# A Model of Mission Drift in Microfinance Institutions

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## Abstract

In this paper we offer a theoretical formalization of the phenomenon known as mission drift. In recent years there have been claims that the entry of large donors with deep pockets have led to a mission drift phenomenon, whereby microfinance institutions (MFIs) who were previously catering to the poorest agents have drifted towards catering to the 'better off' poor. We offer an explanation for how the change in the portfolio of a poverty minimizing MFI might be linked to the phenomenon of increasing commercialization through the advent of large profit oriented donors. Under the presence of profit oriented donors, we identify interesting equilibrium relationships between strategic behavior of MFIs and the outcomes for the poor.

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## 1. Introduction

Amidst the overwhelming success of the microfinance revolution, there is growing concern about the presence of an apparent trend towards commercialization among microfinance institutions (henceforth MFIs). The concern is that an emphasis on profitability implies a de-emphasis on poverty reduction and related development goals. ACCION International, a network based in Boston that provides support for microlenders in the United States and Latin America has been highly influential in shaping donors' minds over the past decade, advocating that subsidization be limited to start-up costs only and then pushing hard for commercial orientation. The idea behind this strategy is that the best hope to reach the greatest number of poor households is to get access to commercial capital in amounts that are only possible if institutions transform themselves into profitable banks. Critics on the other hand argue that this strategy pushes the poorest borrowers out of the client base and hence, amounts to a shift from the original mission of microfinance. This phenomenon has been termed "mission drift", as exemplified in an influential debate between the Grameen Bank founder Mohammad Yunus and the billionaire turned microfinance expert, Pierre Omidyar.[1]

There is mixed academic evidence regarding the success of such an agenda. Studies such as Hulme and Mosley (1996), Coleman (1999) and Copestake et.al (2005) indicate that it is the *better off poor* rather than the *starkly poor* who stand to benefit the most from the wave of commercialization. Other studies such as Khandker (2005) point in the other direction where he finds that the impact of microfinance is slightly higher for extreme poverty than for moderate poverty in his study in rural Bangladesh. The study by Cull et.al (2007) is the only convincing study which explores the issue as to whether more profitability is associated with a lower depth of outreach to the poor and whether there is a deliberate shift away from serving poor clients to wealthier clients in order to achieve financial sustainability. In their study, Cull et.al disaggregate their data set by lending type, namely, joint liability contracts, village banking and individual based lending. They do find evidence that larger loan sizes are associated with lower average costs for both individual-based lenders and group lenders. Since larger loan size is often taken to imply less outreach to the poor, their results do indeed have negative implications. For

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[1] See October 30, 2006 article "Millions for Millions" in *The New Yorker*.

individual-based lenders, the pattern of results they find are consistent with disincentives for depth of outreach- i.e., the personnel expenses devoted to identifying borrowers worthy of larger loans could deter institutions from serving the poorest segments of society. Regarding mission drift they find that larger individual based lenders and group-based lenders tend to extend larger loans and lend less frequently to women. Older individual-based lenders also do worse on outreach measures than younger ones. While this is not evidence of mission drift in the strict sense (i.e., that pursuit of improved financial performance reduces focus on the poor), the results for larger and older microbanks are consistent with the idea that as institutions mature and grow, they focus increasingly on clients that can absorb larger loans.

We believe that the theoretical literature on microfinance has failed to adequately address such issues and hence to either explain or predict the analytics that might govern such phenomenon. The literature has talked about the 'better off poor' and the 'starkly poor' though the objective function adopted to model the MFIs is generally the standard profit maximization or client maximization such as in the recent study by McIntosh and Wydick (2005). One weakness of these objective functions is that they fail to distinguish between poor agents in terms of depth of poverty. A poor person who is just below the poverty line is treated equivalently as one who is much further below the poverty line. This is important because a number of recent policy debates and empirical studies, some of which we have mentioned above, emphasize that depth of poverty is a critical factor in determining the impact of microfinance. In this paper we take these issues explicitly into account by considering a weighted poverty minimization objective function to model the MFIs.

We contribute to the literature on microfinance by building a model in order to study the phenomenon of "mission drift". Firstly, we believe that we need to define as to what exactly one means by the term "mission drift". We follow the definition given in the study by Cull et.al (2007) where they define "mission-drift" as the phenomenon where "microbanks moved away from serving their poorer clients in pursuit of commercial viability". [2] Notice that this definition has no mention of the poverty reducing mission of the MFI. It is necessary to point this out since oftentimes the literature has interchangeably used the concepts of poverty reduction as the same thing as catering to the poorest clients. Our model uncovers the possible trade-offs and interactions associated with the poverty reducing mission of the MFI and the mission of catering

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[2] Cull et.al (2007), pg F108.

to the poorest clients. More precisely, we want to study whether and how it might be the case that the MFIs are able to have a larger impact on poverty at the expense of the poorer borrowers.

Empirical evidence regarding microfinance and poverty has posited that the microfinance revolution has indeed brought towards poverty reduction. Using panel data from Bangladesh, Khandker (2005) finds that microfinance accounts for 40 percent of the overall reductions in poverty in rural Bangladesh. Hulme and Mosley (1996) consider programs from different countries in Asia. In general they conclude that the average incomes for program participants have significantly increased. Mosley (2001) studies the poverty impact of *BancoSol* in Bolivia and finds that average income growth for program participants have more than doubled compared to non-participants. Similar poverty reduction effects were also found in the study by Dunn and Arbuckle (2001) in their study of the *Mibanco* in Peru. Thus in general the positive effect on poverty reduction due to MFIs has found widespread empirical support.[3] On the otherhand as the latest study of MFIs across 49 countries by Cull et.al (2007) shows, there has been a drift away from the poorest borrowers. In our paper we try to analyze the circumstances under which this situation might arise. If one considers mission-drift as a drift away from the poorest borrowers, then we show that indeed mission-drift has taken place, but at the same time the effect on poverty reduction has also taken place, as the empirical findings summarized above show.

With that aim, a natural first step to analyzing the impact of MFI lending would be to adopt a different sort of metric, such as a weighted poverty gap to scrutinize the impact the MFI's lending policies have on poverty. We consider agents with heterogenous wealth who differ in the success rates of their entrepreneurial projects, to uncover the trade-offs involved in allocating a given amount of subsidy to potential borrowers. As mentioned before, the MFI uses a weighted poverty gap such that it induces a higher weightage to the relatively poorer agents. Also in consonance with the empirical literature we vary the amount of loan required such that the better off agents have bigger projects which needs larger loan size. There is a transaction cost associated with each loan. In this scenario the weighted poverty index inclines the allocation of the loans to the poorer agents while the lower transaction costs associated with the larger loans of the better off agents inclines it to the better off agents. This is the basic tension in our model. We

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[3] There are few studies which have a nuanced verdict though. For example Amin et.al (2003) in their study in Northern Bangladesh finds that though programs are successful in reaching the poor, they are less successful at reaching the vulnerable. Poor vulnerable are effectively excluded from membership.

find that before the advent of the large donors, the MFIs distributed their loans based on the weightage it assigned to the poverty index. The amount of loans that each MFI received was based on the quality of their borrower pool. We compare this case with the scenario after the large donors entered the microfinance landscape. The advantage of such large donors is that their deep pockets free the MFI's from operating under restricted government subsidies which was the case before. On the other hand the large donors have no information as such about the pool of borrowers of the MFIs. Hence they cannot distinguish between competing MFIs. This prompts them to rely on the rate of return in order to extrapolate the quality of borrowers in each MFI's pool. We show that this in turn leads to the phenomenon of mission drift whereby the MFI's caters to the better off borrowers at the expense of the starkly poor in order to improve on their rate of return. Thus for same poverty weightage on the poverty index, we show that the MFI's change their loan portfolio to give larger loans while they were giving smaller loans to poorer agents before. They do this in equilibrium since the poverty reduction brought about by the larger pool of 'better-off poor' compensates the decrease in the poverty gap which it brought about by catering to the 'starkly-poor' borrowers before the advent of the large commercial donors.

The paper is structured as follows. In section 2 we establish the basic model. In section 3 a period game is explicitly analyzed to bring out the trade-offs that are driving the model. In section 4 we analyze the dynamic game between the donor and the MFI's. In this section we try to explain the apparently contradictory findings that have been the subject of the current debates on the issue of mission drift. Finally, in section 5 we conclude.


## 2. The Model


Assume there is a large population of agents. Each agent has access to a risky production project that generates a gross return of $R$ if successful and zero if unsuccessful. The probability that an agent's project is successful is $p_j$, where $j = h, l$ indicates the type of agent undertaking the project. We assume that $p_h > p_l$. Furthermore, the population of agents can be partitioned according to the size of investment they may make in their project. Fraction $\lambda$ of the population

can invest capital $k_L$ in the project and fraction $1 - \lambda$ can invest $k_S$, where $k_L > k_S$. We also assume that agents that can invest $k_L$ have an initial wealth endowment $w_L$, and agents that invest $k_S$ have an endowment $w_S$, where $w_L > w_S$.

To invest in their projects, agents must obtain capital loans. We assume agents cannot use their wealth endowments for investment as collateral. Hence, loan contracts are limited liability and loan size is simply $k_L$ or $k_S$, depending on the size of investment an agent is capable of. We use $r$ to denote the interest rate charged on the loan. Given a loan of size $k_i$, the agent must use available project revenue to make a repayment of $(1 + r)k_i$.

In our model, agents seek loans from a microfinance institution (MFI). MFI $j$ is provided with an initial budget $B_j$ that the MFI uses to distribute capital loans to agents. On each loan issued, we assume the MFI must pay an ex ante transaction cost $c$. The question the MFI faces is how many small loans and large loans to issue. If we denote $n_{S,j}$ as the number of small loans and denote $n_{L,j}$ as the number of large loans issued by MFI $j$, then the MFI selects an $n_j \equiv (n_{S,j}, n_{L,j})$ such that $n_{S,j}(k_S + c) + n_{L,j}(k_L + c) = B_j$. Note that since $k_S < k_L$, if the MFI specializes by loan size, it can issue more small loans than it can large loans.

To simplify the analysis we assume that the interest rate charged on each loan is fixed. That is, on every loan issued by an MFI, whether it is small or large, the interest rate is $r$. Under this assumption, the decision variable for the MFI is limited to the selection of an $n_j$, which we refer to as the *portfolio* choice of the MFI.

We assume that the MFIs vary in type. In particular, an MFI can be distinguished according to the fraction of agents in its portfolio choice that have high and low probabilities of success. For MFI $j$ fraction $\mu_j$ of the loans are issued to agents with a probability of success $p_h$, and fraction $1 - \mu_j$ of the loans are issued to agents with probability $p_l$. This parameter $\mu_j$ can be interpreted as a measure of the ability of the MFI to screen agents by their risk types.


**3. The One Period Game**

In our paper we focus on poverty minimizing MFIs. In particular, let $y_i$ denote an agent $i$'s expected net worth at the end of the period. To define poverty we adopt an expected poverty gap, $\sum_{y_i < \bar{y}} (\bar{y} - y_i)^\alpha$ where $\bar{y}$ is an exogenous poverty line and $\alpha$ is the weight assigned to the poverty gap. Throughout this paper, we restrict our attention to a case where all agents in the economy are always poor.

Suppose each MFI is endowed with an initial budget $B_j$. At the beginning of the period, endowed with a budget, the MFI selects a portfolio. The objective of the MFI is to choose a portfolio in order to maximize the aggregate decrease in poverty for agents who have no alternative source of funding. Note that the (expected) poverty gap for an agent that does not receive a loan is simply $(\bar{y} - w_i)^\alpha$, for $i \in \{S, L\}$. If MFI $j$ distributes a loan of size $k_i$ to an agent, then the expected net worth of the agent is

$$w_i + (\mu_j p_h + (1 - \mu_j) p_l)[R - (1 + r)] k_i.$$

Hence, for this agent the expected poverty gap is

$$\left( \bar{y} - \left\{ w_i + (\mu_j p_h + (1 - \mu_j) p_l)[R - (1 + r)] k_i \right\} \right)^\alpha.$$

The one-period problem facing MFI $j$ can be stated as follows.

Static Problem      Choose $n_j$ in order to maximize

$$\sum_{i = S, L} n_{i,j} \left( \bar{y} - w_i \right)^\alpha - n_{i,j} \left( \bar{y} - \left\{ w_i + (\mu_j p_h + (1 - \mu_j) p_l)[R - (1 + r)] k_i \right\} \right)^\alpha$$

Subject to      $n_{S,j}(k_S + c) + n_{L,j}(k_L + c) = B_j$

$$0 \le n_{i,j} \le B_j (k_i + c)^{-1} \text{ for } i = S, L$$

If we solve the first constraint for $n_{L,j}$ and substitute this into the objective function, we can express the MFI's problem as follows.

Choose $n_{S,j} \in \left[ 0, B_j (k_S + c)^{-1} \right]$ in order to maximize

$$n_{S,j} \left\{ \Delta_{S,j}(\alpha) - \frac{k_S + c}{k_L + c} \Delta_{L,j}(\alpha) \right\} + \frac{B_j}{k_L + c} \Delta_{L,j}(\alpha),$$

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where

$$\Delta_{i,j}(\alpha) \equiv (\bar{y} - w_i)^{\alpha} - (\bar{y} - \{w_i + (\mu_j p_h + (1 - \mu_j) p_l)[R - (1 + r)]k_i\})^{\alpha}$$

for $i \in \{S, L\}$. One can see that the problem has a corner solution, where the MFI exclusively issues small loans if

$$\frac{\Delta_{S,j}(\alpha)}{k_S + c} > \frac{\Delta_{L,j}(\alpha)}{k_L + c},$$

otherwise the MFI exclusively issues large loans. That is, we say the MFI chooses to specialize. The optimal portfolio choice is driven by whether $\Delta_{i,j}(\alpha)(k_i + c)^{-1}$ is larger for small or large loans.

Let us define $\rho_{i,j}(\alpha) \equiv \Delta_{i,j}(\alpha)(k_i + c)^{-1}$. This expression has a fairly nice interpretation. It indicates the decrease in an agent's poverty gap as a fraction of the resources invested in the agent by the MFI. To put it another way, it is the MFI's return on investment in terms of poverty reduction for a given loan size. Thus, the optimal portfolio choice for the MFI can be determined by simply comparing this poverty return on small and large loans.

For a general portfolio choice $n_j$ by MFI $j$, not necessarily portfolio specialization, the total expected poverty reduction expressed as a fraction of the MFI's budget is

$$\frac{n_{S,j} \Delta_{S,j}(\alpha) + n_{L,j} \Delta_{L,j}(\alpha)}{B_j}.$$

If we define $\phi_{S,j}$ as the fraction of the MFI's budget allocated to small loans, this expression is equivalent to

$$\rho_j(\phi_{S,j}; \alpha) \equiv \phi_{S,j} \rho_{S,j}(\alpha) + (1 - \phi_{S,j}) \rho_{L,j}(\alpha).^{4}$$

We refer to $\rho_j(\phi_{S,j}; \alpha)$ as the *poverty return* that MFI $j$ earns on a portfolio choice where fraction $\phi_{S,j}$ of the budget is allocated to small loans. Note that, maximizing this return is equivalent to maximizing the objective function stated in the MFI's static problem. The poverty return on the portfolio can be expressed as a linear combination of the returns on investment in terms of poverty reduction for a given loan size. For example, if $\rho_{S,j}(\alpha) > \rho_{L,j}(\alpha)$, then the

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[4] That is, $\phi_{S,j} \equiv B_j^{-1} n_{S,j}(k_S + c)$.

MFI's poverty return is maximized by setting $\phi_{S,j} = 1$, in which case the MFI specializes in offering small loans.

The discussion up to this point has not addressed how the weight $\alpha$ on the poverty gap plays a role in determining the portfolio choice of the MFI. To address this, let us start by considering the case where $\alpha = 1$.

**Proposition 1.** *If $\alpha = 1$, then the MFI optimally chooses to minimize outreach among the poor by exclusively issuing large loans to agents with higher wealth levels.*

*Proof.* MFI $j$ will select a portfolio where $n_{S,j} = 0$ if

$$\frac{\Delta_{S,j}(\alpha)}{k_S + c} < \frac{\Delta_{L,j}(\alpha)}{k_L + c}$$

$$\frac{(\mu_j p_h + (1 - \mu_j))[R - (1+r)]k_S}{k_S + c} < \frac{(\mu_j p_h + (1 - \mu_j))[R - (1+r)]k_L}{k_L + c}$$

$$k_S < k_L. \quad \text{QED}$$

If we define outreach as the number of loans issued, then by distributing large loans the MFI effectively decides to minimize outreach. Given that $\alpha = 1$, note that the MFI is indifferent between raising the income for an agent with $w_L$ ("the poor") and an agent with $w_S$ ("the poorest of the poor"). The MFI's decision to specialize in large loans is due to the presence of transaction costs. Since every loan issued by the MFI absorbs a positive transaction cost, by distributing large loans instead of small loans, more of the budget is actually utilized as capital for generating income.

When $\alpha = 1$, we might say that poverty is poverty regardless of how poor an agent is. On the other hand, if $\alpha > 1$ then the poorest of the poor become relatively more important in the measure of poverty. In fact, as $\alpha \to \infty$ the poverty gap is approximately equal to the sum of the gaps for only the poorest agents in the economy. In this case, to maximize the impact on poverty, the MFI should focus entirely on the poorest agents.

***Proposition 2.*** *There exists a* $\bar{\alpha} > 0$ *such that for all* $\alpha < \bar{\alpha}$ *the MFI issues exclusively large loans and for all* $\alpha > \bar{\alpha}$ *the MFI issues exclusively small loans.*

In the one-period framework, we find that the MFI optimally chooses to specialize by either exclusively distributing small loans or exclusively distributing large loans. This portfolio choice is governed by the weight on the poverty gap. Not surprisingly, for high weights on the poverty gap, the MFI will distribute loans to the poorest of the poor. For smaller weights, we find that due to transaction costs, the MFI optimally targets the less poor using larger loans.

When an MFI uses its budget to create a loan portfolio, out of the set of agents that receive loans, only a subset of these agents repays their loans. The fraction of agents that repay their loans depends on the types of agents in the portfolio, which in turn depends on the type of MFI issuing the loans. For this reason, if two different MFIs select an identical loan portfolio, the financial return on the portfolios will vary.

Given a budget $B_j$, the one period expected return MFI $j$ earns on portfolio $n_j$, given that $\phi_{S,j} = B_j^{-1} n_{S,j} (k_S + c)$, is

$$\pi_j\left(\phi_{S,j}\right) \equiv \frac{\sum_{i=S,L} n_{i,j}(\mu_j p_h + (1-\mu_j)p_l)(1+r)k_i - B_j}{B_j} \tag{01}$$

$$= \left[\phi_{S,j}\frac{k_S}{k_S + c} + (1-\phi_{S,j})\frac{k_L}{k_L + c}\right]\left(\mu_j p_h + (1-\mu_j)p_l\right)(1+r) - 1.$$

The expected portfolio return $\pi_j\left(\phi_{S,j}\right)$ an MFI earns is a function of both its portfolio choice and MFI type. As discussed earlier, due to the presence of transactions costs, to maximize portfolio return the MFI should exclusively distribute large loans. That is, the MFI maximizes its portfolio return by setting $\phi_{S,j} = 0$, which then generates an expected portfolio return of

$$\pi_j(0) = \frac{k_L(\mu_j p_h + (1-\mu_j)p_l)(1+r)}{k_L + c} - 1.$$

Independent of portfolio choice, the MFI's portfolio return is increasing in the parameter $\mu_j$. The MFI that is more effective at identifying low risk agents will wind up with the higher expected portfolio return. Furthermore, since low risk agents are more likely to be the ones that

successfully convert their capital loan into positive income, it is the MFI with the higher $\mu_j$ that has the greatest impact on poverty. Thus we establish the following link between portfolio return and poverty reduction.

***Lemma 1.*** *For a given portfolio, the higher the expected return the MFI earns on the portfolio, the greater the impact on poverty reduction.*

*Proof.* We know that portfolio return is increasing in $\mu_j$. For a portfolio choice $n_j$, the associated reduction in poverty is

$$\sum_{i=S,L} n_{i,j} \left( \bar{y} - w_i \right)^{\alpha} - n_{i,j} \left( \bar{y} - \left\{ w_i + (\mu_j p_h + (1-\mu_j) p_l)[R - (1+r)] k_i \right\} \right)^{\alpha}.$$

Taking the partial derivative of this summation with respect of $\mu_j$ results in

$$\sum_{i=S,L} -\alpha n_{i,j} \left( \bar{y} - \left\{ w_i + (\mu_j p_h + (1-\mu_j) p_l)[R - (1+r)] k_i \right\} \right)^{\alpha-1} (-p_h + p_l)[R - (1+r)] k_i > 0. \quad \text{QED}$$

If we have a situation where several different MFIs choose exactly the same portfolio, then any difference in portfolio return can be attributed to the ability of the MFI to screen lower risk agents. It is this type of low risk agent that is most likely to produce positive income and hence, the better the MFI is at identifying low risk agents, the greater the impact on poverty.

Up to this point we have identified the one-period tradeoffs faced by an MFI given a fixed budget. We now turn to a dynamic framework and allow the allocation of the budget to depend on the behavior of the MFI.

## 4. The Donors and the MFI budget

In this section, we examine the portfolio choices made by the MFI in a setting where the budget can depend on performance of the MFI. In particular, we study two separate cases. In the first case, we establish a benchmark in which the budget an MFI receives is conditional on its type. This model is intended to represent the early decades of microfinance, when donors themselves often were directly involved in creating and running the microfinance institution.

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Thus there was not only a congruency of the objectives of the donors and the MFI's but also the donors had perfect information of the quality of the borrower pool. Under such a setting, the portfolio choices of the MFI have no impact on their budgets. In the second case, we add a new type of donor to the model. This donor, unlike the other donors, has a profit maximizing objective. Also, the new donors had imperfect information about the quality of the borrower pools of the MFI are which they were catering to. In such a scenario the donor's funds are allocated to the MFI that earns the higher portfolio return. Under this framework, the portfolio choice of the MFI influences its budget. We study this problem in a repeated game framework. Our analysis is focused on identifying steady state equilibrium.

### 4.1. Poverty minimizing donors

In this section we consider a case where the donors are informed about the MFI and its lending activities. The donors are either assumed to know MFI type, or equivalently, to be capable of inferring type through the observation of portfolio return and portfolio choice. The informed donors then allocate funds to MFIs based on type, summarized by the parameter $\mu_j$. For our purposes, the donors decisions are entirely exogenous to the model. We simply postulate that given an MFI type $\mu_j$, donors allocate a budget of $B_j$. The implication of this assumption is that the budget allocation is independent of the portfolio choice by the MFI . Since the donors' objective is the same as the MFIs, namely poverty reduction, donor supply of funds should be sensitive to the type of MFI making loans. With perfect information, this is summarized by the parameter $\mu_j$. To formalize this, we assume there is a donor supply function $B(\mu)$, such that the MFI's budget depends on $\mu_j$, where $B'(\mu) > 0$.

***Proposition 3.*** *Under perfect information, for $\alpha > \bar{\alpha}$ ( $\alpha < \bar{\alpha}$ ) each MFI exclusively offers small (large) loans and the MFI with the higher fraction of low risk clients receives the largest budget.*

When donors have perfect information, funds are allocated based on the portfolio of the individual MFI, i.e., the MFI with the higher fraction of low risk clients receives the largest budget. The disbursement of the type of loans as to whether they give large or small loans is

based on the poverty weight. Thus, there is a clear dichotomy between the two aspects of poverty impact and portfolio return, in the sense that given there is perfect information, the donors can separate out these two key variables and disburse their loans based on their objective function, namely that of poverty minimization. We will see in the next section that these twin aspects gets intertwined when the donor cannot observe the porfolio, that is, the fraction of low risk agents that each MFI has.

In a repeated game setting, each period the MFI receives a budget identical to previous budget, independent of history. Thus, the MFI's dynamic problem is identical to the static problem. Each period the MFI simply solves its static poverty minimization problem. In this informed investor setting, where funds don't depend on performance, MFI behavior has no strategic elements. We can use this to contrast it with the next case, in which a new donor/investor with an alternative objective enters the microfinance market.

## 4.2. Profit oriented donors with Imperfect Information

The crux of the mission drift problem is that in recent years the MFI landscape has witnessed the entry of large commercial investors (large donors from here on) whose objective is that of profit maximization. The supposed advantage of such large donors is that their deep pockets free the MFI's from operating under restricted government subsidies as in the early years. On the other hand, the large donors tend to be arms-length investors, who rarely hold perfect information on the portfolios held by an MFI. In such a setting, investors might try to use portfolio return in order to extrapolate the quality of borrowers in the portfolio. If donors care only about the portfolio return, we show that this can have a rather dramatic impact on the portfolio choices of the MFI. In studying this game we restrict our attention to the case where the poverty weight $\alpha > \bar{\alpha}$. Under this assumption, our earlier results explained that the best portfolio choice in the static game is one of specialization in small loans.

In order to study the interaction between the donors and the MFIs, we adopt an infinite period alternating move repeated game. We also assume that the players utilize Markov strategies rather than history dependent strategies. When agents follow history-dependent strategies, actions can depend on aspects of the preceding game other than the present state of nature. That is, an agent's move may be contingent on how the agents arrived at the present

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situation. As the agents are allowed to reward or punish past moves by the opponent, the set of feasible equilibrium outcomes of infinite games is generally expanded compared to games where the agents apply Markov strategies.[5] A Markov strategy depends only on the state of nature when an agent moves. Decisions are based solely on factors related to the subgame played by the agents. Maskin and Tirole (1987, 1988a,b) in a series of papers on duopoly theory analyzed subgame perfect equilibria in Markov strategies of infinitely repeated, alternating move games. They defined a Markov perfect equilibrium as a pair of dynamic reaction functions where each agent maximizes the discounted sum of one-period payoffs for the rest of the game. In our model the MFI minimizes poverty reduction and the large donor maximizes profits. At the beginning of each period the donor determines the budget based on how the MFI is going to allocate it. The MFI in turn decides on its strategy as to whether to distribute large or small loans after observing the action of the donor. As shown in Maskin and Tirole (1987), the steady state of the game is equal to the static equilibrium for a discount rate of zero. Rather the dynamic reaction functions coincide with the static counterparts. Thus we will focus on the static game between the MFI and the donor in this scenario.

Throughout this section we assume that the donors can observe the ex post return the MFI generates on the lending portfolio. Thus, donors can use portfolio return to determine the size of the MFI budget. Consider a setting with two MFIs, indexed $j = a, b$. Assume that $\mu_a > \mu_b$ and that there is a poverty weight where $\alpha > \bar{\alpha}$. We refer to the MFI with $\mu_a$ as the "high quality" MFI and the other MFI as the "low quality" MFI. Suppose that, as in the previous section, poverty minimizing donors supply funds to each MFI based on type. That is, MFI $j = a$ has a budget of $B_a$ and MFI $j = b$ has a budget $B_b$. In addition to this source of funds, we now assume that there is a second type of donor. The new donor supplies an additional amount of funds $F$ to the MFI that earns the highest portfolio return. Hence, unlike the original donors, this new donor only cares about the financial return the MFI can earn by lending to the poor. Furthermore, we assume the new donor cannot observe the portfolio choice of the MFI and hence, cannot contract on portfolio choice.

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[5] For instance in the Cournot duopoly game, the infinite supergame with simultaneous moves has only one equilibrium when agents apply Markov strategies, yielding the one-period Nash-Cournot solution in each period, while several types of equilibria are feasible when agents follow history-dependent strategies (Maskin and Tirole 1987).

From the earlier analysis, we know that given a high weight on the poverty gap, each MFI specializes in distributing small loans. Under specialization, MFI $j$ earns a portfolio return of $\pi_j(1)$ and since $\mu_a > \mu_b$, it follows that $\pi_A(1) > \pi_B(1)$. If each MFI actually chooses to exclusively distribute small loans, MFI $a$ earns the higher portfolio return and thus, secures the additional funding $F$.

The MFI with the lower portfolio return receives no funding from the new donor. However, if this MFI adjusts its lending portfolio by issuing some large loans, its portfolio return will rise. In fact, we can calculate exactly what fraction of the portfolio the MFI must allocate to large loans in order to generate a portfolio return that matches what MFI $a$ earns. That is, we can find an $\phi_{S,b}$ where $\pi_b(\phi_{S,b}) = \pi_a(1)$. If MFI $b$ allocates a fraction just exceeding $\phi_{S,B}$ the MFI will win the funding $F$.

The question is whether the MFI would alter its loan portfolio to win a larger budget. To answer this we can compare the impact on poverty under the two scenarios. With a budget of only $B_b$, dedicated exclusively to small loans, MFI $b$ manages a reduction in poverty equal to

$$\frac{B_b}{k_S + c} \Delta_{S,b}(\alpha_b).$$

In order to win the additional funds $F$ the MFI must raise its portfolio return. In particular, the MFI needs a portfolio choice $(n_{S,b}, n_{L,b})$ such that $\pi_b(\phi_{S,b}) = \pi_a(1)$, or

$$\phi_{S,b} = \frac{\pi_a(1) + 1 - \dfrac{k_L}{k_L + c}\left(\mu_b p_h + (1-\mu_b)p_l\right)(1+r)}{\left(\dfrac{k_S}{k_S + c} - \dfrac{k_L}{k_L + c}\right)\left(\mu_b p_h + (1-\mu_b)p_l\right)(1+r)}.$$

With this allocation and a total budget of $B_b + F$, the MFI achieves a reduction in poverty of

$$\frac{\phi_{S,b}(B_b + F)}{k_S + c}\Delta_{S,b}(\alpha_b) + \frac{(1-\phi_{S,b})(B_b + F)}{k_L + c}\Delta_{L,b}(\alpha_b).$$

Keep in mind that by shifting its portfolio towards larger loans, this implies the MFI faces a decreasing poverty return $\rho_j$ on its portfolio choice. The reason this may an optimal strategy is because the adjusted portfolio, while earning a lower portfolio return, attracts a larger budget.

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To determine whether the MFI should adjust its loan portfolio we can compare the two poverty impacts. That is, the MFI will add large loans to its lending portfolio if

$$\frac{B_b}{k_S+c}\Delta_{S,b}\left(\alpha_b\right)<\frac{\phi_{S,b}(B_b+F)}{k_S+c}\Delta_{S,b}\left(\alpha_b\right)+\frac{(1-\phi_{S,b})(B_b+F)}{k_L+c}\Delta_{L,b}\left(\alpha_b\right).$$

$$F>\frac{(1-\phi_{S,b})B_b\left[\rho_{S,b}\left(\alpha\right)-\rho_{L,b}\left(\alpha\right)\right]}{\rho_b\left(\phi_{S,b};\alpha\right)} \quad (*)$$

First, note that if $F$ is large enough, then even when the MFI issues some large loans, the MFI may still be able to issue a higher number of small loans relative to the case where its budget is only $B_b$. That is, for a high enough $F$ the inequality will hold. Second, note that if $F$ is zero the inequality does not hold. In general, given the larger budget $B_b+F$, if the MFI issues fewer small loans than it did under the budget of $B_b$, the inequality may or may not hold.

**Lemma 2.** If MFI $j=a$ specializes in small loans, MFI $j=b$ will have an incentive to adjust its loan portfolio by adding large loans if (*) holds.

What we find is that an MFI may shift its lending strategy away from exclusively issuing small loans to the poorest of the poor. The motivation for this is the additional funding that is available from a profit maximizing donor. While this shift from small loans to large loans implies that the poverty return on the portfolio will fall, the MFI only makes this deviation if it can achieve a larger reduction in poverty by doing so. The implication is that the amount of poverty reduction per dollar spent falls as the MFI shifts to large loans, but the total reduction in poverty actually achieved by the MFI rises.

When an MFI chooses to make this kind of adjustment to its portfolio, it does so because the reduction in poverty it is responsible for, goes up. Hence, one can argue that since the donors that provide MFI $j=b$ with the budget $B_b$ share the same objective function as the MFI, these donors are also better off when the MFI makes this deviation. In this sense, the two different objectives of the donor do not necessarily lead to contradictory lending policy. However, what we have avoided up to this point is how the other MFI will respond to its counterpart's decision to start issuing larger loans.

We have outlined a scenario where a lower quality MFI has an incentive to allocate part of its loan portfolio to large loans in order to raise its portfolio return. In doing so, the MFI is able to generate a portfolio return that exceeds the portfolio return generated by the higher quality MFI. The incentive for such behavior comes from the promise of additional donor funds. Of course, faced with the prospect of losing donor funds $F$, the high quality MFI may choose to react by altering its own portfolio.

If the two MFIs are allowed to engage in this sequential adjustment of their portfolios, say prior to actually issuing loans, eventually they will reach a point where the lower quality MFI has a portfolio comprised entirely of large loans. At this point the lower quality MFI has a portfolio return of $\pi_b(0)$. Note that this is the highest portfolio return the MFI is capable of. To match this return, MFI $a$ can allocate fraction $\phi_{S,a}$ of portfolio to small loans, such that $\pi_a(\phi_{S,b}) = \pi_b(0)$. Since $\mu_a > \mu_b$ MFI $a$ is able to match the return at a fraction $\phi_{S,a} > 0$. With this portfolio choice by MFI $a$, it is now impossible for the lower quality MFI to achieve a higher portfolio return. Thus, with this particular fraction of its portfolio allocated to small loans, the high quality MFI is guaranteed to receive the additional donor funds $F$.

Consider a profile of strategies where MFI $a$ chooses a portfolio characterized by $\phi_{S,a}$ such that $\pi_a(\phi_{S,b}) = \pi_b(0)$, and MFI $b$ chooses to specialize in small loans. Assume for the moment, that if MFI $a$ makes any reduction in the number of large loans it issues, MFI $b$ will immediately react by adjusting its portfolio in order to capture the funds $F$. Given this situation, MFI $a$ faces the following choice. Either maintain a portfolio characterized by $\pi_a(\phi_{S,a}) = \pi_b(0)$ with a total budget of $B_a + F$, or specialize in small loans using a budget of only $B_a$. The MFI will prefer the mixed portfolio as long as

$$\left\{\frac{B_a}{k_S + c} - \frac{\phi_{S,a}(B_a + F)}{k_S + c}\right\}\Delta_{S,a}(\alpha_a) < \frac{(1 - \phi_{S,a})(B_a + F)}{k_L + c}\Delta_{L,a}(\alpha_a) \qquad (**)$$

$$F > \frac{(1 - \phi_{S,a})B_a\left[\rho_{S,a}(\alpha) - \rho_{L,a}(\alpha)\right]}{\rho_a(\phi_{S,a};\alpha)}$$

***Proposition 4.*** For $\alpha > \bar{\alpha}$, there exists an $\bar{F}$, such that for all $F \geq \bar{F}$ there is

    (i)     A (reactive) equilibrium in which the high quality MFI selects a loan portfolio comprised of both large and small loans, and the low quality MFI specializes in issuing small loans.

    (ii)    $\dfrac{\phi_{S,a}(B_a + F)}{k_S + c}\Delta_{S,a}(\alpha_a) + \dfrac{(1-\phi_{S,a})(B_a + F)}{k_L + c}\Delta_{L,a}(\alpha_a) \leq \dfrac{B_a}{k_S + c}\Delta_{S,a}(\alpha).$

**Proof.** To sustain the equilibrium we require that MFI $a$ prefers to keep the mixed portfolio and larger budget, rather than a specialized portfolio with the smaller budget. Formally, given that $\phi_{S,a}$ satisfies $\pi_a(\phi_{S,a}) = \pi_b(0)$, we require

$$\frac{B_a}{k_S + c}\Delta_{S,a}(\alpha) < \frac{\phi_{S,a}(B_a + F)}{k_S + c}\Delta_{S,a}(\alpha) + \frac{(1-\phi_{S,a})(B_a + F)}{k_L + c}\Delta_{L,a}(\alpha)$$

We also require that MFI $b$ would prefer to specialize in large loans if he can win the additional donor funds of $F$, rather than continue to hold the portfolio of small loans using the smaller budget. Formally, given a $\phi_{S,b} = 0$, we require

$$\frac{B_b}{k_S + c}\Delta_{S,b}(\alpha) < \frac{\phi_{S,b}(B_b + F)}{k_S + c}\Delta_{S,b}(\alpha) + \frac{(1-\phi_{S,b})(B_b + F)}{k_L + c}\Delta_{L,b}(\alpha)$$

In general, we get a minimum level of funding $F$ necessary for each constraint:

$$F > \frac{(1-\phi_{S,j})B_j\left[\rho_{S,j}(\alpha) - \rho_{L,j}(\alpha)\right]}{\rho_j(\phi_{S,j}; \alpha)} \quad \text{for } j = a, b$$

If we define $\bar{F}$ as the higher of the two F values, then as long as $F \geq \bar{F}$, we have a reactionary equilibrium. QED

       This proposition is the main result of the paper. Under the assumption that $\alpha > \bar{\alpha}$, the MFI faces a tradeoff between maximizing the financial return on the portfolio and the poverty return on the portfolio. For larger loans, the portfolio return is higher while the poverty return is lower and vice versa for smaller loans. When the donor had a poverty minimizing objective, as in the last subsection, there was a congruency of objectives amongst the donor and the MFI. As a result MFIs chose to specialize in distributing small loans, which maximized the poverty return. In the case of the less informed and larger donors with profit maximization objectives, the donors only look at portfolio return. Hence, to attract these new funds, the MFIs must focus on the portfolio returns. As a result, funding goes up only when the MFI is willing to lower the poverty return on its portfolio. What we find is that the higher quality MFI may choose to

distribute large and small loans in order to raise its portfolio returns enough to beat competing MFIs. This is worthwhile when the MFI can use the additional funds to make a bigger impact on poverty relative to the case of relying solely on profit minimizing donor budgets.

Hence, while the higher quality MFI wins the funding using a mixed portfolio, the lower quality MFI then gives up, so to speak, and selects a strategy of specializing in issuing small loans, as that is in consonance with its objective of poverty minimization. This forms a reactive equilibrium as claimed in part (i) of the above Proposition, and as defined by Riley (1979).[6] The high quality MFI will only alter its portfolio towards large loans if the extra funding that it gets, allows it to achieve a relatively greater reduction in poverty. Furthermore, the lower quality MFI selects the same portfolio as it did in the case of profit minimizing donors. Hence, part (ii) of the above Proposition states that the aggregate reduction in poverty is higher when the profit maximizing donor is present, relative to the reduction in poverty when they are not present.

**4.3 Mission Drift**

The equilibrium scenario we have described depicts a situation that roughly matches the empirical findings that have been documented with regard to mission drift. Namely, there has been a shift in lending portfolios from smaller to larger loans with increased commercialization in terms of the entry of larger donors, while at the same time, as several studies have indicated, poverty appears to have gone down. We observe these two facts simultaneously in our model. For a large weight on the poverty gap, we have shown that there is a portfolio adjustment away from smaller loans to larger loans by the high quality MFIs, signifying a move away from the 'starkly poor', as it is generally true that loan sizes are directly related to the wealth of the agents. But at the same time it can be in perfect consonance with the objective of poverty minimization, which is the sole objective of the MFIs.

We do find that the equilibrium outcome is not what the higher MFIs might hope for. That is, the MFI would prefer a situation where it could attract the funding from profit

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[6] For a formal definition of a "Reactive Equilibrium" see Pg 350 of Riley (1979). The basic idea is that a set of strategies is a reactive equilibrium if, for any deviating strategy which generates an expected gain to the agent, there is another which yields a gain to the other agent and losses to the first. If agents learn to anticipate such reactions, they will not make this type of alternative moves. In our case, a deviation from the above strategy as given in part (i) of Proposition 4 where the high quality MFI makes all smaller loans is profitable for it, but this will provoke a strategy where the low quality MFI gives larger loans. Thus anticipating this, the high quality MFI will not deviate.

maximizing donors and simultaneously choose a portfolio that maximizes its poverty return. This amounts to specializing in issuing small loans. The problem with such a lending strategy is that lower quality MFIs will then have an incentive to adjust their portfolios to boost portfolio return and hence, win additional funding. Again, this is a decision the MFI makes in order to make the biggest impact on poverty it can. Since the lower quality MFIs have an incentive to adjust their portfolios, the higher quality MFI must do likewise if it wants to retain the donors funding. As a result, the portfolio drifts towards larger loans, which generates a higher reduction in poverty, but a lower and lower poverty return.

## 5. Conclusion

Amidst the overwhelming success of the microfinance revolution there has been an increasing concern during the last decade about the phenomenon of 'mission drift'. Though there is body of empirical research and published debates on this phenomenon, to our knowledge there have been no attempts to formalize this question. Our paper develops a model which utilizes a definition of mission drift that claims that the entry of arm's length profit oriented donors with deep pockets have led to a phenomenon whereby MFIs previously catering to the poorest agents have drifted towards catering to the 'better off' poor. This observation is explained in papers such as Cull et.al (2007). At the same time there have been studies which conclusively show that there has been a decline in the overall poverty rate as a result of microfinance operations.

Our paper offers one explain as to how the changing portfolios of certain MFIs can be linked to the phenomenon of increasing commercialization through the advent of the large profit oriented donors. We find that while this drift towards larger loans does lower the actual reduction in poverty per dollar spent, the MFI is actually not abandoning its original mission. The MFI optimally chooses a balance between poverty and financial return, in order to maximize the individual impact the MFI can make on poverty. We should also acknowledge that there are certainly more than one definition of mission drift circulating in the literature. Our paper offers one approach to better understanding this controversial trend in the landscape of microfinance.

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