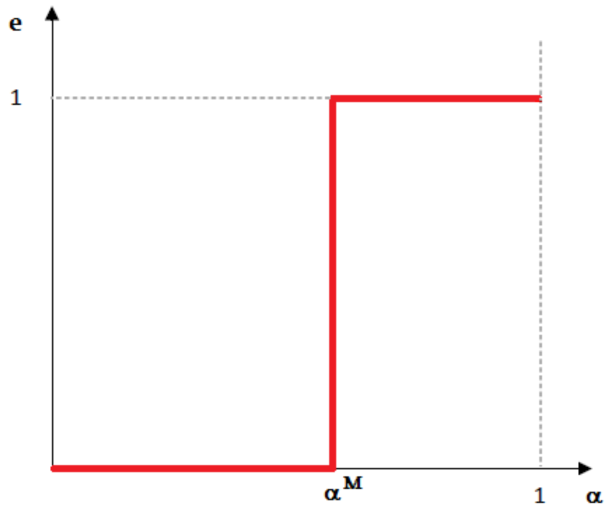


Figure 1: MFI's preferences

Now, the funding institution. We first consider the funding institution's first best, the choice that he would impose on the MFI if he could choose the pair (α, e) which maximizes his utility while satisfying the MFI budget constraint, $T \leq \theta(\alpha, e) - \mu e$. This constraint will always be binding since $\lambda_2 < 1$, therefore we can assume that in this first best contract, $T = \theta(\alpha, e) - \mu e$ so that the funding institution's utility will be equal to:

$$V = R_P + \alpha(R_R - R_P) - 1 + \Delta Re - \mu e + \lambda_1\Big(1 - (\frac{\alpha - \alpha^*}{1 - \alpha^*})^2\Big) \tag{5}$$

This is equal to the utility of the MFI given in (3), except that T (the transfer for the MFI) is replaced by 1 and the parameter β_1 is replaced by λ_1.

Looking at the formula, we observe that if $\Delta R < \mu$, the funding institution prefers $e = 0$, if $\Delta R > \mu$, the funding institution prefers $e = 1$, and if $\mu = \Delta R$, the funding institution is indifferent among effort levels. As for the optimal level of α, we can find it by maximizing $\alpha(R_R - R_P) + \lambda_1(1 - (\frac{\alpha-\alpha^*}{1-\alpha^*})^2)$. This gives an optimal α for the funding institution.

$$\alpha^F \equiv \alpha^* + \frac{(1 - \alpha^*)^2(R_R - R_P)}{2\lambda_1} \tag{6}$$

Now, the funding institution cannot actually choose the pair (α, e) because he does not observe the choice of the MFI. He faces 3 different cases.

If $\Delta R \leq \mu$, the cost of effort is higher than the social benefit, the funding institution prefers $(\alpha^F, 0)$. Preferring that the MFI makes no effort, the funding institution can propose a contract which only covers the costs with no effort when the share of richer borrowers is equal to α^F, $(\theta^c, T^c) = (\theta(\alpha^F, 0), \theta(\alpha^F, 0))$. The MFI will accept the contract and choose $(\alpha, e) = (\alpha^F, 0)$ so that the funding institution will manage to impose his preferred pair on the MFI.

If $\Delta R > \mu$ and $\alpha^F \geq \alpha^M$, the cost of effort is lower than the social benefit and the optimal α for the funding institution is higher than the optimal α for the MFI. The funding institution can obtain that the MFI chooses $(\alpha, e) = (\alpha^F, 1)$ by proposing a contract $(\theta^c, T^c) = (\theta(\alpha^F, 1), \theta(\alpha^F, 1) - \mu)$. In this case, the funding institution can obtain the preferred share of richer borrowers by imposing a high reimbursement which forces the MFI to exert effort and to push the share of richer borrowers to α^F.

The richest case is when $\Delta R > \mu$ and $\alpha^F < \alpha^M$. Since $\Delta R > \mu$, the funding institution would prefer the MFI to make an effort equal to 1 (the social cost of the effort is lower than the social profit). The funding institution would also like the MFI to choose an α strictly lower than α^M since $\alpha^F < \alpha^M$. However, we already noted that whatever the contract proposed (θ^c, T^c), it is never possible to obtain that the MFI chooses an effort equal to 1 and an $\alpha < \alpha^M$ since the MFI will always reduce its effort (with a marginal cost $\frac{\mu}{\Delta R}$ for an increase in θ) and raise the ratio α of richer borrowers (with a marginal disutility for an increase in θ strictly lower than $\frac{\mu}{\Delta R}$ when $\alpha < \alpha^M$). Therefore, we obtain the following result.

Proposition 1 *The funding institution proposes a contract (θ^c, T^c) to the MFI such that:*

- *If* $\Delta R \leq \mu$, *the funding institution proposes a contract inducing effort* $e = 0$, *setting* $\theta^c = \theta(\alpha^F, 0)$ *and* $T^c = \theta(\alpha^F, 0)$.

- *If* $\Delta R > \mu$ *and* $\lambda_1 > \frac{\Delta R}{\mu}\beta_1$ *(equivalent to* $\alpha^F \geq \alpha^M$*), the funding institution proposes a contract inducing effort* $e = 1$, *setting* $\theta^c = \theta(\alpha^F, 1)$ *and* $T^c = \theta(\alpha^F, 1) - \mu$.

- *If* $\mu \leq \Delta R < \mu + \frac{\lambda_1(\alpha^M - \alpha^F)(\alpha^M + \alpha^F - 2\alpha^*)}{1-\alpha^*} + (\alpha^M - \alpha^F)(R_R - R_P)$ *and* $\lambda_1 \leq \frac{\Delta R}{\mu}\beta_1$, *the funding institution proposes a contract inducing effort* $e = 0$, *setting* $\theta^c = \theta(\alpha^F, 0)$ *and* $T^c = \theta(\alpha^F, 0)$.

- *If* $\Delta R > \mu + \frac{\lambda_1(\alpha^M - \alpha^F)(\alpha^M + \alpha^F - 2\alpha^*)}{1-\alpha^*} + (\alpha^M - \alpha^F)(R_R - R_P)$ *and* $\lambda_1 \leq \frac{\Delta R}{\mu}\beta_1$, *the funding institution proposes a contract inducing effort* $e = 1$, *setting* $\theta^c = \theta(\alpha^M, 1)$ *and* $T^c = \theta(\alpha^M, 1)$.

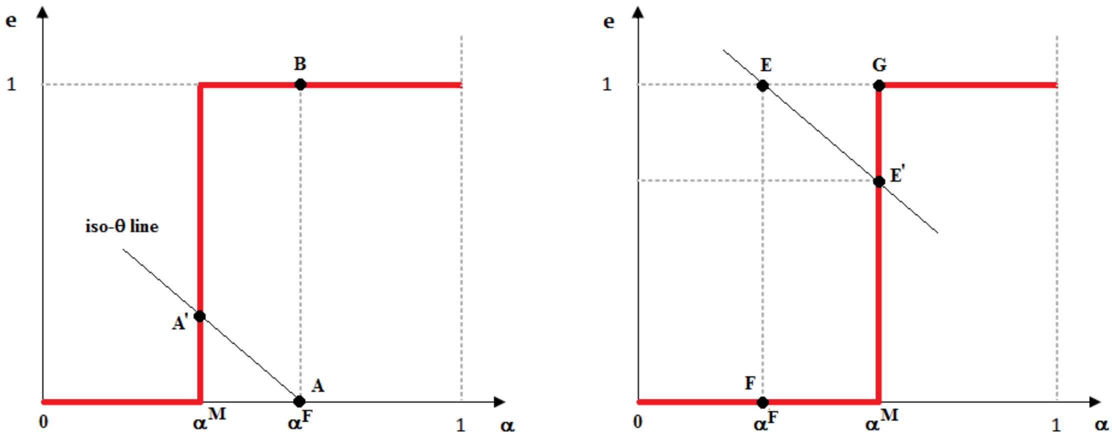
In all cases the MFI accepts and executes the proposed contract.

Let us first consider the case $\mu \geq \Delta R$, where the cost of effort is higher than its social benefit. Then, no effort is exerted and the funding institution can impose his preferred choice: no effort and $\alpha = \alpha^F$. Even if he does not observe θ, he can propose a reimbursement rate $\theta(\alpha^F, 0)$ and obtain his preferred choice.

Even if $\alpha^M < \alpha^F$ so that in order to obtain the reimbursement rate $\theta(\alpha^F, 0)$ which coincides with the preferred choice of the funding institution $(\alpha^F, 0)$, the MFI would rather make a strictly positive effort and choose an α strictly lower than α^F (as can been seen with point A and A' in Figure 2(a)), the funding institution can implement $(\alpha^F, 0)$. As a matter of fact, because of her budget constraints the MFI will never make any effort if she is not compensated for it. If the funding institution wants to implement point A, although the MFI would prefer point A' (with the same θ), the funding institution can force the MFI to choose A.

The α chosen is not equal to α^*, which may be considered as mission drift. This is explained by the tradeoff between lending money to poorer borrowers and obtaining a higher reimbursement rate. Since the cost of an increase in the fraction of richer borrowers in the neighborhood of α^* is negligible and the marginal increase in reimbursement rate is constant, equal to $R_R - R_P$, the chosen α will always be higher than α^*.

Now, if the social cost of effort is lower than its social benefit, $\mu < \Delta R$, it is socially optimal to make an effort equal to 1. However, this effort will not always be implemented. If α^F is higher than α^M the situation is simple: the funding institution proposes a contract with an $\alpha = \alpha^F$, $e = 1$ and a repayment such that the MFI makes no profit. Since $(\alpha^F, 1)$ is an element of the optimal curve of the MFI, he will accept the contract and choose $(\alpha^F, 1)$. This is represented by point B in Figure 2(a). But if $\alpha^F < \alpha^M$ and the funding institution proposes a contract $(\theta(\alpha^F, 1), \theta(\alpha^F, 1) - \mu)$, the MFI will not choose $(\alpha^F, 1)$. He will choose a lower effort level and a higher α.



(a) (b)

Figure 2: MFI's preferences and optimal contracts under hidden action.

As we can see in Figure 2(b), if the funding institution proposes a contract $(\theta(\alpha^F, 1), \theta(\alpha^F, 1) - \mu)$ with $\alpha < \alpha^M$ (such as the one denoted by point E in Figure 2(b)), the MFI will substitute effort for a higher proportion of richer borrowers (choosing E'). Therefore, the funding institution cannot do better than choosing between 2 solutions. He can either obtain that the MFI chooses α^F by proposing a contract $(\theta(\alpha^F, 0), \theta(\alpha^F, 0))$ (corresponding to point F in Figure 2(b)) but no effort will be made, or he can propose $(\theta(\alpha^M, 1), \theta(\alpha^M, 1) - \mu)$ (corresponding to point G in Figure 2(b)) so that the effort level will be equal to 1 but the fraction of richer borrowers will be higher than the funding institution's first best. In the first case the effort level is suboptimal; in the second case the fraction of richer borrowers is too high, indicating a stronger mission drift. The funding institution will choose among these two contracts the one that minimizes his utility loss.

The model thus shows how mission drift is affected by the objectives of the funding institution and the MFI. As expected, a high share of richer borrowers can depend on the preferences of the funding institution. If the funding institution puts a low weight on the pro-poor mission, then he can decide to push the MFIs to realize his preferred share of poor borrowers by asking for a high reimbursement rate, so that effort alone is not enough for the MFI to generate the required revenue and she is pushed to serve more richer borrowers. The hidden-action problems can have an additional (adverse) impact on the mission drift as compared to the benchmark case of complete information. This happens when the MFI puts relatively low weight on the pro-poor mission while the funding institution is more pro-poor (as in the case illustrated in Figure 2(b)): in this case, the funding institution cannot induce the preferred share of poorer borrowers and mission drift increases (as in point G). Alternatively, the funding institution has to renounce inducing higher effort (as in point F). This could also be interpreted as another source of mission drift in the sense that, for a given share of richer borrowers, the quality of the services provided by the MFI has to be degraded to satisfy the contract proposed by the funding institution.

We have thus shown that hidden action is likely to have an adverse effect on mission drift when the pro-poor orientation of the MFI is weak compared to that of the funding institutions. On the contrary, if the MFI is pro-poor, the contract proposed by the funding institution can induce the desired level of effort and of the share of richer borrowers desired by the funding institution, so that asymmetric information has no particular impact on the mission drift.

To derive some implications from the model, it is first important to note that hidden action is related to the unobservability of effort. In practice, this problem is more relevant when the market is less transparent and the information on the functioning of MFIs is hard to gather. For instance the report "Microfinance in Africa" (OSAA and NEPAD, 2013) mentions that a widespread weakness of African microfinance is the prevalence of governance problems coupled with the diffusion of informal enterprises with scarce access to reliable information. In these countries, governments and development institutions should thus probably concentrate their efforts on increasing transparency, and support MFIs to improve governance. In addition, we have shown that the distortions are driven from the weak pro-poor orientation of MFIs. In a context in which many MFIs are profit-oriented, as in many Latin American countries, the presence of hidden action is more likely to worsen the mission drift. But things should be different in Asian countries like India and Pakistan which have a traditional focus on the social mission (Report on Asian Microfinance edited by Bedson, 2009). This is not to say that moral hazard cannot occur in pro-poor MFIs, but in our framework we show that in this case it is easier for the funding institutions to obtain the desired levels of effort and redistribution through second-best contracting with the MFIs.

5 Second case: the funding institution cannot observe the type of the MFI, μ (Hidden type)

In this section, we consider the case in which MFIs are characterized by unobservable heterogeneity. For simplicity, we assume that there are two types of MFIs, a share η of more efficient ones with low cost of effort μ^L, and a share $(1-\eta)$ of less efficient MFIs with high cost of effort $\mu^H > \mu^L$. To simplify the analysis, we assume in this section that effort is observable and can take two values, $e_i \in \{0, 1\}$, $i = 1, 2$. We thus restrict our attention to the hidden-type problem faced by the funding institution. The funding institution cannot observe the cost of effort of the MFI but he can offer a menu of contracts possibly discriminating between the different types of MFIs.[6] We assume that the funding institution offers a contract depending on the type of MFI (H, L) in such a way that each MFI prefers the contract designed for her type rather than the contract designed for the other type (the Revelation Principle ensures that restricting attention to this kind of contract is without loss of generality). Thus, in step 0, the funding institution proposes a menu of contracts depending on the MFI's type $(\theta^H, T^H, e^H), (\theta^L, T^L, e^L)$. The other steps are unaffected.

Because types are unobservable, the proposed contracts have to satisfy an incentive compatibility constraint, to avoid MFIs mimicking a cost of effort that differs from the true one. As is well known, incentives for truthful revelation generally generate additional costs for the principal (the funding institution) in terms of rents abandoned to the agents (the MFI) and in terms of contract distortions. In some cases the principal (the funding institution) might also decide to offer the same contract to both types (pooling equilibrium) instead of tailoring the contract to the different cost characteristics, when the distortions created by the separating contracts are too large.

The funding institution maximizes his expected utility:

$$\begin{aligned} V &= \eta\Big[T^L - 1 + \lambda_1\Big(1 - (\frac{\alpha^L - \alpha^*}{1-\alpha^*})^2\Big) + \lambda_2(\theta(\alpha^L, e^L) - \mu^L e^L - T^L)\Big] \\ &\quad +(1-\eta)\Big[T^H - 1 + \lambda_1\Big(1 - (\frac{\alpha^H - \alpha^*}{1-\alpha^*})^2\Big) + \lambda_2(\theta(\alpha^H, e^H) - \mu^H e^H - T^H)\Big] \qquad (7) \end{aligned}$$

Under the two budget constraints:

$$\theta(\alpha^L, e^L) - T^L - \mu^L e^L \geq 0 \qquad (8)$$

[6] We will provide an interpretation of this menu of contracts at the end of the section.

$$\theta(\alpha^H, e^H) - T^H - \mu^H e^H \geq 0 \quad (9)$$

And the incentive compatibility constraints:

$$\theta(\alpha^L, e^L) - T^L - \mu^L e^L + \beta_1(1 - (\frac{\alpha^L - \alpha^*}{1 - \alpha^*})^2) \geq \theta(\alpha^H, e^H) - T^H - \mu^L e^H + \beta_1(1 - (\frac{\alpha^H - \alpha^*}{1 - \alpha^*})^2) \quad (10)$$

$$\theta(\alpha^H, e^H) - T^H - \mu^H e^H + \beta_1(1 - (\frac{\alpha^H - \alpha^*}{1 - \alpha^*})^2) \geq \theta(\alpha^L, e^L) - T^L - \mu^H e^L + \beta_1(1 - (\frac{\alpha^L - \alpha^*}{1 - \alpha^*})^2) \quad (11)$$

For standard reasons, at the optimal solution, the budget constraint of type H (9) and the incentive compatibility constraint of type L (10) will be binding, so that in the objective function of the funding institution (7) we can replace the values of the transfers:

$$T^H = \theta(\alpha^H, e^H) - \mu^H e^H \quad (12)$$

$$T^L = T^H + \beta_1\Big[(\frac{\alpha^H - \alpha^*}{1 - \alpha^*})^2 - (\frac{\alpha^L - \alpha^*}{1 - \alpha^*})^2\Big] + (\theta(\alpha^L, e^L) - \theta(\alpha^H, e^L)) + e^H(\mu^H - \mu^L) \quad (13)$$

Replacing (12), (13) and (1) in (7) we obtain:

$$\begin{aligned} V = & \ \eta\Big[\lambda_1(1 - (\frac{\alpha^L - \alpha^*}{1 - \alpha^*})^2) + \Delta R + R_P + \alpha^L(R_R - R_P) - \mu^L e^L - 1\Big] \\ & + (1-\eta)\Big[\lambda_1(1 - (\frac{\alpha^H - \alpha^*}{1 - \alpha^*})^2) + \Delta R + R_P + \alpha^H(R_R - R_P) - \mu^H e^H - 1\Big] \\ & - \eta(1 - \lambda_2)\Big[\beta_1[(\frac{\alpha^H - \alpha^*}{1 - \alpha^*})^2 - (\frac{\alpha^L - \alpha^*}{1 - \alpha^*})^2] + e^H(\mu^H - \mu^L)\Big] \end{aligned} \quad (14)$$

Because the MFI's revenue $\theta(\alpha^i, e^i)$ and her effort e^i, $i = \{1, 2\}$ are observable, maximizing (7) with respect to T^i, $\theta(\alpha^i, e^i)$ and e^i corresponds to maximizing equation (14) with respect to e^i and α^i subject to the residual constraints (8) and (11).

The last term in the funding institution's objective (14), $\beta_1[(\frac{\alpha^H - \alpha^*}{1-\alpha^*})^2 - (\frac{\alpha^L - \alpha^*}{1-\alpha^*})^2] + e^H(\mu^H - \mu^L)$, represents the information rent of the most efficient type L. Efficient MFIs get a (weakly) positive rent from their information advantage. This rent is null if and only if $\mu^H e^H = \mu^L e^L$ (which can occur only if $e^H = e^L = 0$) and $\alpha^H = \alpha^L$. The objective function of the funding institution is decreasing in the information rent, but its weight in the funding institution's utility is decreasing in λ_2 (the higher λ_2 the more the funding institution is willing to abandon positive profits to the MFI to ensure their survival and thus the less costly is the information rent in terms of utility for the funding institution). The funding institution can choose to induce equal or different effort levels and propose different or equal transfers (and thus shares α^i, $i \in \{H, L\}$).

Proposition 2 *Depending on the value of the parameters, the optimal menu of incentive-feasible contracts takes one of the following forms:*

***Type 1**: The funding institution induces no effort for both types ($e^H = e^L = 0$). The shares of richer borrowers are $\alpha^L = \alpha^H = \alpha^F$. Transfers are equal for the two types of MFI, $T^H = T^L = \theta(\alpha^F, 0)$.*

***Type 2**: The funding institution induces effort only from the efficient type L ($e^H = 0, e^L = 1$). The shares of richer borrowers are $\alpha^L = \alpha^H = \alpha^F$ respectively. The transfer from the less efficient MFI is $T^H = \theta(\alpha^F, 0)$ and $T^L = \theta(\alpha^F, 1) - \mu^L$ (or more precisely T^L is arbitrarily closed to $\theta(\alpha^F, 0) - \mu^L$).*

***Type 3**: The funding institution induces effort from both types ($e^H = e^L = 1$) and proposes separating contracts with different shares of richer borrowers $\alpha^L < \alpha^H$ and $T^L < T^H$.*

Proof: see Appendix

Analysis.

Type 1 contract (no effort) is optimal if and only if $\Delta R < \mu^L$. Otherwise, the principal would induce effort of at least the more efficient type L.

If $\mu^L \leq \Delta R \leq \mu^H$ the funding institution proposes a type 2 contract, inducing high effort only for type L, because effort of type H is too costly to be desirable. This type of contract does not generate any information rent and allows the funding institution to obtain its preferred share of richer borrowers α^F. Because type H is not incited to exert effort, its contract is not attractive for type L, who will be indifferent between the contract for type H and the one proposed for its type. Similarly, type H is not attracted by the contract proposed to type L because this contract does not allow it to cover a high cost of effort μ_H.

The richest case is the one in which $\Delta R > \mu^H$. In this case, effort of the two types of MFI is socially efficient, and would always be induced under complete information. However, under asymmetric information the principal needs to satisfy the incentive compatibility constraint (10), which becomes costly because an MFI of type L has a lower cost of effort and an incentive to pretend to be of type H.

Therefore, in order to obtain that both types of MFI make the effort without maximizing the cost of these efforts for the donor, it is necessary to leave an information rent to the efficient MFIs. Then, even when $\Delta R > \mu^H$, it may be the case that the funding institution prefers a type 2 contract in which inefficient MFIs do not make the effort in order to reduce the information rent given to efficient MFIs. This will be the case if $\Delta R - \mu^H$ (the efficiency gain associated to the effort of an inefficient MFI) and $1 - \eta$ (the proportion of inefficient MFIs) are low.

However, for reasonable values of the parameters of the model, the optimal contract for the funding institution will be a separating type 3 contract in which both types of MFI make the effort. This requires that $\Delta R > \mu^H$, which means that effort of the less efficient type also brings some efficiency gain, and that $1 - \eta$ is not too small, which means that there is not an overwhelming majority of more efficient MFIs. We will elaborate on type 3 contracts in the remaining part of this section.

Let us first consider the nature of these contracts. The funding institution wants both types of MFI to make the effort. But, in order to deter efficient MFIs from choosing the contract designed for inefficient ones, the funding institution has to make the contract designed for inefficient MFIs less attractive. Since T^H cannot be lower than $\theta(\alpha^F, 1) - \mu^H$ (otherwise inefficient MFIs will not be able to cover their costs), a natural way to do so is to increase α^H. Lowering the fraction of loans provided to poorer borrowers is costly for the MFI who also cares about the ratio of poorer and richer borrowers financed by his loans. Then, an efficient MFI will prefer a contract with $\alpha = \alpha^F$ and a lower T rather than the contract designed for inefficient MFIs with both a higher T and a higher α. As a result, we observe a stronger mission drift with an $\alpha > \alpha^F$ when the MFI is inefficient even though both the MFI and the funding institution would prefer α to be equal to α^F. This mission drift is explained by the hidden type of the MFI. The funding institution chooses the stronger mission drift as a way to reduce the information rent given to the efficient type.

Now, this is not the end of the story. Let us remember the *no distortion at the top* rule that usually applies in principal-agent contexts. The contract designed for the most efficient agent is not distorted, being unaffected by the asymmetric information (except for the amount of the transfer). A natural interpretation of this rule in the environment we consider would be that the contract proposed to the efficient agent should specify an effort level and an α equivalent to the one we would observe with perfect information: $e = 1$ and $\alpha = \alpha^F$. This is not the case here and it is possible to obtain a contract which is socially preferable[7] to the one obtained in the perfect information case.

For the sake of simplicity, we will first present the intuition of this result for the case $\lambda_2 = 0$. Suppose that the funding institution wants both types of MFI to make the effort and α to be

[7] By *socially preferable*, we mean here that both the MFI and the funding institution are more satisfied with the level of α obtained with asymmetric information than the one obtained with perfect information.

equal to α^F. He can obtain this outcome with a contract $(e, \alpha, T) = (1, \alpha^F, \theta(\alpha, 1) - \mu^H)$. Both types of MFI accept the contract and efficient MFIs obtain a revenue equal to $\mu^H - \mu^L$. This means that efficient MFIs are no longer budget constrained. Then, the funding institution could propose a contract $(1, \alpha^F - \varepsilon, \theta(\alpha^F - \varepsilon, 1) - \mu^H + \frac{\varepsilon(2\alpha^F - 2\alpha^* - \varepsilon)\beta_1}{(1-\alpha^*)^2})$, $\frac{\varepsilon(2\alpha^F - 2\alpha^* - \varepsilon)\beta_1}{(1-\alpha^*)^2}$, being the MFI's increase in utility when α decreases from α^F to $\alpha^F - \varepsilon$. This contract can be interpreted as follows. The funding institution proposes to efficient MFIs a reduction of α by ε, a decrease in the repayment due to the higher fraction of poorer borrowers and an increase in the money that he is paid back by an amount *equivalent* to the increase in utility of the MFI obtained by reducing α. This means that the funding institution derives both his extra utility by lowering α and the extra utility that the MFI derives by lowering α (through the increase of T), a total equal to $(\lambda_1 + \beta_1)\frac{(\alpha^F - \alpha^*)^2 - (\alpha^F - \varepsilon - \alpha^*)^2}{(1-\alpha^*)^2}$.

If the funding institution receives all the social surplus associated to a decrease in α, his optimal value of α is no longer α^F but it coincides with the socially optimal value of α (taking into account the MFI and the funding institution's preferences): $\alpha^{F+M} \equiv \alpha^* + \frac{(1-\alpha^*)^2(R_R - R_P)}{2(\lambda_1 + \beta_1)} < \alpha^F$ so that the funding institution is better off if the efficient MFI accepts the contract (as long as $\alpha^F - \varepsilon \geq \alpha^{F+M}$) and the MFI will accept it as long as $\frac{\varepsilon(2\alpha^F - 2\alpha^* - \varepsilon)\beta_1}{(1-\alpha^*)^2} \leq \mu^H - \mu^L$ (otherwise the budget constraint is no longer satisfied and she goes bankrupt).

This explains why in the optimal contract designed for the efficient MFI, the α is strictly lower than α^F, getting closer to α^{F+M}, the value of α which maximizes the joint utility of the funding institution and the MFI. Distorting downwards the share of richer borrowers served by the efficient MFI, the funding institution can obtain a higher surplus, so that he always chooses to do this at the optimal contract.

It is an unusual result to observe that the existence of hidden types may somehow improve the situation. This is explained by the budget constraint of the MFI. If the MFI was not budget constrained, even in the absence of asymmetric information she may *bargain* with the funding institution to set $\alpha = \alpha^{F+M}$, with an associated repayment T higher than borrowers' reimbursements. But this is not feasible because of the budget constraint of the MFI. Now, with hidden types, the efficient MFI extracts an information rent so that her budget constraint is relaxed. This allows to make a contravt with α closer to α^{F+M} and a lower net income for the efficient MFI.

Because in the optimal contract the share of richer borrowers is distorted upwards for the inefficient MFIs and downwards for the efficient ones, the average share of richer borrowers can be lower or higher than the one prevailing under complete information. The impact of hidden types on mission drift is thus ambiguous. Intuitively, if the share of efficient MFIs, η, is high enough, then the average share of richer borrowers served by the two types of MFI will decrease, because the downward distortion of α will prevail for a large number of contracts.

To see this, we have computed the share of richer borrowers $\overline{\alpha} = \eta\alpha^L + (1-\eta)\alpha^H$ and compared it with the benchmark level α^F (obtained under complete information) in numerical examples. For instance, if we set $\alpha^* = 0.2$, $\beta_1 = \lambda_1 = 0.3$, $\lambda_2 = 0$, $R_P = 0.5$, $R_R = 0.1$, $\Delta R = 0.7$, $\mu^H = 0.4$ and $\mu^L = 0.1$, then the average share of richer borrowers $\overline{\alpha}$ is lower than α^F whenever the share of efficient MFI, η, is higher than 0.5. Thus, in this example if more than half of the MFIs are efficient, mission drift is reduced when information is asymmetric. The same qualitative behavior holds in general (but of course the threshold of η moves when we modify the values of the parameters), as shown in the Appendix.

In our context, in which both the MFI and the funding institution are pro-poor (although they can put different weights on their pro-poor orientation and also care about revenues), incomplete information can deliver a result which is socially more desirable than complete information. The necessity to discriminate among MFI types pushes the funding institution to decrease the share of richer borrowers served by more efficient MFIs while demanding higher transfers to compensate for this deviation from the preferred level α^F. This allows the funding institution and the MFI to increase efficiency and may have an unexpected beneficial effect on the pro-poor orientation of lending activities (when the average share of poorer borrowers is increased).

Discussion

A noticeable feature of the hidden-type problem is that the impact of asymmetric information does not necessarily go in the direction of increasing the mission drift with respect to the benchmark case of complete information. As shown above, in the separating equilibrium with different shares of richer borrowers, this share is distorted upwards for the inefficient MFIs but downwards for the more efficient ones.

For the separating contract of type 2, with identical shares of richer borrowers for the two types of MFI, the shares are not distorted with respect to the full information case. However, the agency problem for the funding institution induces an inefficiently low level of effort for high-cost MFIs. This can be perceived as a higher difficulty for some types of (relatively inefficient) MFIs to increase services to borrowers, when contracting with an external funding institution.

Hidden-type issues are particularly relevant in markets in which the heterogeneity among MFIs is high. This is the case in many Latin American countries, as stressed for instance in the recent report by Trujillo and Navajas (2014). In this context, our analysis could offer arguments that governments and development institutions have a role to play in helping MFIs to build capacity, provide better services and increase efficiency. In our model, to discriminate among MFIs under hidden types, the funding institution must set the contract such that the share of richer borrowers is smaller for more efficient MFIs. This allows the funding institution and the MFI to increase efficiency and may have an unexpected beneficial effect on the pro-poor orientation of lending activities. This indirect positive effect can occur if the number of efficient MFIs is large enough and it is increasing with the fraction of efficient MFIs. Therefore, governments and development institutions aiming to strengthen the fight against poverty could play a role by helping MFIs to increase their efficiency. Such a policy has a direct positive effect (which is expected), but in addition we show that it also has an additional indirect positive effect on the reduction of the mission drift.

It is also worth noting that the optimal menu of contracts of type 3 could also be interpreted as follows. The funding institution knows that MFIs may face high or low costs of effort and that MFIs must cover their costs. Because the funding institution cannot observe the type of the MFI, he proposes two different contracts. The first contract leaves the MFI (after the reimbursement T) a low amount in order to cover her costs, but *in compensation* the funding institution allows the MFI to lend money mainly to the poorer with an α close to α^*. In practice, the funding institution offers MFIs which announce low costs the possibility of financing projects that are more ambitious in terms of poverty outreach. The second contract instead leaves the MFI a higher amount in order to cover her costs, but implies a lower fraction of the lending activities being oriented towards the poorer borrowers, a higher α. Of course, the contract between the funding institution and the MFI is written in terms of repayment to the funding institution and not in terms of money left to finance the MFI's activities. But these are equivalent.

One may interpret the second contract, "A higher amount to cover the MFI's cost and a higher α", as follows. Since the MFI faces high costs, the funding institution does not want to spend too much money on the project and urges the MFI to choose a higher α to reduce the costs of funding her. However, we provide a different motive for this contract. We suggest that the funding institution may want to minimize the information rent of the MFI in case she faces low costs of effort. The funding institution wants to encourage low-cost MFIs to reveal their true efficiency. In order to do that, he must propose to high-cost MFIs a contract which is sufficiently unattractive for low-cost MFIs. Hence, the funding institution does not choose a high α^H in order to reduce his expenses when he is matched with a high-cost MFI, but rather to reduce the costs related to information extraction when matched with a low-costs MFI.

6 Conclusion

The present paper contributes to the debate on the recent evolution of the microfinance sector, fueled by the explosion of for-profit and profit-oriented MFIs and by a change in the nature of some external funding institutions (private vs. public). The entry of new market players raises the fear for a deviation from the social mission, the so-called mission drift. We build a model in which we analyze the relationship between funding institutions and MFIs, assuming that both are pro-poor. Assuming that the effort to screen valuable investment projects is costly, incentives have to be provided to the MFI by the funding institution to exert the right effort level and to choose the desired share of poorer borrowers.

We first concentrate on hidden-action issues. We show that, in this context, asymmetric information can reduce the share of poorer borrowers reached by loans, thus increasing the mission drift. In the second part of the paper, we concentrate on hidden-type issues. Incentives have to be provided to screen heterogeneous MFIs while inducing the optimal level of effort. In this case, the impact of asymmetric information does not necessarily increase the mission drift. The share of richer borrowers can be distorted upwards for inefficient MFIs but downwards for the more efficient ones. Our results confirm the idea that mission drift is a complex phenomenon and that observing that MFIs are serving unbanked wealthier populations should not, as such, be considered as alarming by socially responsible investors and observers.

Appendix:

Proof of Proposition 2

Let us first show that $(e^H, e^L) = (1, 0)$ cannot be part of an optimal choice for the funding institution. Suppose that there exists an optimal menu of contracts for the funding institution $((e^H, T^H, \alpha^H), (e^L, T^L, \alpha^L))$ with $(e^H, e^L) = (1, 0)$ for some values of the parameters of the model.

In order to satisfy the incentive constraints, the two following conditions must be satisfied:

$$\theta(\alpha^H, 1) - T^H - \mu^H + \beta_1(1 - (\frac{\alpha^H - \alpha^*}{1 - \alpha^*})^2) \geq \theta(\alpha^L, 0) - T^L + \beta_1(1 - (\frac{\alpha^L - \alpha^*}{1 - \alpha^*})^2)$$

$$\theta(\alpha^L, 0) - T^L + \beta_1(1 - (\frac{\alpha^L - \alpha^*}{1 - \alpha^*})^2) \geq \theta(\alpha^H, 1) - T^H - \mu^L + \beta_1(1 - (\frac{\alpha^H - \alpha^*}{1 - \alpha^*})^2)$$

which induce:

$$\theta(\alpha^H, 1) - T^H - \mu^H + \beta_1(1 - (\frac{\alpha^H - \alpha^*}{1 - \alpha^*})^2) \geq \theta(\alpha^H, 1) - T^H - \mu^L + \beta_1(1 - (\frac{\alpha^H - \alpha^*}{1 - \alpha^*})^2)$$

which cannot be verified since $\mu^L < \mu^H$. Hence, there cannot exist an optimal menu of contracts for the funding institution with $(e^H, e^L) = (1, 0)$.

Assume now that there exists an optimal menu of contracts for the funding institution such that $e^H = e^L = 0$.

Because no effort is made, there is no asymmetric information issue. In order to maximize his objective function the funding institution chooses his preferred α: α^F and a transfer equal to the expected repayment without effort and an $\alpha = \alpha^F$ for both types: $\theta(\alpha^F, 0)$.

Consider the case in which the funding institution would like to impose $(e^H, e^L) = (0, 1)$.

Suppose that there were only MFIs of type L and the funding institution would like them to make an effort. Then, by the definition of α^F and because of the budget constraint, the funding institution would impose the following optimal contract $(e^L, \alpha^L, T^L) = (1, \alpha^F, \theta(\alpha^F, 1) - \mu^L)$. On the other hand, if there were only MFIs of type H and the funding institution would like them to make no effort, by the definition of α^F and because of the budget constraint, the funding institution would impose the following optimal contract $(e^H, \alpha^H, T^H) = (0, \alpha^F, \theta(\alpha^F, 0))$. Now, even in the presence of the two types of MFI, these two contracts satisfy the budget constraints and the incentive constraints so that the funding institution cannot obtain a higher utility than what he obtains by proposing these two contracts if he wants to implement $(e^H, e^L) = (0, 1)$.

Eventually, suppose that the funding institution wants both types of MFI to make the effort.

We first intend to show that the funding institution cannot maximize his utility by choosing a menu of contracts such that $\alpha^H < \alpha^L$ or $\alpha^H = \alpha^L \neq \alpha^F$.

Suppose that the funding institution can maximize his utility by proposing two contracts with $\alpha^H \leq \alpha^L$. Because of the incentive constraints, we must have

$$T^L = T^H - \beta_1((1-(\frac{\alpha^L-\alpha^*}{1-\alpha^*})^2) - (1-(\frac{\alpha^H-\alpha^*}{1-\alpha^*})^2))$$

If this equality is not satisfied, one of the two incentive constraints is not satisfied.

Besides, the budget constraint of type L can be written $T^H \leq \theta(\alpha^H, 1) - \mu^H$, so that the best contracts the funding institution can propose for a fixed (α^L, α^H) with $\alpha^H < \alpha^L$ gives him the following utility:

$$(1-\eta)(\theta(\alpha^H,1) - 1 - \mu^H - \beta_2(1-(\frac{\alpha^H-\alpha^*}{1-\alpha^*})^2))$$
$$+\eta(\theta(\alpha^L,1) - 1 - \mu^H - \beta_2(1-(\frac{\alpha^L-\alpha^*}{1-\alpha^*})^2) - \beta_1((1-(\frac{\alpha^L-\alpha^*}{1-\alpha^*})^2) - (1-(\frac{\alpha^H-\alpha^*}{1-\alpha^*})^2)))$$

If we put aside the last term, $\beta_1((1-(\frac{\alpha^L-\alpha^*}{1-\alpha^*})^2) - (1-(\frac{\alpha^H-\alpha^*}{1-\alpha^*})^2))$, by the definition of α^F, this expression is maximized by choosing $\alpha^H = \alpha^L = \alpha^F$. Besides, since $\alpha^H \leq \alpha^L$, the last term is always negative or null and by choosing $\alpha^H = \alpha^L = \alpha^F$ the funding institution minimizes the value of this last expression making it equal to zero. Hence, this cannot be maximized by choosing $\alpha^H < \alpha^L$ or $\alpha^H = \alpha^L \neq \alpha^F$.

Overall, neither $\alpha^H < \alpha^L$ nor $\alpha^H = \alpha^L \neq \alpha^F$ can be part of an optimal menu of contracts for the funding institution.

Now we intend to prove that $\alpha^H = \alpha^L = \alpha^F$, necessarily with $T^L = T^H = \theta(\alpha^F, 1) - \mu^H$, cannot be part of an optimal menu of contracts for the funding institution. In order to prove it, we will propose a pair of contracts that gives a higher utility to the funding institution.

Consider the following pair of contracts: $(1, \alpha^F, \theta(\alpha, 1) - \mu^H)$ and $(1, \alpha^F - \varepsilon, \theta(\alpha - \varepsilon, 1) - \mu^H + \frac{\varepsilon(2\alpha^F - 2\alpha^* - \varepsilon)\beta_1}{(1-\alpha^*)^2} - \varepsilon^2)$ with ε strictly positive and arbitrarily small.

The type H will never choose the second contract since this would mean making the effort and having to repay to the MFI an amount strictly higher than her reimbursement minus μ^H. She does not respect her budget constraint with this contract and goes bankrupt, so that she chooses the first contract.

Now, let us verify that the type L prefers the second contract.

With the first contract, she gets:

$$\mu^H - \mu^L + \beta_1(1 - (\frac{\alpha^F - \alpha^*}{1 - \alpha^*})^2 \tag{15}$$

With the second contract, she gets:

$$\mu^H - \mu^L + \beta_1(1 - (\frac{\alpha^F - \varepsilon - \alpha^*}{1 - \alpha^*})^2 - \frac{\varepsilon(2\alpha^F - 2\alpha^* - \varepsilon)\beta_1}{(1 - \alpha^*)^2} + \varepsilon^2 \tag{16}$$

Equal to

$$\mu^H - \mu^L + \beta_1(1 - (\frac{\alpha^F - \alpha^*}{1 - \alpha^*})^2 + \varepsilon^2 \tag{17}$$

(17) is strictly higher than (16) since $\varepsilon^2 > 0$.

Now, is the funding institution strictly better off if a type L MFI chooses the second contract rather than the first one?

If a type L MFI chooses the first contract, the funding institution gets:

$$\theta(\alpha^F, 1) - \mu^H - 1 + \lambda_1(1 - (\frac{\alpha^F - \alpha^*}{1 - \alpha^*})^2) + \lambda_2(\mu^H - \mu^L) \tag{18}$$

If a type L MFI chooses the second contract, the funding institution gets:

$$\theta(\alpha^F - \varepsilon, 1) - \mu^H - 1 + \frac{\varepsilon(2\alpha^F - 2\alpha^* - \varepsilon)\beta_1}{(1 - \alpha^*)^2} - \varepsilon^2 + \lambda_1(1 - (\frac{\alpha^F - \varepsilon - \alpha^*}{1 - \alpha^*})^2)$$
$$+\lambda_2(\mu^H - \mu^L + \varepsilon^2 - \frac{\varepsilon(2\alpha^F - 2\alpha^* - \varepsilon)\beta_1}{(1 - \alpha^*)^2})$$

Computing the value of (19) − (18), we obtain:

$$\theta(\alpha^F - \varepsilon, 1) - \theta(\alpha^F, 1) + \frac{\varepsilon(2\alpha^F - 2\alpha^* - \varepsilon)\beta_1}{(1 - \alpha^*)^2} - \varepsilon^2 + \lambda_1(\frac{(\alpha^F - \varepsilon - \alpha^*)^2 - (\alpha^F - \alpha^*)^2}{(1 - \alpha^*)^2})$$
$$+\lambda_2(\varepsilon^2 - \frac{\varepsilon(2\alpha^F - 2\alpha^* - \varepsilon)\beta_1}{(1 - \alpha^*)^2})$$

Remembering that $\theta(\alpha^F - \varepsilon, 1) - \theta(\alpha^F, 1) = -\varepsilon(R_R - R_P)$, this is equal to:

$$-\varepsilon(R_R - R_P) + \frac{\varepsilon(\beta_1 + \lambda_1)}{(1 - \alpha^*)^2}(2\alpha^F - 2\alpha^* - \varepsilon) - \varepsilon^2 + \lambda_2(\varepsilon^2 - \frac{\varepsilon\beta_1}{(1 - \alpha^*)^2}(2\alpha^F - 2\alpha^* - \varepsilon)) \tag{19}$$

Which can be written:

$$\varepsilon[-(R_R - R_P) + \frac{\beta_1(-\alpha_2) + \lambda_1}{(1 - \alpha^*)^2}(2\alpha^F - 2\alpha^* - \varepsilon) - \varepsilon^2(-\lambda_2)] \tag{20}$$

Now, by definition, $\alpha^F = \alpha^* + \frac{(1-\alpha^*)(R_R - R_P)}{2\lambda_1}$ so that (20) is equal to:

$$\varepsilon[-(R_R - R_P) + (R_R - R_P)\frac{\beta_1(-\alpha_2)}{(1-\alpha^*)^2}(2\alpha^F - 2\alpha^* - \varepsilon) - \varepsilon^2(-\lambda_2)] \tag{21}$$

Equivalent to:

$$\varepsilon[\frac{\beta_1(-\alpha_2)}{(1-\alpha^*)^2}(2\alpha^F - 2\alpha^* - \varepsilon) - \varepsilon^2(-\lambda_2)] \tag{22}$$

If ε is sufficiently small this is strictly positive since $\alpha^F > \alpha^*$.

The funding institution is strictly better off if the type L chooses the second contract rather than the first one. Since the type L also strictly prefers the second contract rather than the first one, the funding institution will be strictly better off proposing both contract 1 and contract 2 than if he only proposes contract 1. Hence, $\alpha^H = \alpha^L = \alpha^F$, necessarily with $T^L = T^H = \theta(\alpha^F, 1) - \mu^H$, is not an optimal menu of contracts for the funding institution.

Q.E.D.

Illustration: non-binding budget constraint for type L

Consider the case in which the budget constraint of type L, given in (8), is not binding at the optimal solution. In this case, the optimal shares of richer borrowers α^H and α^L are obtained maximising the objective of the funding institution as given in (14) with no further constraints, as long as $\alpha_L < \alpha_H$. In fact, as long as $\alpha_L < \alpha_H$, the incentive compatibility of type H, (11), is always satisfied because type H cannot choose the contract designed for type L without violating the budget constraint (9). The following result holds:

Result 1 *Suppose that $\mu^H < \Delta R$ and $\mu^H - \mu^L > \beta_1 - \frac{(1-\alpha^*)^2(R_R-R_P)^2}{4(\beta_1(1-\lambda_2)+\lambda_1)^2}$ so that the budget constraint (8) is not binding. Then there exists a threshold $\eta(\alpha^*, \lambda_1, \lambda_2, \beta_1, R_R - R_P) \equiv \tilde{\eta} \in (0,1)$ such that:*

- *If $0 < \eta \leq \tilde{\eta}$ the funding institution proposes the separating contract with different shares of richer borrowers described in case 3, the MFIs accept the contract and choose*

$$\alpha^H = \begin{cases} \alpha^F + \frac{(1-\alpha^*)^2\beta_1\eta(1-\lambda_2)(R_R-R_P)}{2(\lambda_1(1-\eta)-\beta_1\eta(1-\lambda_2))}, & \text{if } \eta \leq 1 - \frac{2\beta_1(1-\lambda_2)}{(1-\alpha^*)(R_R-R_P)+2\beta_1(1-\lambda_2)+2\lambda_1}; \\ 1, & \text{otherwise.} \end{cases} \tag{23}$$

$$\alpha^L = \alpha^F - \frac{(1-\alpha^*)^2\beta_1(1-\lambda_2)(R_R-R_P)}{2\lambda_1(\lambda_1+\beta_1(1-\lambda_2))} \tag{24}$$

- *If $\tilde{\eta} < \eta \leq 1$ the funding institution proposes the separating contract with equal share of richer borrowers described in case 2. Type L exerts high effort and type H does not. Both types choose $\alpha^H = \alpha^L = \alpha^F$.*

Proof: Suppose for now that (8) is not binding (the condition under which this is satisfied will be checked ex-post). Then, the optimal contract from the point of view of the funding institution is obtained by the unconstrained maximisation of (14) with respect to α^H and α^L. Because (14) is a concave function of α^L and α^H, the optimal solution is obtained from the first-order conditions:

$$\begin{aligned}\frac{\partial V}{\partial \alpha_H} &= (1-\eta)(R_R - R_P - \frac{2(\alpha^H - \alpha^*)}{(1-\alpha^*)^2}) + \eta\beta_1 \frac{2(\alpha^H - \alpha^*)}{(1-\alpha^*)^2} = 0 \\ \frac{\partial V}{\partial \alpha_L} &= \eta(R_R - R_P - \frac{2(\alpha^L - \alpha^*)}{(1-\alpha^*)^2}) = 0\end{aligned}$$

Solving the system of first order conditions (and imposing $0 \leq \alpha^H \leq 1$ and $0 \leq \alpha^L \leq 1$) gives the values of α^H and α^L in (23) and (24). We have now to verify the conditions under which these contracts respect the type L budget constraint (8). Replacing these values in (8) and developing computations, we obtain that (8) is not binding if and only if $\mu^H < \Delta R$ and $\mu^H - \mu^L > \beta_1 - \frac{(1-\alpha^*)^2(R_R - R_P)^2}{4(\beta_1(1-\lambda_2)+\lambda_1)^2}$. Equations (23) and (24) thus characterize the best separating contract from the point of view of the funding institution when the latter condition is satisfied.

Now consider the (weighted) average share of richer borrowers given by $\overline{\alpha} = \eta\alpha^L + (1-\eta)\alpha^H$. Replacing for the values of α^H and α^L given by (23) and (24) respectively and developing computations, we find that $\overline{\alpha}$ is smaller than α^F if and only if $\eta > 1 - \frac{(1-\alpha^*)\beta_1(1-\lambda_2)(R_R - R_P)}{\lambda_1(2\lambda_1 + 2\beta_1(1-\lambda_2) - (1-\alpha^*)(R_R - R_P))} \equiv \hat{\eta}$. Replacing for $\alpha^* = 0.2, \beta_1 = \lambda_1 = 0.3, \lambda_2 = 0, R_P = 0.5, R_R = 0.1, \Delta R = 0.7, \mu^H = 0.4, \mu^L = 0.1$, we obtain the numerical example given in the main text. We recall here that for very low values of $1-\eta$ the contract of type 2 illustrated in Proposition 2 is preferred by the funding institution to the contract of type 3 here illustrated. Replacing for the value of the parameters in the utility of the funding institution (14) one can check that this only happens if $\eta > 0.8$.

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