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A Model of Microfinance Regulation in a Mission Drift Context

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Abstract

This paper analyzes the problem of mission drift of risk averse microfinance institutions (MFIs) facing exogenous regulatory constraints. We develop a static portfolio model generalized to MFIs whose objective function has a double financial and social dimension. This model highlights a solidarity-return trade-off and allows us to determine the degree of mission drift of the MFI as the optimal proportion of the poorest in its micro-credit portfolio. The regulatory constraints lead to mission drift of MFIs by increasing the perceived risk of the poorest and the risk aversion of IMF, and/or by decreasing the loan return on the poorest. In order to curb mission drift in microfinance, regulatory inflection measures are recommended: the perceived risk reduction in microfinance sector, promoting certain financial innovations (quasi-capital, subsidized loans) and organizational innovations (two-headed structure of co-production) that strengthen the pro-social behavior of IMFs.

Keywords: Microfinance institutions, regulatory constraints, mission drift, banking portfolio model.

JEL Classification: G11, G23, G28, E58

1. Introduction

Combining financial intermediation and social intermediation, microfinance is an alternative to the financial inclusion of certain social categories excluded from the classical banking system. However, this challenge of financial inclusion goes on the difficulty of coupleing solidarity and economic calculation. In other words, microfinance is in danger of compatibility between solidarity and sustainability (Rhyne, 1998, Hulme and Mosley, 1998; Guérin, 2002). These difficulties are even greater when we face a growing integration of microfinance in the formal financial system (Christen, 2001, Littlefield and Rosenberg, 2004). Such a trend, which has become the dominant paradigm for the sector (Labie and Mees, 2005), results, on the one hand, from a real desire to transform IMFs into bank entities (Porteous, 2006). On the other hand, it results from strong external pressures from the dominant current of the profession and donors, which can lead IMFs to take on their social mission (Chao Beroff and Prebois, 2001). As a symbol, the Mexican IMF, Compartamos, introduced on stock exchange in 2007 has crystallized the debate on microfinance mission drift (Rosenberg, 2007; Lapenu, 2007).

The microfinance mission drift consists for the IMF in dedicating most of its financial resources to serve the richest clients at the expense of poor customers[2]. That's how, according to Cull et al. (2007), mission drift can be defined as the tendency of microfinance institutions (IMFs) to stand out from funding the poorest customers in order to achieve commercial viability.

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[2] Mission drift can also be taken into account in the behavior of certain IMFs that impose unbearable burden on the poorest: usurp rates, loans for insolvent households, unpaid borrowers who cannot repay.

Chao Beroff and Prebois (2001) identify three types of constraints based on mission drift: political constraint (integration with the dominant liberal system, in which economic matter predominates social one), cultural constraint (not taking into account social relationships either by indifference or because of their relative complexity) and institutional constraint (difficult direct contact with populations due to geographical and technical barriers). However, the question of mission drift remains open, according to a study conducted by CGAP (2003) on microfinance in Latin America. Indeed, if the mission drift is characterized by the offer of loans of higher amount by the MFIs in their process of change of scale, it goes without saying that the statement of a positioning on a market segment more " top of the line "can be variously interpreted. This can be as much a sign of mission drift as the sign of other factors: a progressive loan (natural evolution of the target group), a cross subsidy (Armendáriz and Szafarz, 2009, 2011, Armendáriz et al, 2013), an intertemporal strategy to attract commercial financial resources in order to finance the poor later (Ghosh and Van Tassel, 2008). Christen (2000) lists several factors, such as portfolio strategy and maturity that may lead the MFI to increase the size of loans granted without abandoning its mission to reduce poverty.

These nuances that enrich the debate on mission drift in microfinance have been provided by recent theoretical works growing in the field of microfinance (Copestake, 2007, Ghosh and Van Tassel, 2008, Mersland and Strøm, 2010, Armendáriz and Szafarz, 2011, etc.). In particular, the works developed by Gosh-Van Tassel (2008) and Copestake (2007) form the pioneering theoretical models for mission drift in microfinance. Gosh and Van Tassel (2008) model mission drift as part of a dynamic model with strategic interactions and show that it appears as the optimal strategy for MFIs to attract more capital from commercial donors (profit-oriented Donors). Armendáriz and Szafarz (2009) develop a one-period static model and show that mission drift is the result of an optimization process of the MFI faced with different costs related to the heterogeneity of the clientele (poor borrowers and richer borrowers). Armendáriz and al (2013) show that the current targeting of loans to the richest is not necessarily a sign of mission drift of the MFI. This can reflect the desire to reduce poverty in an intertemporal perspective. Their analytical framework is a dynamic model inspired by the theory of precautionary savings and works concerning the negative impact of aid volatility on poverty and growth. In case of uncertainty about obtaining financial subsidies, the MFI can optimally constitute a kind of precautionary savings in the first period by serving richer clients at the expense of poor clients. These additional resources are then a form of cross-subsidy that allows financing more poor customers in the second period. The tendency to lend more to the non-poor is seen here as an insurance policy against the inability to extend lending to the poor in the future.

Empirical observations show that the mission drift of some MFIs is not always linked to their desire to target the poor in an intertemporal perspective or the result of a strategic interaction between commercial and solidarity-based MFIs. Mission drift may simply be the result of overly burdensome prudential rules imposed on MFIs. In general, the regulation of microfinance codifies the management of competition, the applicable taxation, the methods of forced recovery of their claims and the supervision of MFIs (Lhériau, 2003). These rules, imposed on financial intermediaries to protect customer deposits and ensure the stability of the financial system, link the quality of borrowers (degree of risk) to the cost of credit: the riskier the borrower, the greater the credit must be expensive. The first component of these standards is a minimum capital requirement. While the ratio of a commercial bank's capital to the weighted sum of its assets (risk-weighted assets) must be at least 8%, that required by MFIs is sometimes around 20% (Gibbons and Meehan, 2003). Indeed, regulators categorize microcredit as a very risky asset. They consider that in microfinance, the risk that a borrower becomes insolvent and cannot repay the loan under the terms of the original agreement is very high. Thus, MFIs are forced to increase their equity if they want to grow and lend more. As a result, microcredit becomes expensive, reducing the yield of loans to the poorest.

Our objective, in this article, is to develop a mission drift model in which mission drift is the fruit, not of dynamic strategic behavior of MFIs, but rather of regulatory constraints that affect the risk-return pairing of their portfolios of customers. We use a portfolio model specific to traditional financial intermediaries that we generalize to MFIs in order to take into account the financial and social objective of the MFIs. The banking portfolio models are the application of the portfolio approach of Tobin (1958) and Markowitz (1959) to the analysis of the portfolio management of certain financial intermediaries. The banker is considered a risk-averse fund manager that diversifies its portfolio of assets taking into account their risk and uncertain future returns. The banker seeks to optimize the risk-return ratio so as to maximize the expected utility of the portfolio's profit from his investments while respecting his balance sheet constraint. The bank is in a pure and perfect competition situation and is a price-taker in the credit and deposit markets. We extend this type of model to the analysis of the economic behavior of an MFI.

Mission drift is then interpreted as an optimal response by MFIs responding to regulatory constraints by a solidarity-return trade-off. The rest of the article is organized as follows: after having modeled the risk-return trade-off by the portfolio theory approach (section 1), we derive the main results and comment on them (section 2). Next, the impact of regulatory constraints on solidarity-return trade-off is studied (section 3). Finally, we propose recommendations to curb the drift of mission in microfinance (section 4). Section 5 concludes.

2. A model of the MFI optimal behavior

2.1. The general assumptions of the model

A MFI is supposed to aim at the financial inclusion of individuals excluded from the traditional banking system. Without loss of generality, we restrict ourselves to the case of an MFI whose portfolio of assets includes only loans granted to poorer clients and less poor clients. The MFI finances a proportion θ of poorer clients and a proportion $(1-\theta)$ of less poor clients. The issue facing the MFI can be interpreted in terms of asset portfolio choice: it must then choose the optimal proportion θ^* of poorer clients to finance. The MFI aims for a dual purpose of financial gain and social value. While loans to the poorest and least poor provide financial gain to the MFI, only lending to the poorest provides it with social added value. Very often, the objective-functions used to model the behavior of the MFI are either to maximize the number of clients reached (Armendáriz and Szafarz, 2009, Jain and Mansuri, 2004, Armendáriz and al, 2013), or to maximize profit (McIntosh and Wydick, 2005). A weakness of these objective-functions is that they fail to explicitly distinguish between the poor in terms of depth of poverty. A poor person who is below the poverty line is treated similarly to the one who is above that threshold. In our model, this distinction is made. The goal of the MFI is twofold: financial gain and social utility. We note S_{pp} the social utility that the MFI derives from the financing of the poorest and S_p the social utility it derives from the financing of the least poor. Assuming that social utility is a certain variable, the expected utility of the social utility of the MFI's client portfolio is:

$$V(S_{IMF}) = \theta S_{pp} + (1-\theta) S_p \qquad (1)$$

The MFI is assumed not to derive a social utility from financing the least poor, so that $S_p = 0$. We then obtain:

$$V(S_{IMF}) = \theta S_{pp} = \frac{\sigma_{IMF}}{\sigma_{pp}} S_{pp} \qquad (2)$$

Taking into account the random nature of the financial gain, and assuming that the MFI is risk-averse, its expected utility associated with the financial gain value is written $U(R_{IMF}, \sigma_{IMF})$ with $U(.)$ a Von Neumann-Morgenstern utility function, continuous, increasing and concave: $U' > 0,\ U'' < 0$. Tobin (1958) and Markowitz (1959) have shown that some restrictions on the utility function or on the *a priori* distribution of random returns allow for the development of the mean-variance model as a solution to the portfolio selection problem. Levy and Markowitz (1979) demonstrate for some classes of utility functions that a portfolio based on the mean-variance criterion provides a level of expected utility that is very close to the level obtained by direct maximization of the expected utility, regardless of the nature of the distribution of random rates of return on assets. Based on these results and noting φ, the MFI degree of risk aversion, we can write the expected utility of the financial value, $U(R_{IMF}, \sigma_{IMF})$, according to the mean-variance criterion:

$$U(R_{IMF}, \sigma_{IMF}) = R_{IMF} - \frac{1}{2}\varphi \sigma_{IMF}^2 \qquad (3)$$

Where R_{IMF}, σ_{IMF} are respectively the portfolio yield and the portfolio risk of the MFI. The objective function of the MFI is the sum of the expected utility of its social utility and the utility of its financial gain weighted by the respective weight it gives to the social utility (α) and the financial utility $(1-\alpha)$. The weight α is assumed to be exogenous for the MFI. The objective function can then be written:

$$F(R_{IMF}, \sigma_{IMF}) = \alpha\, \theta S_{pp} + (1-\alpha)\left(R_{IMF} - \frac{1}{2}\varphi \sigma_{IMF}^2\right) \qquad (4)$$

This expression (4) shows that the values taken by the weight α in the interval $[0,1]$ correspond to different degrees of immersion of microfinance in the financialized environment:

- If $\alpha = 0$, the MFI makes its choices on the sole criterion of financial utility: we are in the case of purely commercial microfinance;
- if $\alpha = 1$, the MFI decides on the sole criterion of social utility: the case of microfinance with a purely social purpose;
- if $0 < \alpha < 1$, the MFI is based on both criteria. If α is closer to 0 than 1, it is because the commercial vocation of the MFI prevails over its social vocation. If α is closer to 1 than 0, it is the social vocation that prevails.

2.2. Assumptions about the constraints the MFI faces

The IMF faces prudential rules imposed by the regulator to protect customer deposits and ensure the stability of the financial system. These regulatory constraints link the quality of borrowers (degree of risk) to the cost of credit: the riskier the borrower, the greater the credit must be expensive. The regulator categorizes microcredit as a very risky asset. They consider that in microfinance is considered to highlight a very high risk that a borrower becomes insolvent and cannot repay the loan under the terms of the original agreement. Thus, MFIs are forced to increase their equity if they want to grow and lend more. As a result, the minimum capital requirement applied to microfinance is too high compared to that applied to conventional banks. We suppose that these regulatory constraints are exogenous to the MFI's optimization program. So they don't affect directly the objective function of the IMF. The constraint that is endogenous to the MFI's optimization program is the MFI's portfolio constraint. We get this constraint as follows: let us note R_{pp} the financial gain that the MFI draws from the financing of the poorest and R_p the financial gain it derives from financing the poor. It is a realistic assumption that the financial gain that the MFI receives from the poorest is strictly inferior to that obtained by the poorest $(R_{pp} < R_p)$. The financial gain of the MFI's client portfolio is:

$$R_{IMF} = \theta R_{pp} + (1-\theta)R_p = R_p + \theta(R_{pp} - R_p) \qquad (5)$$

To determine the risk associated with the portfolio of funded clients, we use the concepts of variance and standard deviation:

$$\sigma_{IMF}^2 = Var\,(R_{IMF}) = \theta^2\sigma_{pp}^2 + (1-\theta)^2\sigma_p^2 \qquad (6)$$

It is also assumed that financing poorer clients is more risky for the MFI than financing poor clients. Without loss of generality, it is posited that the financing of the poor is without risk, ie $\sigma_p^2 = 0$; from where:

$$\sigma_{IMF}^2 = \theta^2\sigma_{pp}^2 \quad \Rightarrow \quad \theta = \frac{\sigma_{IMF}}{\sigma_{pp}} \qquad (7)$$

By integrating the expression (7) in (5), it comes:

$$R_{IMF} = R_p + \frac{(R_{pp} - R_p)}{\sigma_{pp}}\sigma_{IMF} \qquad (8)$$

Knowing that $R_{pp} < R_p$, relation (8) expresses a result that contrasts with that obtained in traditional models of banking portfolio. In these traditional portfolio models, when the return on risky assets (in this case the poorer clients) is strictly lower than the yield of the risk-free asset (in this case the less poor), the financial intermediary has an interest in fully investing its resources in the risk-free assets. Indeed, with $R_{pp} - R_p < 0$, it comes that $R_{IMF} < R_p$: the financial return of the portfolio of the MFI is strictly lower than the financial return of the loans to the least poor, which implies that it is rational to form a portfolio composed exclusively of less poor clients. In this case, the optimal proportion is $\theta^* = 0$. The problem of the choice of portfolio then becomes trivial. But our model shows that this result of the traditional model of portfolio only holds in the particular case where the financial intermediary makes his decisions on the sole criterion of the financial capital gain, that is to say when $\alpha = 0$. When the MFI also aims for the social utility goal, this result no longer holds. Let's show it intuitively.

In the presence of the sole criterion of financial capital gain, when $R_{IMF} < R_p$, choosing a mixed portfolio is sub-optimal compared to the portfolio composed exclusively of less poor clients because the MFI can always increase its profit by substituting a less poor client to a poorer client to the point where the marginal gain in financial gain vanishes, that is, when all clients in their portfolio are less poor. On the other hand, when the MFI also takes into account the criterion of social added value, the choice of the exclusive portfolio is no longer optimal even if $R_{IMF} < R_p$: indeed, the MFI can increase its satisfaction by substituting a customer more additional poor to a less poor client as long as the marginal gain in social capital gain is greater than the marginal loss of financial gain.

In summary, in the presence of the only criterion of financial surplus value, when $R_{IMF} < R_p$, the optimum of the MFI is obtained to the point where the substitution of a less poor client for a poorer client continues until that the marginal gain in financial gain vanishes: the portfolio is composed exclusively of less poor clients. But in the presence of social utility criterion in addition to that of financial value, when $R_{IMF} < R_p$, the optimum of the MFI is obtained to the point where the substitution of a poorer client to a less poor client continues until the marginal gain in social gain is equal to the marginal loss of financial gain. The mixed nature of the portfolio is due to the presence of a social utility criterion in the objective function of the MFI.

3. The optimal behavior of the MFI faced with exogenous regulatory constraints

3.1. Mission drift as an optimal behavior of the MFI

By optimizing the risk-return profile of the MFI, we can then determine the optimal proportion of poorer clients. The decline in this optimal proportion reflects a mission drift of the MFI. In this way, the risk-return trade-off model that we are developing makes it possible to highlight a solidarity-profitability trade-off. The MFI chooses the pair (R_{IMF}, σ_{IMF}) which maximizes (4) under the constraint of (7) and (8). Its objective-function then becomes:

$$F(R_{IMF}, \sigma_{IMF}) = \left(\alpha \frac{S_{pp}}{\sigma_{pp}} + (1-\alpha)\frac{(R_{pp} - R_p)}{\sigma_{pp}}\right)\sigma_{IMF} + (1-\alpha)\left(R_p - \frac{1}{2}\varphi\sigma_{IMF}^2\right) \quad (9)$$

The first order condition gives:

$$\left(\alpha \frac{S_{pp}}{\sigma_{pp}} + (1-\alpha)\frac{(R_{pp} - R_p)}{\sigma_{pp}}\right) - (1-\alpha)\varphi\sigma_{IMF} = 0 \quad (10)$$

From which we obtain:

$${\sigma_{IMF}}^* = \frac{\alpha}{\varphi(1-\alpha)}\frac{S_{pp}}{\sigma_{pp}} + \frac{(R_{pp} - R_p)}{\varphi\sigma_{pp}} \quad (11)$$

$${R_{IMF}}^* = R_p + \frac{\alpha}{\varphi(1-\alpha)}\frac{S_{pp}(R_{pp} - R_p)}{{\sigma_{pp}}^2} + \frac{(R_{pp} - R_p)^2}{\varphi{\sigma_{pp}}^2} \quad (12)$$

Substitute (10) in (3) gives the expression of the optimal proportion of poorer clients in the MFI's portfolio:

$$\theta^* = \underbrace{\frac{\alpha}{(1-\alpha)}\frac{S_{pp}}{\varphi{\sigma_{pp}}^2}}_{\substack{risk- \\ solidarit\ y\ trade-off}} + \underbrace{\frac{(R_{pp} - R_p)}{\varphi{\sigma_{pp}}^2}}_{\substack{risk-return \\ trade-off}} \quad (13)$$

The expression of the optimal proportion of poorer clients shows that it is the sum of two expressions, one reflecting a risk-solidarity trade-off and the other reflecting a risk-return trade-off. Overall, the optimal proportion reflects a trade-off between solidarity and financial performance. Hence the following proposition:

Proposition 1: For an MFI, determining the optimal proportion of the poorest in the IMF portfolio is tantamount to making a solidarity-financial return trade-off. The expression of this optimal proportion is an index of the degree of mission drift of the MFI. The factors explaining the mission drift of an MFI are thus identified:

$$\theta^* = \theta^*(\alpha, S_{pp}, R_{pp}, R_p, \varphi, \sigma_{pp}) \quad (14)$$

Mission drift occurs when the optimal proportion θ^* falls when the following explanatory factors decrease: the preference for the MFI's social performance (α), the social utility of the poorest (S_{pp}), the financial gain obtained from the loans granted to the poorest (R_{pp}); and when the following explanatory factors increase: the financial gain obtained from the loans granted to the least poor (R_p), the degree of MFIs risk aversion (φ) and the risk associated with financing poorer clients (σ_{pp}).

We prove proposition 1 simply by computing the derivative of θ^* with respect to each of the explanatory factors:

$\partial\theta^*/\partial\alpha = \frac{1}{(1-\alpha)^2}\frac{S_{pp}}{\varphi\sigma_{pp}{}^2} > 0$ There is mission drift when, ceteris paribus, the preference for the social performance of the MFI (α) falls.

$\partial\theta^*/\partial S_{pp} = \frac{\alpha}{(1-\alpha)}\frac{1}{\varphi\sigma_{pp}{}^2} > 0$: There is mission drift when, ceteris paribus, decreases the social value (S_{pp}).

$\partial\theta^*/\partial R_{pp} = \frac{1}{\varphi\sigma_{pp}{}^2} > 0$: There is mission drift when, ceteris paribus, the financial gain from loans granted to the poorest (R_{pp}) falls.

$\partial\theta^*/\partial R_p = -\frac{1}{\varphi\sigma_{pp}{}^2} < 0$: There is mission drift when, ceteris paribus, the financial gain from loans granted to the least poor (R_p) increases.

$\partial\theta^*/\partial\varphi = -\frac{\alpha}{(1-\alpha)}\frac{S_{pp}}{\varphi^2\sigma_{pp}{}^2} - \frac{(R_{pp}-R_p)}{\varphi^2\sigma_{pp}{}^2} < 0$: There is mission drift when, ceteris paribus, the MFI's level of risk aversion (φ) increases.

$\partial\theta^*/\partial\sigma_{pp} = -\frac{\alpha}{(1-\alpha)}\frac{S_{pp}}{\varphi\sigma_{pp}{}^4} - \frac{(R_{pp}-R_p)}{\varphi\sigma_{pp}{}^4} < 0$: There is mission drift when, ceteris paribus, the risk associated with financing poorer customers (σ_{pp}) increases.

3.2. Impact of regulatory constraints on mission drift

The regulatory constraints, exogenous to the MFI's optimization program, affect indirectly the optimal proportion of the poorest, through their effects on the explanatory factors identified previously. Capital adequacy can become a major impediment to the growth of MFIs seeking to reach large numbers of poor people. Financial analysts and investors categorize microcredit as a very risky asset, so that the regulator assigns a too high percentage of risk to total microcredits at the denominator of the adequacy ratio. This should compensate for a possible decline in the quality of the loan portfolio. MFIs are then forced to increase their own funds if they want to grow and lend more. The capital adequacy rule allows for increased risk associated with financing poorer customers (σ_{pp}). According to proposition 1, when σ_{pp} grows, θ^* falls: regulatory constraints induce a mission drift through an increase in σ_{pp}.

The return of the credit granted to the poorest, R_{pp}, is what this microcredit pays to the MFI; it is the interest rate set by the MFI to the customer. This interest rate takes into account the high cost of microcredit borne by the MFI due to regulatory constraints. It also takes into account the productivity of the poorest supposedly lower than that of the less poor; so that in the end, the interest rate on loans to the poorest is a compromise between the high cost of microcredit supported by the MFI and the supposedly low productivity of the poorest. In the case of a solidarity-based MFI, the result is a low interest rate: the prudential constraints therefore induce R_{pp} to fall. For a commercial MFI, the compromise results in a high interest rate: the prudential constraints therefore induce R_{pp} to grow. So , according to proposition 1, when R_{pp} decreases, θ^* falls if the MFI is a solidarity-based one: regulatory constraints induce a mission drift through a decrease in R_{pp}.

The perception of microfinance as very risky by the regulator and the constraints this entails for the MFI may end up increasing the risk aversion of the MFI (φ). Put another way, the more capital requirements are exacerbated, the more MFIs become risk-averse. According to proposition 1, when φ grows, θ^* falls: regulatory constraints induce a mission drift through an increase in φ. We summarize the effects of regulatory constraints on microfinance mission drift in the table 1 below:

Table 1: Impact of regulatory constraints on microfinance mission drift

Effects of regulatory constraints on the explanatory variables	**Optimal proportion of poorest**	**Induced forms of microfinance**
$(R_{pp} - R_p)$ very high	$\theta^* \to \frac{(R_{pp} - R_p)}{\varphi {\sigma_{pp}}^2}$ as $\frac{\alpha}{(1-\alpha)} \frac{S_{pp}}{\varphi {\sigma_{pp}}^2}$ becomes negligible $\Rightarrow \theta^* = 0$	Towards pro-commercial microfinance
$\varphi \to \infty$	$\theta^* \to 0$	Towards pro-commercial microfinance
$\sigma_{pp} \to \infty$	$\theta^* \to 0$	Towards pro-commercial microfinance

Source : the autor

Proposition 2: The regulatory constraints lead to mission drift of MFIs by increasing σ_{pp} and/or φ and/or by decreasing R_{pp}. In this context, capital adequacy becomes a major impediment to the growth of MFIs seeking to reach large numbers of poor people.

4. Overcoming the problem of mission drift in microfinance by regulatory inflection

The model has shown that too high capital adequacy ratios applied to microfinance can induce mission drift. A regulatory inflection in terms of reducing these ratios is necessary to curb this mission drift. The idea of reducing perceived risk in microfinance is not arbitrary. Studies based on 10 years of follow-up of several MFIs, and published in the Microbanking Bulletin, show that microfinance is less risky than conventional banking. Indeed, the percentage of non-performing loans in relation to total loans is about less than 20% (CGAP, 2002). By comparison, the percentage of non-performing loans in relation to total loans (including those not liquidated by wealth management companies created to sell outstanding loans) varies by country: Indonesia: 50%; Thailand: 25%; Philippines: 18%; China: 50%; India: 25% (Report of the Asian Development Bank, 2002). Taking into account theses considerations, the regulator can reduce the perceived risk in the microfinance sector, resulting in a lower risk of lending to the poorest σ_{pp}, a decrease in the MFI's aversion to risk φ and an increase in the return on investment loans for the poorest R_{pp}. This regulatory inflection, by increasing θ^*, overcomes or even ends the mission drift. We summarize these results in the table 2 below:

Table 2: Overcoming microfinance mission drift by regulatory inflection

Effects of regulatory inflection on the explanatory variables	**Optimal proportion of poorest**	**Overcoming mission drift**
$\varphi \to \varepsilon_1$ (where $\varepsilon_1 > 0$)[3]	$\theta^* \to 1$	Towards pro-social microfinance
$\sigma_{pp} \to \varepsilon_2$ (where $\varepsilon_2 > 0$)	$\theta^* \to 1$	Towards pro-social microfinance

Source : the author

[3] When $\varphi \to 0$ or $\sigma_{pp} \to 0$, we get $\theta^* \to \infty$.. Now, θ^* is assumed to be in [0,1]. Therefore, we choose not to make φ and σ_{pp} towards 0, but rather a sufficiently small value $\varepsilon_1 > 0$ such that $\theta^* \to 1$.

While reducing the perceived risk of microfinance, the regulator can overcome mission drift by promoting another measures that also help loosen regulatory capital constraints. Such measures lead to a reduction in the cost of microcredit, an increase in the return of loans to the poorest R_{pp} and so an increase in the proportion of the poorest in loans (θ^*). An example of this type of measure is to encourage MFIs to use financial innovations like quasi-capital, subsidized loans. Assets like quasi-capital (subordinated debt, convertible debt, preference shares, etc.), subordinated to other borrowings, may be included in total equity (Third-Party capital) in order to assess the adequacy of equity. In addition, they have a real ability to absorb operational losses. Subsidized loans from the MFI allow, when valued at market prices, to earn an implicit bonus. This bonus consists of the difference between the interest rate of the subsidized loan and the interest rate that the MFI would have to pay by borrowing funds on the money markets. This bonus is quantified and capitalized in the adjusted balance sheet as a component of equity (Third-Party Capital 1) as any other subsidy in the calculation of equity adequacy.

Quasi-equity and subsidized loans were tested successfully in the context of CFTS Ltd (CASHPOR Financial & Technical Services Limited), a MFI that provide financial services to 25,000 poor and very poor rural women in the Mirzapur District of north-east India. The strategy has made it possible to remove the equity adequacy of the CFTS from the negative zone to 10%, which is in line with international standards (Gibbons and Mehaan, 2003).

The regulator can also encourage MFIs to use measures that promote a strengthening of the pro-social behavior of the MFI via an increase in the parameters of solidarity objective α and (S_{pp}). One of these measures is an organizational innovation: the two-headed structure of co-production. This consists, for the MFI, of splitting up into two institutions: the NGO entity with the responsibility to serve the poorest with a goal of solidarity, and the banking entity, in charge of the intermediate sector of banking activities (Glémain, 2006, Kouakou, 2010). The banking entity also has the opportunity to localize itself by creating a specialized unit with procedures and capabilities to offer larger credits. The MFI could thus continue its activity having these two objectives in view. However, for this organizational innovation, to be viable in the long run, it is necessary that the founding NGO remains the main shareholder of the MFI, which enables it to ensure that initial objectives of the fight against poverty are maintained. Such co-production has been experimented in several countries: in Bolivia, where the BANCOSOL MFI resulting from the institutionalization of the PRODEM NGO, split to give the PRODEM NGO and the BANCOSOL bank, both of them evolving in a logic of strategic alliance. While the banking entity finds its way to focus exclusively on the poor, PRODEM targets the poorest, who are characterized by a very high degree of individual and family insecurity (Glémain, op cit). This strategy of creating a new bottom-up financial institution is also applied in the case of co-production between the Dominican NGO ADEMI and the correspondent bank BANCOADEMI. This is also the case of the Kenyan MFI K-REP, organized in the two-headed form of a bank offering financial services and an NGO carrying out solidarity-based training, advisory and information development.

These later results are summarized in the table 3 below:

Table 3: Overcoming microfinance mission drift by regulatory innovations

Effects of regulatory innovations on the explanatory variables	**Optimal proportion of poorest**	**Overcoming mission drift**
$(R_{pp} - R_p) \to 0$	$\theta^* \to \frac{\alpha}{(1-\alpha)} \frac{S_{pp}}{\varphi {\sigma_{pp}}^2}$	Towards pro-social microfinance
$\alpha \to 1$	$\theta^* \to \frac{\alpha}{(1-\alpha)} \frac{S_{pp}}{\varphi {\sigma_{pp}}^2}$ as $\frac{(R_{pp} - R_p)}{\varphi {\sigma_{pp}}^2}$ becomes negligible	Towards pro-social microfinance
S_{pp} very high	$\theta^* \to \frac{\alpha}{(1-\alpha)} \frac{S_{pp}}{\varphi {\sigma_{pp}}^2}$ as $\frac{(R_{pp} - R_p)}{\varphi {\sigma_{pp}}^2}$ becomes negligible	Towards pro-social microfinance

Source : the author

5. Concluding Remarks

This paper uses a portfolio model generalized to MFIs to analyze the problem of mission drift in microfinance. In this model, the MFI objective function takes into account its financial and social objective and the

regulatory constraints it faces are exogenous to its optimization program. Consequently, the prudential rules imposed by the regulator to protect customer deposits and ensure the stability of the financial system, don't affect directly the objective function of the MFI. In that context, we determine the optimal proportion of the poorest in the IMF portfolio as an index of the degree of mission drift. This optimal proportion, and so the degree of mission drift, result from a solidarity-return trade-off. The regulatory constraints lead to mission drift of MFIs by increasing the perceived risk of the poorest and the risk aversion of MFI, and/or by decreasing the loan return on the poorest. In order to curb the mission drift in microfinance, the regulator can reduce the perceived risk in that sector, especially since several studies show that credit risk is lower in microfinance than in classic banks. This regulatory inflection consists in decreasing the percentage of risk to total micro-credits at the denominator of the adequacy ratio. The regulator can also encourage the use of financial innovations (quasi-capital, subsidized loans) and organizational innovations (two-headed structure of co-production) that strengthen the pro-social behavior of MFIs.

This study can be extended in several directions. First, instead of considering regulatory constraints as exogenous to the MFI's optimization program, they can be endogenized and taken into account in its objective function. In this way, it may be possible to directly determine the impact of the regulation variables on the degree of mission drift without going through the variables specific to the MFIs. Another line of research concerns the empirical verification of our theoretical model. It highlights testable hypotheses via the relationship (14) between the optimal proportion of the poorest and the explanatory factors identified. This equation lends itself well to an econometric analysis that would contribute to the empirical analysis of the mission drift of microfinance. We leave these different points for future research.

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