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Subsidies to microfinance institutions: How do they affect cost efficiency and mission drift?

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The costs and benefits of subsidized microfinance are still controversial. We utilize a cost-function estimation approach that accounts for the double bottom line (social and financial) of microfinance institutions (MFIs) to evaluate how subsidies affect both cost efficiency and risk of mission drift. We control for endogenous self-selection into the business models of credit-only versus credit-plus-deposit. Our results suggest that MFIs that both supply loans and collect deposits need no subsidies to be cost-efficient. In addition, subsidies to these MFIs are associated with an increase in deposit size, which might hurt the most disadvantaged depositors. In sum, combining subsidized funds from donors with deposits increases the risk of mission drift, and can therefore be socially undesirable.

Keywords Finance, microfinance, cost efficiency, scale economies, subsidies

JEL Classifications O14, D24, G21, O16, F35

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Abstract

The costs and benefits of subsidized microfinance are still controversial. We utilize a cost-function estimation approach that accounts for the double bottom line (social and financial) of microfinance institutions (MFIs) to evaluate how subsidies affect both cost efficiency and risk of mission drift. We control for endogenous self-selection into the business models of credit-only versus credit-plus-deposit. Our results suggest that MFIs that both supply loans and collect deposits need no subsidies to be cost-efficient. In addition, subsidies to these MFIs are associated with an increase in deposit size, which might hurt the most disadvantaged depositors. In sum, combining subsidized funds from donors with deposits increases the risk of mission drift, and can therefore be socially undesirable.

Keywords: Finance, microfinance, cost efficiency, scale economies, subsidies
JEL Codes: O14, D24, G21, O16, F35

1 Introduction

Microfinance institutions (MFIs) provide financial services to the unbanked poor while striving to cover their own costs (Armendáriz and Morduch, 2010; Battilana and Dorado, 2010). Many benefit from subsidies in various forms, such as grants, soft loans, and in-kind donations (Reichert et al., 2021). Yet subsidies entail the possibility of perverse effects (Deltas et al., 2013), such as a soft budget constraint (Kornai, 1986), dependence on donors' money, and lower productivity and efficiency[1] (Caudill et al., 2009, 2012). While subsidies have been present for a long time in credit-only MFIs and are being used in some credit-plus-deposit MFIs, the costs and benefits of subsidizing microfinance are still not well understood (Khachatryan et al., 2017; Cull et al., 2018). This paper contributes to the literature by evaluating how subsidies affect the efficiency of MFIs and their risk of experiencing mission drift, by accounting for the double bottom line, and by controlling for the endogenous self-selection into a business model of credit-only or credit-plus-deposit.

Evidence on the role of subsidies in microfinance is mixed. On the one hand, subsidies are vital for MFIs' operations, not only during the start-up phase (Morduch, 1999; Hudon and Traça, 2011) but also for mature institutions (Cull et al., 2018). On the other hand, the failure of state-funded microfinance programs – such as in India in the 1970s – raises doubts about the cost-efficiency of subsidized microfinance (Binswanger and Khandker, 1995). Arguably, a closer look at the factors linking the availability of subsidized funds with other, unsubsidized sources of MFI funding, notably deposits, might provide some clues about how subsidies affect cost efficiency. In turn, these other sources of funding depend on the type of financial products that institutions supply and on their business model – deposit-taking MFIs versus credit-only MFIs.

MFIs worldwide seek to fulfil their social mission through various business strategies, depending *inter alia* on their stakeholders' vision and on local legal and financial regulatory constraints (Hartarska and Nadolnyak, 2007). While some MFIs stick to the traditional model of credit-only services, many others have jumped on the deposit-taking bandwagon (Labie et al., 2017). Thus, microfinance has become a heterogeneous sector where microcredit-only providers co-exist with MFIs that also take deposits. In deposit-taking MFIs, subsidies and deposits may act as substitutes rather than as complementary sources of funding. Evidence shows that subsidies crowd out

[1] For surveys of the literature on the efficiency of financial institutions, see Berger and Mester (2003), Berger and Humphrey (1997) and Berger et al. (1993). For a recent meta-analysis of the efficiency of MFIs, see Fall et al. (2018).

deposit collection (Cozarenco et al., 2016). Moreover, both subsidies and deposits are associated with lower outreach and worse financial results (Al-Azzam, 2019; Cull et al., 2018; Cozarenco et al., 2016). As for loan repayment rates, they are lower in subsidized MFIs but are insensitive to deposit collection (Al-Azzam, 2019). Finally, MFIs using subsidies do not improve their scale economies as they age (Caudill et al., 2009). To identify the role of subsidies, we estimated and compared the scale economies achieved by subsidized and unsubsidized credit-plus-deposit MFIs with those of credit-only MFIs.

We also contribute to the literature on microfinance mission drift. "Mission drift" refers to serving better-off, and therefore more profitable, clients (Cozarenco and Szafarz, 2020; D'Espallier et al., 2017). It is often linked to commercialization and growth status (Mersland and Strøm, 2010). This shift is a threat to poverty alleviation; it is observable through an increase in average loan size (a decrease in depth of outreach) or is associated with a reduction in the number of clients (breadth of outreach) (Armendariz and Szafarz, 2011; Grimes et al., 2019; Varendh-Mansson et al., 2020). At the same time, the trend toward prioritizing financial outcomes over social ones corresponds to an increased focus on financial indicators such as self-sustainability and return on assets. To gauge the risk of mission drift, we propose a novel, rigorous method based on comparing regression coefficients attached to social and financial outputs. By doing so, we develop an empirical approach that consistently addresses mission drift within the cost-function framework.

Heterogeneous production processes and business models make it harder to find patterns in the impacts of subsidies (D'Espallier et al., 2013). Previous studies circumvented this issue by assuming that all MFIs had the same underlying technology, with credit-only MFIs simply producing zero savings (Hermes et al., 2011). This assumption was needed to adapt the classical banking-efficiency approach (Berger and Humphrey, 1991). Recent work has shown, however, that credit-only and credit-plus-deposit MFIs use different production processes (Malikov and Hartarska, 2018). Institutions collecting savings offer an additional financial service associated with specific regulatory requirements and a specific production technology. To avoid overestimating the economies of scope and scale, empirical work should therefore account for an MFI's self-selection into either business model. This paper takes this message seriously. It evaluates how subsidies interact with the cost efficiency of credit-only and credit-plus-deposit MFIs by estimating a multivariate cost function that acknowledges MFIs' self-selection into a business model.

The efficiency of financial institutions can be assessed by several methods (Weill, 2004; Delis et al., 2020), such as the estimation of an efficiency frontier (Kumbhakar and Tsionas, 2020), data envelopment analysis (DEA) (Gutierrez-Nieto et al., 2007), and cost-function analysis (Cuevas, 1988). Unlike previous work, our framework accounts for the social mission of outreach maximization. This social orientation of MFIs implies that the measurement of inputs and outputs is more in line with earlier banking models, also known as the production approach, as opposed to intermediation (e.g. Chapter 3.8 in Freixas and Rochet, 1997). We follow Murray and White (1983), who estimate translog cost functions to test for the economies of scale of credit unions, and use the specification introduced for MFIs by Caudill et al. (2009), with outputs measured by the number of active borrowers and the number of active savers, in addition to the dollar values of loans and deposits. The application of this approach to assess the impact of subsidization in microfinance is a substantial innovation of this paper.

The way in which this study measures outputs – in number of clients (social) and in dollar values (financial) – is well suited to capturing the trade-offs between social and financial outputs. For each business model, it will allow assessing whether subsidies mitigate the risk of mission drift, as the results of Cull et al. (2007) suggest. By assuming that the MFI cost function may vary across business models and subsidization statuses, we will be able to gauge how conducive of mission drift each technology is and, subsequently, whether the impact of subsidization on social performance depends on the products supplied. This original methodological standpoint will allow revisiting a long-standing debate on the social effectiveness of microfinance, recently revived by the development of deposit-taking by MFIs.

We used high-quality unbalanced panel data covering 861 MFIs operating in 78 countries between 2004 and 2013. The dataset contains unique detailed information on subsidies and voluntary savings. An original feature of our approach is to distinguish between true savings, which are voluntary, and the use of mandatory savings that substitute for collateralization in microfinance lending technology. In our model, only voluntary savings (depositors) correspond to an output that meets clients' savings needs (Collins et al., 2009).

Our main empirical result shows that the group of unsubsidized credit-plus-deposit MFIs is the only one to operate at minimum costs and so achieve constant returns to scale. This suggests that deposit collection helps MFIs free themselves from subsidy dependence. This argument rationalizes the findings of Cozarenco et al. (2016), namely, that MFIs collecting savings receive fewer subsidies than their credit-only counterparts, suggesting that subsidies and deposits act as substitutes rather than complements. In addition, subsidies may interfere with the outreach mission of deposit collection since the marginal cost of reaching an additional depositor is 7% higher in the subsidized group. Hence subsidization increases the risk of mission drift by undermining the well-known effect of deposits in increasing social impact (Karlan et al., 2014). We also find that credit-only MFIs have increasing returns to scale and that their costs are insensitive to their subsidization status. These findings suggest that subsidy-related distortions are lower for traditional credit-only MFIs. Finally, our results confirm that business models might be endogenous in unsubsidized MFIs, a possibility that is accounted for in our empirical setting. In the short run, deposit collection can be restricted by contextual reasons, such as the characteristics of the pool of borrowers and the legal system in which MFIs operate. These reasons, however, typically hold in the short run only. In the longer run, deposit-taking may provide an opportunity to a broad spectrum of MFIs to achieve both cost efficiency and financial self-sustainability.

The rest of the paper is structured as follows. The next two sections present methods and data, successively. Our regression results on cost efficiency are featured in Section 4, while Section 5 discusses the risk of mission drift. Section 6 concludes.

2 Methods

2.1 The Cost Function

We evaluate how subsidies affect MFI efficiency by adapting the system of equations containing the classical multi-output cost function and cost-share equations (see, for example, Greene, 2012, Chapter 12).[2] The empirical framework used in this study accounts for non-random self-selection into a business model and the cross-country nature of the data. This section specifies the empirical approach, including definitions of the variables used in the estimation, while the next section describes our dataset.

[2]This classical empirical approach comes directly from the duality of profit maximization/cost minimization, where the cost is minimized subject to production technology constraints. The cost function is jointly estimated with the conditional factor demand or cost shares (derived by the Shepard's lemma). Since each equation is a function of input prices and output quantities, the seemingly unrelated regressions (SUR) method is often used as it produces the most efficient estimates of the system.

We extend the standard system of equations by adding a probit equation for (self-)selection into a business model (credit-only vs. credit-plus-deposit) as the first equation. This selection is likely endogenous and can depend on various unobservable factors affecting an MFI's decision to apply for a license and collect deposits. Rather than postulating that credit-only and credit-plus-deposit MFIs have the same cost function, we test this assumption with our data, like Malikov and Hartarska (2018), who find that credit-only and credit-plus-deposit MFIs have different underlying production technologies. Thus, the previous view – the production technology is the same for all MFIs and credit-only MFIs simply produce zero deposits – is unrealistic and restrictive.

Our empirical design is based on grouping MFIs by self-selected business model and estimating the system parameters by subsidization status (subsidized vs. non-subsidized). This double segmentation leaves us with four categories of institution for which cost-efficiency will be assessed.

In the first step, we will jointly estimate the selection equation, the cost equation, and the cost shares by using the conditional mixed process (CMP). CMP operates like the usual seemingly unrelated regressions (SUR) used in multivariate model estimation, but it is more general and therefore preferable in our context (Roodman, 2011). Moreover, estimation of a selection equation (Heckman, 1979) fits well with the SUR-CMP framework. Thus, we estimate a system of equations for each of the four MFI categories. Each system includes four components: one selection-into-a-business-model equation, one cost equation and, owing to normalization, only two cost-share equations (one for labor and one for financial capital).[3]

In the second step, we will use the estimates to compute the economies of scale and then compare efficiency levels, with and without subsidy, within each business model. As in previous work, we use a translog cost function (Caudill et al., 2009; Hartarska et al., 2013a). For expositional clarity, we omit the index for MFI category and write the estimated model as:

$$D = \mathbb{1}[\theta_0 + \sum\theta_j \ln q_j + \sum\psi_k \ln p_k + \lambda' x + \omega' z + u > 0] \tag{1}$$

$$\begin{aligned} \ln C = \alpha_0 + \sum\alpha_j \ln q_j + \sum\beta_k \ln p_k + 1/2\sum\sum\alpha_{ij} \ln q_i \ln q_j \\ + 1/2\sum\sum\beta_{lk} \ln p_l \ln p_k + \sum\sum\delta_{jk} \ln q_j \ln p_k + \gamma' x + \ln v \end{aligned} \tag{2}$$

[3]We start by using three input prices – of capital, labor, and financial capital. We next impose homogeneity on input prices by normalizing the prices of labor and financial capital, and on the total cost by dividing them with the price of physical capital. Thus, we end up with two share equations.

$$s_k = \beta_k + \sum \beta_{lk} \ln p_l + \sum \delta_{jk} \ln q_j + \ln v_k, \quad k \in \{L, K\} \tag{3}$$

where L stands for labor and K for financial capital, and the error terms are correlated Gaussian variables (Roodman, 2011). Equation (1) is a probit selection equation, where D stands for selection into a business model; function $\mathbb{1}[\cdot]$ is the indicator, p_k are the input prices, q_j are the outputs, vector x includes the control variables, vector z includes country-specific variables acting as instruments, θ, ψ, λ, and ω denote coefficients to be estimated, and u is the error term. The rest of the system contains the standard translog cost function and cost shares equations that are well-known in the productivity literature (Kumbhakar, 1997).

More specifically, Equation (2) is the outcome equation, where C is the total cost including labor, financial expenses, and physical capital expenses, with corresponding input prices in p and outputs in q. For each MFI category, the parameters to be estimated are α, β, δ, and γ, while ln$v$ is the error term. Equation (3) uses the cost shares to produce a more efficient estimate of the cost function (León-Ledesma et al., 2010; Hartarska et al., 2013b). The dependent variables are: the labor cost share s_L (personnel expenses divided by total cost) and the financial cost share s_K (financial expenses divided by total cost) derived from the Shephard's lemma, where:

$$s_k = \frac{\partial \ln C}{\partial \ln p_k}, \quad k \in \{L, K\}$$

In addition to input prices p_k and output quantities q_j, which are the standard exogenous variables for a system of cost function and cost-share equations, vector x contains MFI-specific variables, along with country and time dummies. Moreover, in the selection Equation (1), the instrumental variables in vector z include several country-specific variables used in previous work involving self-selection: national saving rate,[4] number of internet subscribers per 100,000 adults, national ratio of remittances to GDP, share of rural population, financial depth, and GDP per capita (Malikov and Hartarska, 2018). The national saving rate controls for the population's capacity to save and hence the availability of savings that an MFI can collect. The number of internet subscribers per 100,000 adults is considered because deposit services in remote areas rely on wireless technology, such as telephone banking (Duncombe and Boateng, 2009). Likewise, including the ratio of remittances to GDP acknowledges that remittances require current accounts (Giuliano

[4]The national saving rate is the difference between gross national income (GNI) and public and private consumption, plus net current transfers (% of GNI).

and Ruiz-Arranz, 2009; Aggarwal et al., 2011) and thus increase demand for deposit services. The share of rural population can impact the MFIs' decisions to supply deposit accounts, since both distance and lack of infrastructure can dissuade MFIs from offering deposits services to the rural poor (Guérin et al., 2013). Last, financial depth (i.e., the ratio of the money aggregate, including currency and deposits (M2), to GDP) proxies for the size of the financial sector (Beck et al., 2000, 2007), and therefore captures the ease of collecting deposits from marginalized clients.[5]

The input prices are measured by the average annual salary (personnel expenses in USD divided by number of employees), the cost of financial capital (financial expenses in USD divided by average borrowings plus average deposits), and the cost of fixed capital (administrative expenses over average net fixed assets). Like Caudill et al. (2009), we acknowledge the dual objective of MFIs by measuring output both in dollar volumes and numbers of clients (borrowers or savers). Using the numbers of poor clients served (breadth of outreach) diverges from the more common setting in the empirical microfinance literature, where social performance is proxied by average loan size (Hermes et al., 2011).[6] Even though average loan size (depth of outreach) is often used by practitioners to evaluate social performance, its relevance for tracking mission drift in microfinance has been questioned by scholars for reasons pertaining, for instance, to cross-subsidization (subsidizing the provision of costly small loans by attracting profitable larger ones) and progressive lending (progressively increasing loan size for creditworthy borrowers to help them graduate for bank loans); these efficient, socially oriented microlending techniques mechanically tend to increase average loan size.

In addition, a methodological reason prevented us from using average loan size as a proxy for social mission. Within the cost-function framework, total cost must be an increasing function of each output, a condition not met by average loan size since high operational costs make small loans more costly to the lender than larger ones. Alternatively, the theoretical literature on mission drift suggests using the number of clients (breadth of outreach) as social performance indicator (Armendariz and Szafarz, 2011), partly because loan size can be manipulated by artificially splitting loans. Fortunately, the number of clients fulfills the monotonicity requirement. Therefore, in line with previous contributions in the field (Caudill et al., 2009; Hartarska et al., 2013b, 2014), we

[5]We obtained similar empirical results with a larger model (results available upon request) including the six additional Worldwide Governance Indicators (Kaufmann et al., 2010), such as control for corruption, which may affect cost efficiency (Al-Azzam, 2016).

[6]Other social missions claimed by MFIs include serving women and rural borrowers (Mersland et al., 2019)

include the two components (numerator and denominator) of average loan size in the cost function, but as separate outputs. This cost-function design also has the merit of emphasizing the trade-off, if any, between financial and social performance and, ultimately, makes it possible to assess whether any mission drift is taking place. This specification not only meets the theoretical requirement that cost should increase with each output (Hartarska et al., 2013b), but also reflects the underlying technology of each business model and makes explicit both the social objective of serving as many poor clients as possible and the financial objective of maximizing output dollar volumes.

We improve on previous microfinance studies on cost efficiency by considering that "deposit accounts" are only those receiving *voluntary* savings. Hence we exclude from output the collected *compulsory* savings that MFIs impose on their borrowers.[7] Until recently, lack of data made it impossible to disentangle the two types of savings, so that previous work used compulsory and voluntary savings indistinctly, even though they serve different purposes and only the collection of voluntary savings is part of the social mission of microfinance. This study overcomes the data limitation by using a unique database. We argue that clearly delineating the deposits aligned with credit-plus-deposit MFIs' social mission reinforces the internal consistency of cost-efficiency assessment in microfinance. This delineation is one of the methodological contributions of our paper.

In Equations (1) and (2), the additional controls in vector x include an MFI's age[8] as a proxy for possible cost reduction over time, its legal status (dummy for an NGO), a dummy variable for compulsory deposits, and the 30-day portfolio at risk, which is the standard risk measure in microfinance. Controlling for risk is essential when modeling the cost structure of financial institutions because MFIs exposed to higher risk levels and lower loan quality face higher costs (Hughes and Mester, 2013). Mills ratio controls for potential selection biases.[9] Since our MFIs are heterogeneous (Varendh-Mansson et al., 2020), in all regressions we cluster standard errors at the MFI level. Normalizing the prices and the total cost by the price of physical capital yields the

[7]Compulsory savings are a common feature of the lending technology used by both regulated and unregulated MFIs (Armendáriz, 2011). They are often characterized as the "hidden collateral" of microcredit. Voluntary savings, by contrast, drive demand for specific deposit products, which are valuable to poor people (Collins et al., 2009). The difference between all savings and voluntary savings is significant: Voluntary savings only involve 68% of the total number of savers and represent 78% of the total volume of savings in our sample. Please note, however, that 76% of all observations concern MFIs that do not require any compulsory deposits.

[8]The detailed MIX dataset that we purchased provides the year of establishment of each MFI. Age is computed as the difference between the fiscal year and the year of establishment.

[9]In the cost equation (2) and the cost-share equation (3), the standard errors of the coefficients are adjusted for selection bias, as in the standard Heckman (1979) model.

following constraints in the estimation of the full model:

$$\sum \beta_k = 1, \ \ \sum \beta_{lk} = \sum \beta_{kl} = 0 \ \text{ over } \ l \ \text{ and } \ k \ \text{ and } \ \sum \delta_{jk} = 0 \ \ \forall q_j$$

We also demean the variables prior to normalizing them, by dividing them by their respective means to ease computation of scale economies and the interpretation of results later on.[10] With this approach, Equation (3) reduces to two share equations: one for the labor share, s_L, and the other for the financial capital share, s_K.

Once the coefficients of the whole system, made up of Equations (1) to (3), are estimated, the next step consists of computing the returns to scale associated with the four groups of MFIs. This phase of the analysis is key because the returns to scale will help us establish the impact of subsidies on cost-efficiency for each business model. The returns to scale are obtained by taking the derivatives of $\ln C$ with respect to outputs (Caudill et al., 2009). After demeaning input prices, the return to scale is the sum $\sum_{j=1}^{n} \alpha_j$, where n, the number of outputs, is equal to two for credit-only MFIs and to four for credit-plus-deposit MFIs. Having economies of scale – or increasing returns to scale – means that an increase in output results in a less-than-proportional change in total cost, holding all input prices constant. We test for economies of scale in each MFI category by performing Wald tests for the null that $\sum_{j=1}^{n} \alpha_j$ is equal one. The interpretation of the results is the following: if $\sum_{j=1}^{n} \alpha_j < 1$, there are economies of scale, meaning that on average the MFIs in the corresponding category can make costs savings by increasing their size. By contrast, if $\sum_{j=1}^{n} \alpha_j > 1$, there are diseconomies of scale, and downsizing is a cost-reducing strategy. If $\sum_{j=1}^{n} \alpha_j = 1$, constant returns to scale indicate that MFIs have reached optimal size in terms of cost minimization.

The empirical analysis introduces an additional methodological novelty in the cost-efficiency literature by using comparisons based on counterfactual cost, a notion closely linked to opportunity cost (Magni, 2009). Since there are two cost equations per business model, to identify the effect of subsidies on cost efficiency, we can compare the estimated cost of an unsubsidized MFI with its counterfactual cost obtained from the cost equation estimated from subsidized MFIs. Thus, for each business model we use four cost prediction models: two for real costs using the cost functions of unsubsidized MFIs, and two for counterfactual costs using the cost functions of subsidized MFIs. In this way, for each business model we will be able to assess the cost-efficiency gains or losses

[10] The demeaning makes computations of the scale economies much easier.

associated with adding subsidies.

2.2 Mission Drift

Making the dual bottom line in output explicit enables us to scrutinize trade-offs and potential risks of mission drift stemming from cost-based incentives. This is a methodological novelty in microfinance. Mission drift is a much debated issue in this field, but its relationship with cost (function) has not been investigated so far. Therefore, for credit-only MFIs we have outputs represented by two q variables: the number of borrowers, and the gross loan portfolio in (constant) USD. For credit-plus-deposit MFIs, additional output measures are the number of depositors and the total volume of deposits in (constant) USD. In microfinance, reaching as many borrowers and savers as possible is as important as collecting large volumes of savings and extending larger amounts of loans (Armendariz and Szafarz, 2011).

The number of clients served is a standard proxy for breadth of outreach, a key dimension of MFI social performance (Hermes et al., 2011). The marginal effect of the number of clients on cost will indicate how costly the social mission is. A large value might therefore point to a business model with increased risk of cost-driven mission drift. When comparing the marginal effects of volume of loans and deposits on costs across MFI groups, larger coefficients will indicate that, all else equal, larger-size financial products are costlier, suggesting that the groups with smaller marginal effects benefit from cost advantages in serving poor clients, who need smaller-size financial products. These groups of MFIs are less exposed to a cost-driven risk of mission drift.

To define mission, we retrieve from Equation (2) the coefficients associated with social and financial outputs in subsidized and unsubsidized MFIs.[11] Let us denote $\theta_i^s(x, y(x))$ the coefficient corresponding to output $i \in \{social, financial\}$ in an MFI with subsidization status $s \in \{subsidized, unsubsidized\}$, business model $x \in \{credit\ only, credit\ and\ deposit\}$ and prod-

[11] The reason for not using average loan size as a proxy for social mission here is methodological. Within the cost-function framework, cost must be an increasing function of outputs. In practice, however, total cost of MFIs tends to depend non-monotonously on average loan size (because of large fixed costs). By contrast, it increases with both the number of clients and the volume of loans/savings. Therefore, we do include the two components (numerator and denominator) of average loan size in the cost function, but as separate outputs. This cost-function design has also the merit of emphasizing the trade-off, if any, between financial and social performance and, ultimately, makes it possible to indicate whether there is any mission drift.

uct

$$y(x) \in \begin{cases} loans & if \quad x = credit\ only \\ loans & if \quad x = credit\ and\ deposit \\ deposits & if \quad x = credit\ and\ deposit \end{cases}$$

The cost-based impact of subsidization on the social and financial outcomes can be summarized by two quantities in credit-only MFIs:

$$\Delta_{social}(credit\ only) = \theta^{subsidized}_{social} - \theta^{unsubsidized}_{social}$$

$$\Delta_{financial}(credit\ only) = \theta^{subsidized}_{financial} - \theta^{unsubsidized}_{financial}.$$

In credit-plus-deposit MFIs, we obtain four such quantities:

$$\Delta_{social}(C\&D, loans) = \theta^{subsidized}_{social}(loans) - \theta^{unsubsidized}_{social}(loans)$$

$$\Delta_{financial}(C\&D, loans) = \theta^{subsidized}_{financial}(loans) - \theta^{unsubsidized}_{financial}(loans)$$

$$\Delta_{social}(C\&D, deposits) = \theta^{subsidized}_{social}(deposits) - \theta^{unsubsidized}_{social}(deposits)$$

$$\Delta_{financial}(C\&D, deposits) = \theta^{subsidized}_{financial}(deposits) - \theta^{unsubsidized}_{financial}(deposits).$$

These quantities will in turn be used to formalize the concept of mission drift in the context of cost-function estimation.

In our setting, a positive value of Δ_{social} is interpreted as subsidization associated with costlier social performance, while a negative $\Delta_{financial}$ means that, all else equal, a subsidized MFI will find it less costly to deliver financial returns. Therefore, the risk of mission drift can be enhanced through both $\Delta_{social} > 0$ and $\Delta_{financial} < 0$. If both effects are present, we will qualify the risk as strong; alternatively, if only one inequality applies and the other delta is zero, then we will say that the risk is weak. By contrast, the opposite signs (i.e. $\Delta_{social} < 0$ and $\Delta_{financial} > 0$) are identified as incentives for mission alignment. Table 1 summarizes the possibilities.

For credit-plus-deposit MFIs, the impacts of subsidies on loans and deposits may be different. For example, subsidies may well provide a cost-based temptation to increase loan size (fewer but larger loans) and decrease deposit size. In this case, the risk of mission drift concerning loans is combined with an incentive for mission alignment concerning deposits.

Table 1: The Cost-Based Impact of Subsidization on Mission Drift

	$\Delta_{social} > 0$	$\Delta_{social} = 0$	$\Delta_{social} < 0$
$\Delta_{financial} > 0$		Weak incentive for mission alignment	Strong incentive for mission alignment
$\Delta_{financial} = 0$	Weak risk of mission drift		Weak incentive for mission alignment
$\Delta_{financial} < 0$	Strong risk of mission drift	Weak risk of mission drift	

This table identifies the incentives for mission alignment and the risks of mission drift associated with subsidization depending on the signs of $\Delta_{social} = \theta_{social}^{subsidized} - \theta_{social}^{unsubsidized}$ and $\Delta_{financial} = \theta_{financial}^{subsidized} - \theta_{financial}^{unsubsidized}$, where θs are the coefficients of corresponding outputs in the cost function (see Equation (2)). The resulting impact applies to loans in credit-only MFIs and, separately, to loans and deposits in credit-plus-deposit MFIs.

The final objective is to check where subsidies create distortions, but also gauge their merits in terms of cost efficiency, while accounting for the endogenous self-selection into the business models of credit-only or credit-plus-deposit MFIs.

3 Data and Summary Statistics

The microfinance data in our study cover the period 2004–2013 and come from the Microfinance Information Exchange (MIX), a non-profit organization that facilitates access to reliable data in the microfinance sector. More precisely, we use the detailed MIX database[12] rather than the publicly available, less complete, version. The most distinctive features of this database relate to financial adjustments for subsidy-related distortions. These adjustments are of utmost importance when it comes to analyzing cost efficiency.

The Mix Market data, now gathered in the World Bank's Data Catalog, "has been reported by financial services providers (FSPs) targeting the unbanked in developing markets around the globe". In addition, "the FSP data points include data on financial statements (income statement, balance sheet), operations, financial products, end clients, and social performance." The sample consists of 2,096 MFI-year observation points constituting an unbalanced panel of 861 MFIs[13] from 78

[12]This detailed database was only available against payment of a fee.

[13]There are about 2.5 observations per MFI and we clustered standard errors at MFI level in all the models. Therefore, the analysis is close to cross-sectional and a time trend may be unreliable. Reliance on mostly cross-

countries.[14] To address the well-known occurrence of outliers in the MIX dataset, we excluded the observations corresponding to the top and bottom 1% of the distributions of total cost, input prices and outputs. The data were self-reported by contributing MFIs, which serve a large proportion of the worldwide client base (Cull et al., 2009). Bauchet and Morduch (2013) mention that the MIX achieves relatively high reporting standards, but its dataset over-represents institutions with high levels of financial self-sufficiency. We combined the MIX dataset with country-specific variables collected from the World Development Indicators database released by the World Bank.

Our data differ from those used in previous MFI efficiency studies in two respects. First, they contain detailed information on subsidization. Second, they make a distinction between voluntary and compulsory deposits. We use a conservative definition of subsidization. Subsidies can be monetary or in-kind. Monetary subsidies can be pure grants, conditional grants, or soft loans (i.e., preferential debt issued at below-market conditions). In-kind subsidies include labor, buildings, and equipment. In line with the literature (Hudon and Traça, 2011; Cull et al., 2009; Bogan, 2012), we define unsubsidized MFIs as MFIs that have never received any donations. Since (total) donated equity is a stock variable, unsubsidized MFIs are characterized by balance sheets containing zero accumulated donated equity. An alternative definition equates subsidies to donations reported in the income statement (D'Espallier et al., 2017). We opted for the conservative approach to make our empirical results more robust.[15]

The great strength of our MIX-based data resides in adjustments that make subsidization comparable across countries applying heterogeneous accounting standards. The adjusted data were previously available for a fee, but the MIX no longer supplies them as part of the freely available data on the World Bank platform. However, these adjustments are key to our purpose of comparing cost efficiency across heterogeneous groups of firms. First, equity and fixed assets are adjusted for inflation. Second, the MIX determines the costs that subsidized MFIs would face if they were unsubsidized. The cost of funds is adjusted for loans at below-market concessional interest rates. The cost reduction is computed according to prevailing market rates and added to actual financial

sectional data also suggests that the results reflect the long-run efficiency in the industry, while heterogeneity is accounted for within the panel context, thus generating relevant results for policy purposes.

[14]Table A9 in the Appendix shows the distributions of both MFIs and MFI-year observations by country.

[15]We could have chosen an alternative definition, which equates subsidies with donations reported in the income statement (D'Espallier et al., 2017), but under this definition, an MFI might be categorized as subsidized given a positive accumulated donated equity in the balance sheet without it having effectively received any donation during the observational period. Therefore, we opted for the conservative approach to make our empirical results more robust.

expenses reported in the profit and loss statements. The MIX also corrects operating expenses by adding the estimated value of any in-kind donation received by the MFI. The final input prices of subsidized MFIs are the market prices that these institutions would have faced if there were no subsidies at all. Altogether, the adjustments make input prices comparable across MFIs, be they subsidized or not.

Table 2 presents a cross-tabulation by MFI business model and subsidization status. A substantial share of the institutions (585 MFI-year observations representing 28% of the full sample) are deposit-takers, but these MFIs are unevenly spread across the subsidized and unsubsidized categories. Among the 1,307 observations of subsidized MFIs, 1,054 (81%) are credit-only, while the 789 observations of unsubsidized MFIs include 457 (58%) credit-only institutions. Unsubsidized MFIs represent slightly more than one-third of the full sample.

Table 2: Sample Composition

	Credit-only MFIs	**Credit-plus-deposit MFIs**	**Total**
Unsubsidized MFIs	457	332	789
Subsidized MFIs	1,054	253	1,307
Total	**1,511**	**585**	**2,096**

Table 3 shows summary statistics for the full sample, the credit-only MFIs, and the credit-plus-deposit MFIs. In each case, we ran t-tests for the difference in means between unsubsidized and subsidized institutions. In the full sample, unsubsidized MFIs incur total costs that are almost twice as large as those of their subsidized counterparts. The data confirm that unsubsidized MFIs face a significantly higher price of labor, defined as personnel expenses in USD divided by staff size. Possibly, unsubsidized institutions operate in richer, more urban areas, and therefore pay higher wages. Table 3 provides both average loan size (ALS) and ALS scaled by GNI per capita. On average, the clients of unsubsidized institutions take out larger loans – and are therefore likely to be less poor – than those of subsidized institutions. As Hudon et al. (2020) explain, subsidization strengthens the expectation that MFIs will deliver microcredit at fair interest rates.

Figure 1 illustrates the number of borrowers and savers by business model (measured on the left vertical axis) and the volume of loans and savings (measured on the right vertical axis). The figure shows that the number of borrowers served is similar across all groups. Subsidized credit-plus-deposit MFIs have larger numbers of savers relative to their unsubsidized counterparts. The broken lines corresponding to dollar volumes of loans and voluntary deposits show that unsubsidized credit-plus-deposit MFIs produce larger volumes than subsidized ones, suggesting that subsidized credit-plus-deposit MFIs supply smaller loans and collect smaller deposits, and are therefore more socially oriented. Hermes et al. (2011) and Reichert (2018) show, however, that there is an outreach-efficiency trade-off, implying that MFIs with smaller ALS are less efficient. The estimation of cost functions will further explore how subsidization interferes with efficiency and social performance, and whether mission drift is a risk for any group of MFIs under study.

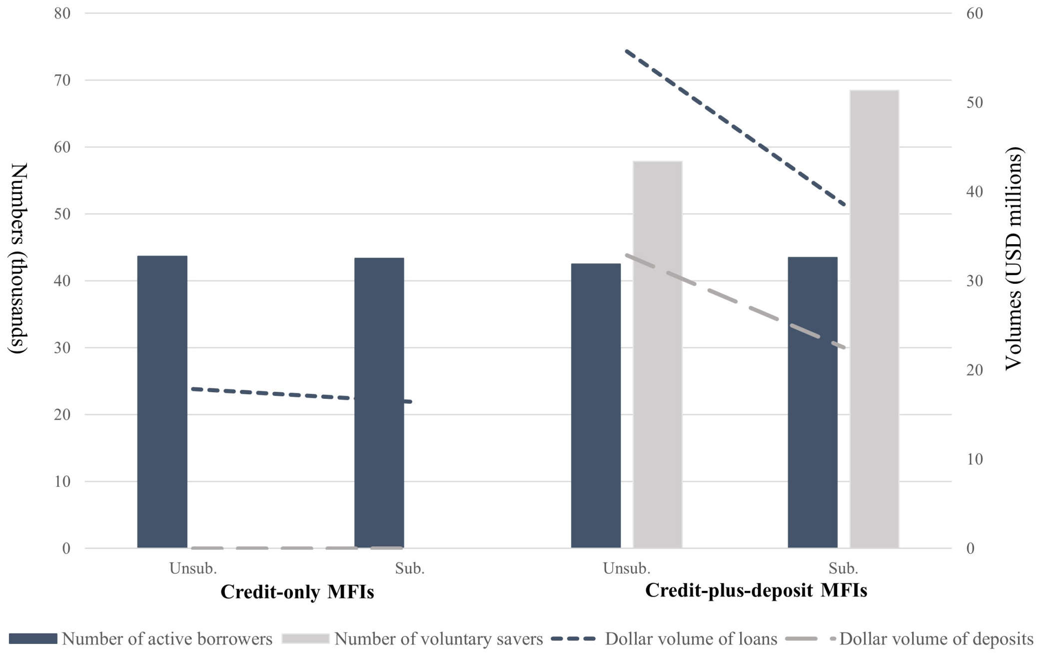
Table 3: Summary Statistics

	Full sample			**Credit-only MFIs**			**Credit-plus-deposit MFIs**		
Variables	**Unsub.**	**Sub.**	**t-test**[a]	**Unsub.**	**Sub.**	**t-test**[a]	**Unsub.**	**Sub.**	**t-test**[a]
Total cost (USD millions)	8.30	4.40	***	5.50	3.77	***	12.16	7.04	***
	(0.54)	(0.24)		(0.54)	(0.23)		(1.00)	(0.77)	
Outputs:									
Number of active borrowers	43.16	43.39		43.64	43.36		42.51	43.50	
(thousands)	(3.17)	(2.40)		(4.76)	(2.69)		(3.73)	(5.39)	
Loan portfolio (USD millions)	33.79	20.74	***	17.86	16.46		55.72	38.57	**
	(2.94)	(1.16)		(2.05)	(1.15)		(5.1)	(3.51)	
Number of voluntary savers	26.55	16.31	***	0.00	0.00		57.90	68.46	
(thousands)	(2.97)	(2.26)					(6.04)	(8.71)	
Voluntary deposits (USD millions)	13.98	4.46	***	0.00	0.00		32.85	22.53	**
	(1.43)	(0.63)					(3.07)	(2.94)	
Social performance:									
Average Loan Size (USD)	1,359	845	***	994	733	***	1,778	1,358	***
	(73)	(32)		(74)	(32)		(127)	(93)	
Average Loan Size/GNI per capita	0.54	0.46	**	0.32	0.37		0.85	0.85	
	(0.03)	(0.02)		(0.02)	(0.01)		(0.07)	(0.08)	
Other variables:									
Price of labor	9,403	7,983	***	9,802	8,076	***	8,855	7,595	***
	(202)	(143)		(271)	(158)		(300)	(339)	
Price of fixed capital	3.15	2.99		3.89	3.22	***	2.13	2.04	
	(0.12)	(0.09)		(0.18)	(0.10)		(0.14)	(0.11)	
Price of financial capital	0.16	0.16		0.21	0.18	***	0.10	0.10	
	(0.01)	(0.01)		(0.01)	(0.01)		(0.00)	(0.01)	
Risk (30-day portfolio at risk)	0.058	0.053		0.054	0.054		0.064	0.049	**
	(0.00)	(0.00)		(0.00)	(0.00)		(0.00)	(0.00)	
Age (in years)	14.29	13.06	***	11.64	12.68	**	17.93	14.62	***
	(0.36)	(0.22)		(0.34)	(0.22)		(0.68)	(0.63)	
NGO (Y/N)	0.22	0.53	***	0.34	0.62	***	0.05	0.19	***
	(0.01)	(0.01)		(0.02)	(0.01)		(0.01)	(0.02)	
Compulsory deposits (Y/N)	0.17	0.29	***	0.18	0.27	***	0.16	0.38	***
	(0.01)	(0.01)		(0.02)	(0.01)		(0.02)	(0.03)	
Observations	789	1,307		457	1,054		332	253	

This table shows mean values of the variables and their standard errors in parentheses for the full sample, credit-only and credit-plus-deposit MFIs.
[a]Two-sided t-test for equal means of unsubsidized and subsidized MFIs. Significance: *** p<0.01, ** p<0.05, * p<0.1

On the output side, the number of voluntary savers is larger in subsidy-free institutions, which is consistent with subsidization being more prevalent in credit-only MFIs. Unsubsidized lenders are less likely to impose compulsory savings on their borrowers and they have larger loan portfolios. Larger loans can be explained by two combined goals: reaching better-off borrowers and

Figure 1: Outputs by Subsidization Status and Business Model



meeting regulatory requirements. Another informative variable is age, often considered as a proxy for experience. The full-sample statistics in Table 3 reveal that unsubsidized MFIs are older than their subsidized counterparts, but the gap – although statistically significant – is small (just over one year).

Some specific features of credit-only and credit-plus-deposit MFIs deserve special attention. Unlike in the full sample, unsubsidized credit-only MFIs are younger than their subsidized counterparts, which is consistent with the finding of Cull et al. (2018) that subsidies flowing into credit-only MFIs tend to persist over time, so that older institutions accumulate larger amounts and improve their chances of achieving financial sustainability. If so, credit-only MFIs would find it harder to survive without subsidies. Among credit-plus-deposit MFIs, the age relationship is reversed: unsubsidized institutions are over three years older than their subsidized counterparts. Considering that older MFIs are by nature more likely to be sustainable than young ones, the contrasting age-subsidization links across business models is a first, albeit preliminary, piece of evidence suggesting that subsidies and deposits can act as substitutes.

The gap in input prices associated with the presence of subsidies is greater for credit-only

MFIs than in the full sample, suggesting higher levels of subsidization. Since the final input price includes the value of subsidy in our adjusted data, the fact that the price of financial capital is significantly higher for unsubsidized MFIs than for subsidized ones may mean that subsidies are used to lower the cost of financial capital. No such difference is found for credit-plus-deposit MFIs. Both in the full sample and the credit-only subsample, risk levels seem unrelated to subsidization. By contrast, the figures reveal a significant difference in risk level for credit-plus-deposit MFIs, suggesting that subsidy-free institutions serve riskier borrowers and confirming that donors do not like risk (Cobb et al., 2016). Presumably, deposit-taking unsubsidized MFIs are more likely to operate in mature markets where competition is tougher and thus delinquency (higher risk value) is more frequent (D'Espallier et al., 2015).

Tables A4 to A7 in the Appendix provide descriptive statistics for MFIs split by institutional form. NGOs, which represent 41% of our MFI-year observations, are more likely to be subsidized and/or credit-only. The figures in Table A4 reveal that 75% of NGOs are subsidized credit-only, 5% are subsidized credit-plus-deposit, 18% are unsubsidized credit-only, and the remaining 2% are unsubsidized credit-plus-deposit. There are few differences in costs and outputs between subsidized and unsubsidized NGOs, but subsidized NGOs reach more borrowers and offer larger loans (scaled by the GNI per capita) than their unsubsidized counterparts. As regards differences in control variables among NGOs, subsidy is associated with a lower price of labor, less financial capital, lower age, and more compulsory savings.

MFIs with non-NGO institutional forms are split as follows: 34% are non-bank financial institutions (NBFIs) (among which 55% are subsidized), 10% are credit cooperatives (62% subsidized), and 9% are commercial banks (39% subsidized). Regardless of their business model, the characteristics of banks are relatively unaffected by their subsidization status. The same holds true for credit-only cooperatives. In contrast, subsidized credit-plus-deposit cooperatives differ from their unsubsidized counterparts in several aspects, such as total costs, prices of inputs, and compulsory-deposit collection.

Only for NBFIs does subsidization affects both business models. Indeed, subsidized credit-only NBFIs have lower total costs, offer larger loans (scaled by the GNI per capita), and face a higher price of fixed capital than their subsidized counterparts. Likewise, subsidized credit-plus-deposit NBFIs differ from their unsubsidized counterparts in all aspects but age, suggesting that credit-plus-deposit NBFIs are MFIs that are highly sensitive to subsidization.

Overall, the statistics broken down by institutional form and subsidization status suggest that subsidization interacts significantly with the characteristics of three specific groups of MFIs: credit-only NGOs, credit-plus-deposit cooperatives, and all NBFIs. In contrast, banks seem mostly unaffected by subsidization. These figures, however, might reflect the fact that some statuses are uncommon: Few NGOs take deposits and few cooperatives are credit-only, while banks are regulated, which leaves little room for variations in characteristics. The NBFIs status is both less regulated than the status of banks and is compatible with any business models, which may explain why NBFIs exhibit flexible adjustments to subsidization.

Table A8 in the Appendix shows both the variance inflation factor (VIF) and the correlations between the explanatory variables to assess multicollinearity. The highest correlation is 0.764 (between voluntary deposits in USD and the number of voluntary savers). This correlation is well below the recommended upper threshold of 0.9 (Kennedy, 2008). The highest VIF is 9.38 (Loan portfolio in USD) and the mean VIF is 3.40. Both values are below the recommended upper bound of 10 (Hair et al., 2010). Hence, multicollinearity does not seem to be a serious concern for our analysis.

4 Cost Efficiency

We estimate the cost functions following the empirical design described in Section 2. While the estimated model includes Equations (1) to (3), only the results of Equation (2) are directly related to cost efficiency. For this reason, we present the results of the selection equation (Equation (1)) and share equations (Equation (3)) in the Appendix.

Most coefficients in the selection equation (Table A1) have the expected signs. For example, NGOs are typically credit-only MFIs. Still, the loadings of a few variables deliver less straightforward results. Among unsubsidized MFIs, the selection is sensitive to the number of active borrowers and to the dollar volume of loans. By contrast, this is not true among subsidized MFIs, suggesting that unsubsidized credit-only MFIs have more borrowers and smaller volumes of loans than unsubsidized credit-plus-deposit MFIs, which in turn signals a greater attention to social orientation. The positive impact of internet subscriptions on the selection of credit-only MFIs among the unsubsidized, but not among the subsidized, suggests that unsubsidized credit-only MFIs must maintain an edge in innovative technology, including participation in social networks, to reach out to potential clients and so cut costs (Morduch, 2000).

This section analyzes cost efficiency in two stages: Subsection 4.1 deals with credit-only MFIs and Subsection 4.2 with credit-plus-deposit MFIs. In both cases, we compare the efficiency levels of subsidized and unsubsidized institutions and factor in the endogenous selection into a business model by defining uncensored observations as those for which the selection dummy takes the value of 1. As a result, in Subsection 4.1 (Table 4), uncensored observations correspond to credit-only MFIs, while in Subsection 4.1 (Table 5), they correspond to credit-plus-deposit MFIs. Last, Table A3 in the Appendix provides an overview of our results by estimating the CMP model with interaction terms for subsidization. This is basically a way to assess the robustness of our previous results by using a single, but longer, equation, and to check whether coefficients are statistically different across subsidization groups.

4.1 The Cost of Credit-Only MFIs

Table 4 accounts for endogenous self-selection into the credit-only business model. The two outputs are the number and dollar volume of loans. The left-hand and right-hand sides of the table present the results concerning unsubsidized and subsidized institutions, respectively. The adjusted R-squared (0.94 and 0.95) show that the translog fit is excellent. The significant coefficients have signs and magnitudes that are consistent with previous studies (Hartarska et al., 2013b; Caudill et al., 2009).

Our primary focus is the impact of the output variables in the first two lines of Table 4. The coefficients show that both the number of active borrowers and the dollar volume of loans affect the cost of credit-only MFIs, regardless of their subsidization status. Reaching an additional percent of borrowers increases the cost by 0.23 percent in an unsubsidized MFI and by 0.20 percent in a subsidized one, but the two effects are not significantly different from each other.[16]

In line with previous contributions, Table 4 shows that risk, measured by the size of the 30-day portfolio at risk, has a positive effect on cost (Hartarska et al., 2013b). The increase is, however, smaller in subsidized MFIs since the sensitivity to risk in these MFIs is almost half as large as in unsubsidized MFIs. This suggests that subsidized credit-only MFIs reach riskier, and

[16]Since the variables are demeaned prior to taking logs and normalized, the coefficient of the derivative with respect to the output/input price is the marginal effect.

Table 4: Cost Equation: Credit-Only MFIs

Variables	**Unsubsidized MFIs** Coefficient	Standard error	**Subsidized MFIs** Coefficient	Standard error
ln(number of active borrowers)	0.233***	(0.053)	0.204***	(0.047)
ln(loans in USD)	0.653***	(0.055)	0.732***	(0.047)
ln(PLabor)	0.399***	(0.011)	0.379***	(0.009)
ln(PFinCapital)	0.372***	(0.015)	0.343***	(0.012)
ln(number of active borrowers)^2	-0.083*	(0.048)	0.069	(0.043)
ln(loans in USD)^2	0.017	(0.055)	0.164***	(0.051)
ln(loans in USD)*ln(number of active borrowers)	0.038	(0.047)	-0.103**	(0.044)
ln(PFinCapital)^2	0.081***	(0.011)	0.083***	(0.007)
ln(PLabor)^2	0.101***	(0.010)	0.084***	(0.007)
ln(PLabor)*ln(PFinCapital)	-0.072***	(0.006)	-0.063***	(0.006)
ln(number of active borrowers)*ln(PLabor)	0.043***	(0.008)	0.050***	(0.006)
ln(loans in USD)*ln(PLabor)	-0.055***	(0.010)	-0.074***	(0.007)
ln(number of active borrowers)*ln(PFinCapital)	-0.034***	(0.007)	-0.037***	(0.007)
ln(loans in USD)*ln(PFinCapital)	0.069***	(0.010)	0.074***	(0.007)
Risk (30-day portfolio at risk)	0.118***	(0.022)	0.065***	(0.015)
Age (in years)	0.008**	(0.004)	0.005	(0.004)
NGO (Y/N)	0.098	(0.072)	0.067	(0.060)
Compulsory deposits (Y/N)	0.038	(0.094)	0.023	(0.062)
Constant	-0.684***	(0.113)	-0.135	(0.163)
Mills ratio	0.253***		0.166	
Country dummies	Yes		Yes	
Observations	789		1,307	
Uncensored observations	457		1,054	
Adjusted R-squared	0.95		0.95	
Economies of scale	0.886		0.936	
P-value Wald test H0: Constant returns to scale	0.000		0.001	

All the variables are demeaned. The prices of labor and financial capital are normalized by the price of physical capital. The total number of observations corresponds to total MFI-year observations. Uncensored observations correspond to credit-only MFIs. Standard errors are clustered at MFI level.
Significance: *** p<0.01, ** p<0.05, * p<0.1

presumably poorer, borrowers, which is in line with the social mission typically associated with subsidies. Additionally, Table A2 in the Appendix confirms that subsidization has a negative impact (-1.162) on costs and that subsidies make the cost of microfinance less sensitive to labor expenses (by 0.02 percent).

By using an endogenous self-selection model, we assume that MFIs choose their business model by considering both the type of social performance expected by subsidy providers and the constraints and opportunities in their local field of operation, such as market conditions and regulations. Under this assumption, MFIs that enjoy a comparative advantage in taking deposits may self-select into the credit-plus-deposit business model and, subsequently, pay relatively less attention to the strings attached to subsidies. In other words, taking deposits confers financial autonomy and can ultimately provide more freedom to unsubsidized institutions to better adjust their business model to their environment. In contrast, the business-model selection of a subsidized institution would be strongly driven by donors, and hence more likely exogenous. The credibility of this rationale is attested by the Mills ratio in Table 4, which rejects the hypothesis of an exogenous selection of the business model, but only for unsubsidized MFIs.

The penultimate line in Table 4 shows that all credit-only MFIs benefit from increasing returns to scale. However, Table A3 (Panel B) makes clear that, in this group, subsidized institutions are closer to constant returns to scale (0.938 > 0.882) and the difference is significant at the 5% level. Consequently, subsidized credit-only MFIs are closer to their cost-minimizing size compared with unsubsidized credit-only MFIs. This result corroborates our previous finding: subsidies to credit-only MFIs do not harm cost efficiency; on the contrary, they may be helping them grow and reach riskier borrowers at a lower cost. Overall, our estimation suggests that subsidies have no adverse impact on credit-only MFIs.

4.2 The Cost of Credit-plus-Deposit MFIs

The cost function of credit-plus-deposit MFIs includes four outputs: loans and deposits, both in numbers and in dollar volume. Their estimated coefficients appear in the first four lines of Table 5. As expected, the two adjusted R-squared (0.98) show an excellent statistical fit. Let us now consider the impact of subsidization on lending and deposit-taking activities.

First, the cost elasticities reported in Table 5 show that serving a marginal borrower is costlier for an unsubsidized MFI than for a subsidized one. The difference in elasticities (0.18 versus 0.08) is consistent with the view that subsidies are used to lower costs and serve more borrowers. Second, the cost of unsubsidized credit-plus-deposit MFIs is sensitive to the dollar value of deposits (coefficient 0.224), but not to the numbers of depositors served. The results are reversed for subsidized institutions, for which cost is insensitive to deposit size and the marginal impact on cost of reaching an additional percent of depositors is 0.076%.

The estimation results in Table 5 complete the picture by suggesting that the donor focus on lending is partly attributable to MFIs having self-fulfilling expectations about subsidies. Since credit-plus-deposit MFIs that receive subsidies – compared with those that do not – have a higher

Table 5: Cost Equation: Credit-plus-Deposit MFIs

	Unsubsidized MFIs		**Subsidized MFIs**	
Variables	Coefficient	Standard error	Coefficient	Standard error
ln(number of active borrowers)	0.180***	(0.044)	0.082*	(0.047)
ln(loans in USD)	0.604***	(0.055)	0.737***	(0.050)
ln(number of voluntary depositors)	-0.003	(0.031)	0.076**	(0.030)
ln(deposits in USD)	0.224***	(0.036)	0.054	(0.033)
ln(PLabor)	0.284***	(0.013)	0.311***	(0.023)
ln(PFinCapital)	0.403***	(0.016)	0.328***	(0.025)
ln(number of active borrowers)^2	0.129***	(0.036)	-0.087*	(0.047)
ln(loans in USD)^2	0.236***	(0.059)	0.086	(0.053)
ln(number of voluntary depositors)^2	0.001	(0.011)	0.018	(0.012)
ln(deposits in USD)^2	0.117***	(0.025)	-0.025*	(0.013)
ln(number of active borrowers)* ln(number of voluntary depositors)	-0.048***	(0.010)	0.011	(0.017)
ln(loans in USD)*ln(number of active borrowers)	-0.103***	(0.039)	0.049	(0.047)
ln(deposits in USD)*ln(number of active borrowers)	0.023	(0.020)	-0.026	(0.022)
ln(loans in USD)*ln(number of voluntary depositors)	0.065***	(0.015)	-0.049**	(0.022)
ln(deposits in USD)*ln(number of voluntary depositors)	-0.019	(0.011)	0.030***	(0.011)
ln(loans in USD)*ln(deposits in USD)	-0.154***	(0.032)	0.005	(0.023)
ln(PFinCapital)^2	0.187***	(0.009)	0.129***	(0.010)
ln(PLabor)^2	0.097***	(0.012)	0.050***	(0.013)
ln(PLabor)*ln(PFinCapital)	-0.101***	(0.008)	-0.046***	(0.009)
ln(number of active borrowers)*ln(PLabor)	0.056***	(0.008)	0.050***	(0.011)
ln(loans in USD)*ln(PLabor)	-0.046***	(0.010)	-0.047***	(0.011)
ln(number of voluntary depositors)*ln(PLabor)	0.001	(0.005)	0.004	(0.006)
ln(deposits in USD)*ln(PLabor)	-0.026***	(0.007)	-0.011*	(0.006)
ln(number of active borrowers)*ln(PFinCapital)	-0.057***	(0.010)	-0.053***	(0.011)
ln(loans in USD)*ln(PFinCapital)	0.048***	(0.012)	0.077***	(0.010)
ln(number of voluntary depositors)*ln(PFinCapital)	-0.002	(0.009)	-0.008	(0.007)
ln(deposits in USD)*ln(PFinCapital)	0.021**	(0.009)	0.002	(0.006)
Risk (30-day portfolio at risk)	0.019*	(0.010)	0.013	(0.020)
Age (in years)	-0.004***	(0.002)	-0.001	(0.003)
NGO (Y/N)	0.174	(0.217)	0.135	(0.107)
Compulsory deposits (Y/N)	0.172***	(0.054)	0.043	(0.063)
Constant	-0.415***	(0.117)	0.412**	(0.161)
Mills ratio	0.012		-0.232*	
Country dummies	Yes		Yes	
Observations	789		1,307	
Uncensored observations	332		253	
Adjusted R-squared	0.98		0.98	
Economies of scale	1.005		0.949	
P-value Wald test H0: Constant returns to scale	0.836		0.032	

All the variables are demeaned. The prices of labor and financial capital are normalized by the price of physical capital. The total number of observations corresponds to total MFI-year observations. Uncensored observations correspond to credit-plus-deposit MFIs. Standard errors are clustered at MFI level.
Significance: *** p<0.01, ** p<0.05, * p<0.1

cost elasticity of savers and a lower cost elasticity of dollars in deposits, they may be tempted to please donors by adopting a production technology favoring borrowers who are less attractive in terms of their capacity to save. Ultimately, this will lead these institutions to offset the additional costs of lending with subsidies and, thus, perpetuate their subsidy dependency.

Moreover, Table 5 shows that the total cost of subsidized MFIs is less sensitive to the cost of capital than the total cost of their unsubsidized counterparts, pointing to a crowding-out effect of deposits on subsidies (Cozarenco et al., 2016).[17] In subsidized credit-plus-deposit MFIs, cost decreases with age at a rate of only one percent per year, suggesting that learning by doing is slow in this group (Caudill et al., 2009). Regardless of this, our results provide consistent evidence that subsidization interferes with an MFI's ability to offer savings products.

Regarding returns to scale, the penultimate line in Table 5 shows that unsubsidized credit-plus-deposit MFIs have reached their optimal size. They have constant returns to scale, since summing up the coefficients of the four outputs yields an estimate of 1.005 and the Wald test does not reject the null hypothesis that this value is equal to one. These unsubsidized institutions operate at minimum costs. In contrast, their subsidized counterparts have increasing returns to scale: the sum of the four output coefficients is equal to 0.949, which is tested significantly smaller than one. Compared with their unsubsidized counterparts, subsidized credit-plus-deposit MFIs exhibit lower cost-efficiency and suboptimal size. Table A3 (Panel B) indicates that the difference is significant at the 10% level.

The Appendix presents a series of robustness checks. Tables A10 and A11 assess the robustness of our results by excluding data from the three countries with the largest numbers of MFIs in our sample (India, the Philippines, and Peru). Likewise, in Tables A12 and A13, we ran the regressions after removing the MFIs with a single observation in our dataset from the sample. Overall, our results are robust with respect to these two types of exclusion. All the economies of scale previously smaller than one remain so, even though the level of significance for subsidized credit-plus-deposit MFIs is reduced in Tables A11 and A13. Since the subsidized credit-plus-deposit MFIs constitute the smallest group in our sample, the reduction in significance level may be due to the smaller number of observations.

[17] Yet the production rather than the intermediation approach to MFI cost function specification with deposits as output remains valid because none of the output coefficients are negative, that is to say, cost does not decrease with savings outputs.

In an additional robustness check, we further scrutinized whether NGOs might be different from other MFIs by running regressions with interactions between the NGO dummy and every output variable. The results in Tables A14 and A15 suggest that, regarding cost-efficiency, NGOs are similar to other types of MFIs. A Wald test failed to identify any significant difference between economies of scale for NGOs and for other MFIs.

In practice, however, seizing the growth opportunity associated with cost-efficiency gains can have the drawback of reducing the MFI's depth of outreach – the average loan is larger in unsubsidized institutions. In addition, growing is not always feasible since MFIs operating in poor and remote areas might find it difficult to increase their size without compromising their location and/or social outcomes.

Summing up, our results suggest that deposit mobilization is consistent with a cost-minimizing size. This conclusion is in line with the summary statistics in Table 2 showing that 57% of credit-plus-deposit MFIs in our sample are free of subsidy, against only 30% of credit-only MFIs. Most importantly, subsidies can create a negative externality on the efficiency of credit-plus-deposit MFIs. A comparison of the average cost efficiency across the four groups of institutions shows that only unsubsidized credit-plus-deposit MFIs have achieved their cost-minimizing size.[18] By contrast, their subsidized counterparts have increasing returns to scale, suggesting that subsidies to MFIs interfere negatively with deposit collection. The next subsection will assess the robustness of this message with the help of counterfactual simulations.

4.3 Comparing Predicted Costs: A Counterfactual Exercise

The final step of our investigation analyzes the impact of subsidization on the cost efficiency of unsubsidized MFIs by deriving their real and counterfactual costs. To this end, we compute the cost function of unsubsidized MFIs under the hypothetical scenario of their being subsidized, all else equal (including the business model used). In other words, we use counterfactuals, which are obtained by plugging in the characteristics of unsubsidized MFIs into the cost functions estimated

[18] We estimated a SUR model to assess whether our results depend on CMP accounting for endogenous self-selection into a business model (results available upon request). Overall, the SUR model produces similar economies of scale for unsubsidized and subsidized credit-only MFIs. For credit-plus-deposit subsidized MFIs, however, the SUR model reveals two notable differences when compared to the CMP: First, the number of active borrowers is no longer significant and, second, the relationship between total cost and deposits in USD is significant at the 5% level. These differences confirm the message from our significant Mills ratio, namely, that endogenous self-selection is a major feature in the microfinance industry.

with the data from subsidized institutions, while holding the business model constant.

Since the estimated cost functions used for this exercise depend on the business model, we use two different models for credit-only MFIs and credit-plus-deposit MFIs, which are presented in Table 4 and Table 5, respectively. Next, we compare the actual (real) with the counterfactual cost functions in the following way: to predict the real costs of unsubsidized MFIs, we use the estimated coefficients listed in column (1) of Table 4 for credit-only MFIs, and those listed in column (1) of Table 5 for credit-plus-deposit MFIs, while the predictions of counterfactual costs are obtained by using coefficients from columns (2) in Tables 4 and 5.

Table 6 shows the costs in USD millions. By comparing average real costs with counterfactual costs, Table 6 contrasts the production technologies underpinning MFIs sharing the same business model. This allows us to assess the cost efficiency of unsubsidized MFIs with respect to the hypothetical group of MFIs having the exact same characteristics except for the subsidization status.

Table 6: Predicted and Counterfactual Costs for Unsubsidized MFIs in USD millions

	Credit-only MFIs N=457	**Credit-plus-deposit MFIs N=332**
Predicted cost	4.576	12.408
Counterfactual cost	4.852	20.130
Difference	0.275***	7.721***
P-value of the two-sided t-test for equal means of predicted and counterfactual costs	0.002	0.000

The counterfactual costs are computed using the cost function for subsidized MFIs. Significance: *** p<0.01, ** p<0.05, * p<0.1

First, unsubsidized MFIs producing only credit have an average estimated cost of USD 4.58M, while the counterfactual cost is USD 4.85M. The interpretation is that, if all the unsubsidized credit-only MFIs were subsidized but otherwise identical, their average cost would be higher by USD 0.27M (which corresponds to an increase of 6% from USD 4.58M to USD 4.85M). The p-value of the t-test for equal means suggests that the difference is statistically significant at the 1% level.

Second, unsubsidized credit-plus-deposit MFIs have an average real cost of USD 12.41M and an average counterfactual cost of USD 20.13M. If they were subsidized, their average cost would rise by USD 7.72M, corresponding to a 62% increase. This difference is both statistically significant and economically large compared with the corresponding figures obtained for credit-only MFIs. The counterfactual exercise emphasizes that credit-plus-deposit MFIs are more cost-efficient when unsubsidized.

As any comparison based on counterfactuals, the exercise has limitations owing to the hypothetical nature of the simulated scenarios. Not all unsubsidized MFIs would make sense as organizations with identical features but receiving subsidies. Indeed, several unsubsidized MFIs in our sample operate in a way that would not easily be transposed into their hypothetical subsidized counterparts. Yet comparing the cost gaps between credit-only and credit-plus-deposit MFIs reveals an asymmetric pattern: providing credit-only MFIs with subsidies does increase costs, but modestly. This is in stark contrast with the large gap observed for credit-plus-deposit MFIs (6% versus 62%).

Overall, the CMP joint estimation of the selection equation, cost functions, and cost shares associated with our counterfactual analysis shows that the most cost-efficient MFIs are unsubsidized credit-plus-deposit institutions. Therefore, combining subsidized funds from donors with deposits is associated with a lower cost efficiency. This result is consistent with previous evidence by Cozarenco et al. (2016) and Al-Azzam (2019) showing that subsidization and deposit-taking are a bad fit in the microfinance industry; this suggests that subsidies and deposits are substitutes rather than complements.

5 Mission Drift

This section scrutinizes differences in cost functions between subsidized and unsubsidized MFIs using the same business model. The goal is to establish whether subsidies to any business model put recipient organizations at risk of mission drift or, conversely, shield them from it. On the basis of the formal definitions provided in Section 2.2, we may represent the impact of subsidies on the costs of credit-only and credit-plus-deposit MFIs by six parameters (see Table 7). Thus, we retrieved from Table A3 the regression coefficients of the six interaction terms involving the dummy that stands for subsidization multiplied by any output variable. To be more precise, the coefficients of "subsidized * number of active borrowers" and of "subsidized * number of voluntary depositors" correspond to social outputs and can be interpreted as Δ_{social}'s, while the interaction terms associated with dollar volumes are interpreted as $\Delta_{financial}$'s. For credit-only MFIs, there are only one social and one financial output, thus two coefficients of interest; for credit-plus-deposit MFIs, we obtain four coefficients grouped by activity (two for loans and two for deposits).

Table 7: Subsidization and Risk of Mission Drift

	Credit-only MFI	**Credit-plus-deposit MFI**	
		Loans	**Deposits**
Δ_{social}	0.002	-0.122*	0.073*
$\Delta_{financial}$	0.054	0.131*	-0.046***
Conclusion at the 1% significance level	No risk of mission drift	No risk of mission drift	Weak risk of mission drift
Conclusion at the 10% significance level	No risk of mission drift	Strong incentive for mission alignment	Strong risk of mission drift

This table shows $\Delta_{social} = \theta_{social}^{subsidized} - \theta_{social}^{unsubsidized}$ and $\Delta_{financial} = \theta_{financial}^{subsidized} - \theta_{financial}^{unsubsidized}$, where θs are the regression coefficients of outputs interacted with the subsidy dummy retrieved from Table A3. The conclusions are based on the decision rules presented in Table 1. Significance: *** p<0.01, ** p<0.05, * p<0.1

Table 7 confirms the findings in Table 4: subsidies do not interfere with the lending activity of credit-only MFIs since both Δ_{social} and $\Delta_{financial}$ are insignificant. Hence for credit-only MFIs subsidization has no cost-based impact on mission drift/alignment.

By contrast, as regards the deposit-taking activity of credit-plus-deposit MFIs, Table 7 shows that Δ_{social} is significantly positive (at the 10% level) whereas $\Delta_{financial}$ is significantly negative (at the 1% level). The decision rule in Table 1 dictates the conclusion that cost minimization entails a risk of mission drift in the collection of deposits. This risk is weak at the 1% level of significance and strong at the 10% level. In any case, the most notable feature concerns the negative impact of subsidization on the cost of increasing the dollar volume of deposit collection. This outcome goes against the typical goal of subsidy providers, which is to supply as many clients as possible with savings accounts. Accounting for the positive value of Δ_{social}, significant at the 10% threshold, makes things even worse since the risk of mission drift increases from weak to strong.

A possible explanation for these facts is that the pro-poor constraints attached to subsidies counteract the ability and, most likely, the willingness of credit-plus-deposit MFIs to attract voluntary depositors. Poor clients bring tiny deposits, which are costly to handle, while the availability of subsidies may render cost insensitive to the volume of voluntary deposits produced by MFIs. In contrast, unsubsidized MFIs may be able to shape their pool of depositors more freely, and the lack of subsidies makes producing a large volume of deposits costlier, irrespective of their source (large or small-sized savings). Thus, we uncover a potential trade-off based on cost between subsidies and deposit collection, leading to the risk of mission drift associated with deposit collection.

The risk of mission drift in the deposit-collection activity is, however, mitigated by the pro-social impact of subsidies on the lending activity of credit-plus-deposit MFIs. As Section 4.2 showed, issuing larger loans is less costly for credit-plus-deposit MFIs in the absence of subsidies. Thus, subsidization reduces the cost of serving poorer borrowers. In Table 7, the conclusion at the 10% level suggests that subsidies to credit-plus-deposit MFIs provide a strong incentive for mission alignment in loan granting.

Together, these findings reveal a nuanced picture of the risk of mission drift in credit-plus deposit MFIs. While subsidies increase social performance in terms of microcredit provision, they interfere negatively with micro-savings collection. Historically, donors and subsidy providers have focused more on lending than on savings. Average loan size is still their preferred indicator of social performance (D'Espallier et al., 2017) and, logically, the most common criterion for assessing how well MFIs fulfill their mission of poverty alleviation (Reichert, 2018; Cull et al., 2007). Tchakoute Tchuigoua (2015) shows that subsidies are consistently correlated with past loans. If, in turn, MFIs allocate subsidies to their lending activity to please their donors, then their pool of borrowers/depositors will be driven by the incentives created by donors. In our sample, the descriptive statistics suggest that this is the case, since subsidized MFIs grant smaller loans than unsubsidized ones, while the average deposit size is the same in both groups. Subsidization is thus associated with lending to poorer individuals and decreasing the cost of the marginal borrower, so that on the one hand, subsidies encourage pro-social lending but, on the other hand, they increase the risk of mission drift in terms of deposit-taking. In that sense, cost efficiency triggers a trade-off between the two financial products proposed by credit-plus-deposit MFIs.

6 Discussion and Conclusions

This paper contributes to the ongoing conversation on subsidies and cost efficiency in microfinance. Expectations that MFIs would eventually provide financial services to the poor while covering their costs have only been partially fulfilledthe industry still relies on subsidies (Cull and Morduch, 2018). Although the microfinance literature does acknowledge the social benefits of subsidies (D'Espallier et al., 2013; Khachatryan et al., 2017), it also questions the efficiency of subsidized MFIs (Cull and Morduch, 2018; Bos and Millone, 2015). Strikingly, however, the differential cost efficiencies of subsidized and unsubsidized MFIs have remained unexplored.

While originally microfinance was based on the credit-only business model, many MFIs have morphed into credit-plus-deposit institutions, thereby changing their product mix. Meanwhile, most subsidy providers still rely on the established habit of using loan size as the main indicator of social performance, since poorer borrowers typically request smaller loans. This one-sided view neglects another recognized social mission, namely, providing savings opportunities to the poor, and can therefore have an effect on the development of voluntary-deposit collection. In the design of social and financial output variables for this paper, the two activities of credit-plus-deposit MFIs were put on an equal footing.

Why do subsidies have asymmetric effects on credit-plus-deposits and credit-only MFIs? Al-Azzam (2019) shows that deposits and subsidies are substitute sources of funds. The author, however, emphasizes that subsidies may trigger negative outcomes such as repayment problems. Receiving subsidies has a significant impact on both the financial statements of MFIs and their risk structure, including access to debt capital (Dorfleitner et al., 2017), and the interest rates charged (Dorfleitner et al., 2013). D'Espallier et al. (2017) emphasize the detrimental impact of subsidy uncertainty on social performance. Overall, the evidence points to deposits being more beneficial–and sustainable–to MFIs than subsidies. Evidently, this conclusion concerns only MFIs collecting deposits. As regards credit-only MFIs, subsidies undoubtedly constitute financial support that helps them fulfill their social mission. Using two separate cost functions helps us acknowledge this asymmetric effect of subsidies on the two business models.

The first ambition of this paper was to study how subsidies relate to efficiency and scale, while accounting for the fact that MFIs self-select into a business model (credit-only, or credit-plus-deposit) (Malikov and Hartarska, 2018). Our productivity framework departed from those of banks to account for the dual mission of MFIs – outreach and sustainability. We deepened the comparison of cost functions in unsubsidized and subsidized institutions thanks to an original counterfactual analysis. One could however argue that, in our approach, self-selection is limited to the business model and, therefore, does not affect subsidization status. Do MFIs self-select into subsidization status or are they selected as recipients by subsidy providers? Undeniably, MFIs may act on their own subsidization status, for example by rejecting subsidies with uncomfortable strings attached. Nevertheless, assuming that MFIs have the power to self-select into being subsidized or not, regardless of their characteristics, is probably going one step too far in that direction. This assumption would lead to depriving subsidy providers of their main tool for encouraging cost efficiency and discouraging mission drift. As a result, the social orientation of microfinance, which is the very reason why this sector is subsidized, would lose its central place in our setting. Hypothetically, adopting a more granular view of subsidies (for example, by distinguishing pure grants from soft loans), with potential self-selection into subsidy categories, might provide a fruitful extension of our work.

Our empirical results reveal that unsubsidized credit-plus-deposit MFIs constitute the most cost-efficient group of institutions in our sample since they are the only ones to have achieved optimal capacity. On the other hand, subsidies fit poorly with the deposit-taking activity since they counteract cost efficiency. We rationalize these facts by combining the donors' habit of focusing on the lending side and the substitution effect between subsidies and deposits. In sum, subsidies are helpful in lending, especially for credit-only MFIs, but less so for credit-plus-deposit ones, where subsidization involves trade-offs. Our results therefore call for caution when promoting subsidies by arguing that an increase in size would help any MFI to achieve optimal scale and reach its target clientele.

The second takeaway of this paper relates to mission drift. We showed that subsidies to credit-only MFIs had no particular effect on mission drift or fulfilment. In contrast, subsidies did trigger the risk of mission drift by reducing MFIs' appetite for collecting small voluntary deposits. This negative social impact was, however, mitigated by a positive one on the lending activity of credit-plus-deposit MFIs. Our empirical findings thus capture a potentially perverse incentive scheme that encourages subsidy-seeking MFIs to concentrate on producing smaller-size loans but makes reaching depositors costlier, possibly discouraging deposit collection. Overall, the cost-efficiency argument and the mission-drift argument converge to raise concerns about the mismatch between subsidies and deposit-taking.

Our results suggest that subsidization has an adverse influence on credit-plus-deposit institutions seeking to reach optimal capacity. Arguably, this effect can to some extent be attributed to donors who measure social performance by focusing on the lending activity and average loan size. This intuition is corroborated by the observation that, in both business models, the provision of subsidies has no negative impact on the supply of loans, in comparison with deposits. Donor practices incentivize the granting of smaller loans but impose asymmetric incentives on subsidized credit-plus-deposit MFIs as regards their two core activities. A second key factor is the substitutability between subsidized funds and deposits. Social mission aside, deposit-taking brings microfinance technology closer to that of regular banks (Brière and Szafarz, 2015). Another key question relates to the potential endogeneity of the subsidization status. Further work in this direction could assess whether any self-selection into a subsidization status is taking place in our sample and, if so, how much this would affect our results regarding the differential costs of credit-only and credit-plus-deposit MFIs.

Before inferring policy recommendations from our results, further work will be needed to assess the relative impacts on the risk of mission drift of donors' evaluation tools, on the one hand, and of the simple substitution effect, on the other. Future research could also elucidate the feasible transition paths that an MFI could take, from subsidized credit-only to unsubsidized credit-plus-deposit, and the consequences that this might have for their commitment to lending to the very poor. This transitioning story should, however, be viewed with caution because some MFIs, such as NGOs, face institutional constraints that prevent them from launching a deposit-taking activity.

Finally, our results provide a first and promising analysis showing that unsubsidized credit-plus-deposit MFIs can develop a cost-efficient production technology that meets the financial needs of their poor clients. In that sense, this paper is consistent with work calling for the development of a new generation of time-limited transparent subsidies, also known as "smart subsidies", a term coined by Morduch (2006).

Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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Appendix

In Table A1, columns (1) and (2) estimate the selection into the credit-only business model, in the subsamples of unsubsidized and subsidized MFIs, respectively. In both equations, the selection dummy takes the value of 1 for credit-only MFIs and 0 otherwise.

Table A1: Probit Estimation of Selection into Credit-only Business Model

	(1)		(2)	
	Unsubsidized MFIs		**Subsidized MFIs**	
Dependent Variable	**Business model = Credit-only**		**Business model = Credit-only**	
Variables	Coefficient	Standard error	Coefficient	Standard error
ln(number of active borrowers)	0.232***	(0.086)	0.192	(0.124)
ln(loans in USD)	-0.226***	(0.087)	-0.172	(0.148)
ln(PLabor)	-0.564***	(0.112)	-0.366**	(0.179)
ln(PFinCapital)	0.416***	(0.076)	0.216**	(0.099)
Risk (30-day portfolio at risk)	-0.068*	(0.040)	0.065*	(0.034)
Age (in years)	-0.028***	(0.006)	-0.030***	(0.008)
NGO (Y/N)	0.804***	(0.174)	0.803***	(0.149)
Compulsory deposits (Y/N)	0.133	(0.132)	-0.095	(0.164)
National Saving Rate	-0.023**	(0.010)	-0.014**	(0.006)
Internet Subscr. per 100 people	0.077***	(0.019)	0.048	(0.031)
National Remittance Rate	0.015***	(0.006)	0.038***	(0.009)
Rural Population Share	-0.002	(0.005)	-0.002	(0.006)
Financial Sector Depth	0.003	(0.003)	0.001	(0.002)
GDP p.c.	0.384**	(0.172)	0.671***	(0.136)
Constant	-2.677*	(1.569)	-4.318***	(1.281)
Observations	789		1,307	

Standard errors are clustered at MFI level. Significance: *** p<0.01, ** p<0.05, * p<0.1

Table A2: Estimation of the Share Equations for Labor and Capital

	Credit-only MFIs				Credit-plus-deposit MFIs			
	(1)		(2)		(3)		(4)	
	Unsubsidized		**Subsidized**		**Unsubsidized**		**Subsidized**	
Variables	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
Labor Share								
ln(number of active borrowers)	0.043***	(0.008)	0.050***	(0.006)	0.056***	(0.008)	0.050***	(0.011)
ln(loans in USD)	-0.055***	(0.010)	-0.074***	(0.007)	-0.046***	(0.010)	-0.047***	(0.011)
ln(number of voluntary depositors)					0.001	(0.005)	0.004	(0.006)
ln(deposits in USD)					-0.026***	(0.007)	-0.011*	(0.006)
ln(PLabor)	0.101***	(0.010)	0.084***	(0.007)	0.097***	(0.012)	0.050***	(0.013)
ln(PFinCapital)	-0.072***	(0.006)	-0.063***	(0.006)	-0.101***	(0.008)	-0.046***	(0.009)
Constant	0.399***	(0.011)	0.379***	(0.009)	0.284***	(0.013)	0.311***	(0.023)
Mills ratio	-0.075***		-0.075***		0.022*		0.013	
Financial Capital Share								
ln(number of active borrowers)	-0.034***	(0.007)	-0.037***	(0.007)	-0.057***	(0.010)	-0.053***	(0.011)
ln(loans in USD)	0.069***	(0.010)	0.074***	(0.007)	0.048***	(0.012)	0.077***	(0.010)
ln(number of voluntary depositors)					-0.002	(0.009)	-0.008	(0.007)
ln(deposits in USD)					0.021**	(0.009)	0.002	(0.006)
ln(PLabor)	-0.072***	(0.006)	-0.063***	(0.006)	-0.101***	(0.008)	-0.046***	(0.009)
ln(PFinCapital)	0.081***	(0.011)	0.083***	(0.007)	0.187***	(0.009)	0.129***	(0.010)
Constant	0.372***	(0.015)	0.343***	(0.012)	0.403***	(0.016)	0.328***	(0.025)
Mills ratio	-0.031		-0.001		-0.013		0.008	
Observations	789		1,307		789		1,307	
Uncensored observations	457		1,054		332		253	

Standard errors are clustered at MFI level. Significance: *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table A3: Cost Equation Estimation with Subsidy Interaction Terms

	(1)		(2)	
	Credit-only		**Credit-plus-deposit**	
	Panel A: Coefficients and Standard Errors			
Variables	Coefficient	Standard error	Coefficient	Standard error
ln(number of active borrowers)	0.214***	(0.052)	0.189***	(0.048)
ln(loans in USD)	0.668***	(0.054)	0.605***	(0.057)
ln(number of voluntary depositors)			-0.001	(0.031)
ln(deposits in USD)			0.215***	(0.035)
ln(PLabor)	0.401***	(0.009)	0.282***	(0.012)
ln(PFinCapital)	0.361***	(0.012)	0.399***	(0.015)
ln(number of active borrowers)^2	-0.083*	(0.049)	0.130***	(0.039)
ln(loans in USD)^2	0.025	(0.059)	0.211***	(0.062)
ln(number of voluntary depositors)^2			0.003	(0.011)
ln(deposits in USD)^2			0.103***	(0.024)
ln(number of active borrowers)*ln(number of voluntary depositors)			-0.047***	(0.010)
ln(loans in USD)*ln(number of active borrowers)	0.032	(0.049)	-0.096**	(0.044)
ln(deposits in USD)*ln(number of active borrowers)			0.018	(0.020)
ln(loans in USD)*ln(number of voluntary depositors)			0.065***	(0.015)
ln(deposits in USD)*ln(number of voluntary depositors)			-0.018*	(0.011)
ln(loans in USD)*ln(deposits in USD)			-0.136***	(0.031)
ln(PFinCapital)^2	0.083***	(0.011)	0.183***	(0.009)
ln(PLabor)^2	0.095***	(0.009)	0.104***	(0.012)
ln(PLabor)*ln(PFinCapital)	-0.071***	(0.006)	-0.102***	(0.009)
ln(number of active borrowers)*ln(PLabor)	0.041***	(0.007)	0.058***	(0.008)
ln(loans in USD)*ln(PLabor)	-0.054***	(0.009)	-0.048***	(0.010)
ln(number of voluntary depositors)*ln(PLabor)			0.001	(0.005)
ln(deposits in USD)*ln(PLabor)			-0.028***	(0.007)
ln(number of active borrowers)*ln(PFinCapital)	-0.031***	(0.007)	-0.059***	(0.010)
ln(loans in USD)*ln(PFinCapital)	0.066***	(0.009)	0.049***	(0.012)
ln(number of voluntary depositors)*ln(PFinCapital)			-0.002	(0.009)
ln(deposits in USD)*ln(PFinCapital)			0.022**	(0.009)
Risk (30-day portfolio at risk)	0.119***	(0.022)	0.019*	(0.011)
Age (in years)	0.009**	(0.004)	-0.005***	(0.002)
NGO (Y/N)	0.080	(0.072)	0.171	(0.214)
Compulsory deposits (Y/N)	0.042	(0.090)	0.172***	(0.054)
Constant	-0.700***	(0.141)	0.090	(0.246)
Mills ratio	0.214***		-0.042	
Country dummies	Yes		Yes	
Observations	2,096		2,096	
Uncensored observations	1,511		585	
Adjusted R-squared	0.95		0.98	
(Continued on next page)				

Subsidization status is represented by the dummy variable "Subsidized" that takes the value of 1 if the MFI is subsidized, and 0 otherwise. All the variables are demeaned. Prices of labor and financial capital are normalized by the price of physical capital. The total number of observations corresponds to total MFI-year observations. Uncensored observations correspond to credit-only MFIs in column (1) and credit-plus-deposit MFIs in column (2). Standard errors are clustered at MFI level.
Significance: *** p<0.01, ** p<0.05, * p<0.1

Table A3: Cost Equation Estimation with Subsidy Interaction Terms (continued)

	(1) Credit-only		(2) Credit-plus-deposit	
	Panel A: Coefficients and Standard Errors			
Variables	Coefficient	Standard error	Coefficient	Standard error
Subsidized (Y/N)	-1.162***	(0.181)	0.123	(0.244)
Subsidized*ln(number of active borrowers)	0.002	(0.066)	-0.122*	(0.065)
Subsidized*ln(loans in USD)	0.054	(0.067)	0.131*	(0.074)
Subsidized*ln(number of voluntary depositors)			0.073*	(0.041)
Subsidized*ln(deposits in USD)			-0.141***	(0.046)
Subsidized*ln(PLabor)	-0.024**	(0.010)	0.028	(0.017)
Subsidized*ln(PFinCapital)	-0.014	(0.012)	-0.061***	(0.018)
Subsidized*ln(number of active borrowers)^2	0.149**	(0.061)	-0.222***	(0.062)
Subsidized*ln(loans in USD)^2	0.132*	(0.075)	-0.123	(0.084)
Subsidized*ln(number of voluntary depositors)^2			0.023	(0.016)
Subsidized*ln(deposits in USD)^2			-0.124***	(0.026)
Subsidized*ln(number of active borrowers)*ln(number of voluntary depositors)			0.050***	(0.019)
Subsidized*ln(loans in USD)*ln(number of active borrowers)	-0.131**	(0.064)	0.154**	(0.065)
Subsidized*ln(deposits in USD)*ln(number of active borrowers)			-0.040	(0.029)
Subsidized*ln(loans in USD)*ln(number of voluntary depositors)			-0.112***	(0.026)
Subsidized*ln(deposits in USD)*ln(number of voluntary depositors)			0.045***	(0.016)
Subsidized*ln(loans in USD)*ln(deposits in USD)			0.130***	(0.036)
Subsidized*ln(PFinCapital)^2	-0.000	(0.012)	-0.051***	(0.013)
Subsidized*ln(PLabor)^2	-0.008	(0.010)	-0.060***	(0.016)
Subsidized*ln(PLabor)*ln(PFinCapital)	0.006	(0.008)	0.057***	(0.012)
Subsidized*ln(number of active borrowers)*ln(PLabor)	0.010	(0.008)	-0.012	(0.013)
Subsidized*ln(loans in USD)*ln(PLabor)	-0.022**	(0.010)	0.005	(0.015)
Subsidized*ln(number of voluntary depositors)*ln(PLabor)			0.004	(0.008)
Subsidized*ln(deposits in USD)*ln(PLabor)			0.017*	(0.009)
Subsidized*ln(number of active borrowers)*ln(PFinCapital)	-0.006	(0.010)	0.007	(0.015)
Subsidized*ln(loans in USD)*ln(PFinCapital)	0.009	(0.011)	0.029*	(0.016)
Subsidized*ln(number of voluntary depositors)*ln(PFinCapital)			-0.006	(0.011)
Subsidized*ln(deposits in USD)*ln(PFinCapital)			-0.022**	(0.010)
Subsidized*Risk (30-day portfolio at risk)	-0.054**	(0.026)	-0.014	(0.022)
Subsidized*Age (in years)	-0.005	(0.005)	0.007**	(0.003)
Subsidized*NGO (Y/N)	-0.007	(0.081)	-0.160	(0.225)
Subsidized*Compulsory deposits (Y/N)	-0.023	(0.103)	-0.084	(0.069)
	Panel B: Economies of Scale			
Unsubsidized MFIs economies of scale	0.882		1.008	
P-value Wald test H0: Constant returns to scale	0.000		0.738	
Subsidized MFIs economies of scale	0.938		0.949	
P-value Wald test H0: Constant returns to scale	0.001		0.026	
P-value Wald test H0: Unsubsidized MFIs economies of scale = Subsidized MFIs economies of scale	0.034		0.067	

Table A4: Summary Statistics: NGOs

	Full sample			Credit-only MFIs			Credit-plus-deposit MFIs		
Variables	**Unsub.**	**Sub.**	**t-test[a]**	**Unsub.**	**Sub.**	**t-test[a]**	**Unsub.**	**Sub.**	**t-test[a]**
Total cost (USD millions)	2.79	3.23		2.77	3.22		3.01	3.33	
	(0.36)	(0.23)		(0.39)	(0.24)		(0.78)	(0.62)	
Outputs:									
Number of active borrowers	35.02	47.99	*	30.06	44.06	*	83.02	102.45	
(thousands)	(5.48)	(3.52)		(5.55)	(3.28)		(20.02)	(24.7)	
Loan portfolio (USD millions)	9.67	13.71		9.41	13.70		12.20	13.98	
	(1.45)	(1.2)		(1.56)	(1.27)		(3.13)	(2.62)	
Number of voluntary savers	5.77	9.13		0.00	0.00		52.32	102.98	
(thousands)	(2.28)	(3.01)					(16.97)	(31.1)	
Voluntary deposits (USD millions)	0.13	0.20		0.00	0.00		1.35	2.91	
	(0.05)	(0.06)					(0.35)	(0.85)	
Social performance:									
Average Loan Size (USD)	690	474	***	732	487	***	154	270	
	(73)	(21)		(77)	(22)		(38)	(61)	
Average Loan Size/GNI per capita	0.19	0.29	***	0.19	0.29	***	0.19	0.33	
	(0.02)	(0.01)		(0.02)	(0.01)		(0.02)	(0.09)	
Other variables:									
Price of labor	8 819	6 932	***	9 423	7 150	***	2 969	3 921	
	(464)	(163)		(483)	(169)		(664)	(415)	
Price of fixed capital	3.38	3.18		3.54	3.23		1.86	2.58	
	(0.28)	(0.12)		(0.3)	(0.13)		(0.32)	(0.37)	
Price of financial capital	0.22	0.16	***	0.23	0.16	***	0.10	0.13	
	(0.02)	(0.01)		(0.02)	(0.01)		(0.01)	(0.02)	
Risk (30-day portfolio at risk)	0.054	0.059		0.055	0.061		0.040	0.029	
	(0.007)	(0.003)		(0.008)	(0.004)		(0.022)	(0.005)	
Age (in years)	16.42	14.40	***	16.28	14.54	**	17.75	12.40	**
	(0.63)	(0.29)		(0.65)	(0.31)		(2.3)	(0.95)	
Compulsory deposits (Y/N)	0.23	0.34	***	0.18	0.32	***	0.69	0.68	
	(0.03)	(0.02)		(0.03)	(0.02)		(0.12)	(0.07)	
Observations	171	698		155	651		16	47	

This table shows mean values of the variables and their standard errors in parentheses for NGO MFIs (full sample, credit-only, and credit-plus-deposit).

[a]Two-sided t-test for equal means of unsubsidized and subsidized MFIs. Significance: *** p<0.01, ** p<0.05, * p<0.1

Table A5: Summary Statistics: NBFIs

	Full sample			Credit-only MFIs			Credit-plus-deposit MFIs		
Variables	**Unsub.**	**Sub.**	**t-test[a]**	**Unsub.**	**Sub.**	**t-test[a]**	**Unsub.**	**Sub.**	**t-test[a]**
Total cost (USD millions)	8.52	4.51	***	6.06	3.89	***	18.43	8.82	***
	(0.85)	(0.33)		(0.75)	(0.28)		(2.71)	(1.65)	
Outputs:									
Number of active borrowers	51.92	38.75	*	46.22	38.01		74.93	43.83	*
(thousands)	(6.2)	(4.05)		(6.96)	(4.54)		(13.34)	(6.64)	
Loan portfolio (USD millions)	31.18	21.08	***	19.69	17.22		77.47	47.58	*
	(3.15)	(1.82)		(2.04)	(1.34)		(11.95)	(10.29)	
Number of voluntary savers	13.70	3.97	***	0.00	0.00		62.00	25.79	***
(thousands)	(2.79)	(1.03)					(10.64)	(5.8)	
Voluntary deposits (USD millions)	9.06	3.30	***	0.00	0.00		45.43	25.66	*
	(1.94)	(1.04)					(8.31)	(7.39)	
Social performance:									
Average Loan Size (USD)	1 110	1 042		1 141	1 006		1 019	1 304	
	(91)	(63)		(118)	(64)		(89)	(226)	
Average Loan Size/GNI per capita	0.40	0.53	**	0.37	0.45	**	0.53	1.02	*
	(0.03)	(0.05)		(0.03)	(0.03)		(0.08)	(0.31)	
Other variables:									
Price of labor	10 438	9 337	**	10 147	9 574		11 612	7 706	***
	(319)	(291)		(371)	(314)		(558)	(739)	
Price of fixed capital	3.73	3.20	**	4.16	3.26	***	2.02	2.74	**
	(0.21)	(0.15)		(0.25)	(0.17)		(0.16)	(0.23)	
Price of financial capital	0.17	0.19		0.19	0.20		0.10	0.13	**
	(0.01)	(0.01)		(0.01)	(0.01)		(0.01)	(0.01)	
Risk (30-day portfolio at risk)	0.056	0.043	**	0.055	0.044		0.059	0.037	***
	(0.005)	(0.004)		(0.006)	(0.004)		(0.005)	(0.006)	
Age (in years)	9.84	9.62		8.72	9.15		14.35	12.84	
	(0.33)	(0.24)		(0.31)	(0.23)		(0.92)	(0.97)	
Compulsory deposits (Y/N)	0.18	0.23		0.18	0.20		0.19	0.39	**
	(0.02)	(0.02)		(0.02)	(0.02)		(0.05)	(0.07)	
Observations	317	386		254	337		63	49	

This table shows mean values of the variables and their standard errors in parentheses for NBFI MFIs (full sample, credit-only, and credit-plus-deposit).

[a]Two-sided t-test for equal means of unsubsidized and subsidized MFIs. Significance: *** p<0.01, ** p<0.05, * p<0.1

Table A6: Summary Statistics: MFI Credit-Cooperatives

	Full sample			Credit-only MFIs			Credit-plus-deposit MFIs		
Variables	**Unsub.**	**Sub.**	**t-test[a]**	**Unsub.**	**Sub.**	**t-test[a]**	**Unsub.**	**Sub.**	**t-test[a]**
Total cost (USD millions)	4.97	2.38	**	1.30	1.66		5.86	2.53	**
	(1.42)	(0.35)		(0.45)	(0.6)		(1.75)	(0.41)	
Outputs:									
Number of active borrowers	9.74	11.49		5.60	8.49		10.74	12.11	
(thousands)	(1.95)	(1.64)		(1.88)	(3.58)		(2.36)	(1.83)	
Loan portfolio (USD millions)	28.96	13.31	**	6.31	8.07		34.44	14.39	**
	(8.03)	(2.16)		(1.95)	(3.7)		(9.87)	(2.48)	
Number of voluntary savers	21.35	40.13		0.00	0.00		25.88	47.37	
(thousands)	(5.55)	(8.77)					(6.6)	(10.21)	
Voluntary deposits (USD millions)	15.45	10.73		0.00	0.00		18.96	12.75	
	(4.06)	(2.16)					(4.89)	(2.52)	
Social performance:									
Average Loan Size (USD)	3 147	1 759	***	1 778	3 173		3 390	1 433	***
	(380)	(149)		(568)	(568)		(428)	(104)	
Average Loan Size/GNI per capita	0.68	0.86		0.64	0.66		0.68	0.90	
	(0.08)	(0.08)		(0.18)	(0.1)		(0.09)	(0.1)	
Other variables:									
Price of labor	10 064	8 805		9 045	10 749		10 310	8 402	**
	(544)	(556)		(975)	(1651)		(633)	(574)	
Price of fixed capital	3.50	1.78	***	4.38	2.78		3.29	1.57	***
	(0.53)	(0.18)		(0.97)	(0.75)		(0.61)	(0.14)	
Price of financial capital	0.14	0.10	***	0.17	0.17		0.13	0.08	***
	(0.01)	(0.01)		(0.03)	(0.03)		(0.01)	(0.01)	
Risk (30-day portfolio at risk)	0.06	0.07		0.07	0.06		0.06	0.07	
	(0.007)	(0.007)		(0.021)	(0.013)		(0.007)	(0.008)	
Age (in years)	16.89	16.24		15.13	14.65		17.32	16.57	
	(1.49)	(1.03)		(1.41)	(1.84)		(1.82)	(1.18)	
Compulsory deposits (Y/N)	0.13	0.31	***	0.19	0.22		0.12	0.32	***
	(0.04)	(0.04)		(0.1)	(0.09)		(0.04)	(0.04)	
Observations	82	134		16	23		66	111	

This table shows mean values of the variables and their standard errors in parentheses for credit-cooperatives MFIs (full sample, credit-only, and credit-plus-deposit).

[a]Two-sided t-test for equal means of unsubsidized and subsidized MFIs. Significance: *** p<0.01, ** p<0.05, * p<0.1

Table A7: Summary Statistics: MFI banks

Variables	Full sample Unsub.	Sub.	t-test[a]	Credit-only MFIs Unsub.	Sub.	t-test[a]	Credit-plus-deposit MFIs Unsub.	Sub.	t-test[a]
Total cost (USD millions)	24.34	19.54		21.88	16.11		24.96	22.13	
	(1.98)	(2.6)		(5.21)	(4.34)		(2.11)	(3.15)	
Outputs:									
Number of active borrowers	79.71	87.47		135.31	117.52		65.66	64.75	
(thousands)	(9.1)	(14.21)		(33.85)	(30.97)		(6.96)	(7.42)	
Loan portfolio (USD millions)	104.60	102.20		67.00	70.97		114.10	125.90	
	(8.87)	(14.9)		(15.53)	(20.27)		(10.19)	(20.66)	
Number of voluntary savers	92.55	88.47		0.00	0.00		110.86	144.57	
(thousands)	(15.8)	(16.98)					(18.33)	(23.98)	
Voluntary deposits (USD millions)	54.94	41.83		0.00	0.00		68.22	70.39	
	(6.37)	(8.01)					(7.25)	(11.55)	
Social performance:									
Average Loan Size (USD)	2 185	1 629	*	821	786		2 553	2 283	
	(217)	(184)		(241)	(98)		(251)	(278)	
Average Loan Size/GNI per capita	1.39	1.01		0.44	0.83		1.63	1.14	
	(0.19)	(0.11)		(0.14)	(0.21)		(0.23)	(0.12)	
Other variables:									
Price of labor	11 436	9 633	**	10 548	9 130		11 661	10 014	*
	(482)	(549)		(887)	(992)		(561)	(611)	
Price of fixed capital	2.32	2.40		3.53	3.28		2.01	1.73	
	(0.18)	(0.33)		(0.47)	(0.72)		(0.17)	(0.17)	
Price of financial capital	0.13	0.13		0.27	0.18		0.09	0.09	
	(0.01)	(0.01)		(0.06)	(0.03)		(0)	(0.01)	
Risk (30-day portfolio at risk)	0.041	0.030		0.031	0.027		0.043	0.033	
	(0.004)	(0.004)		(0.012)	(0.005)		(0.005)	(0.006)	
Age (in years)	13.06	13.24		9.52	11.23		13.96	14.76	
	(0.88)	(0.97)		(1.3)	(1.11)		(1.04)	(1.45)	
Compulsory deposits (Y/N)	0.08	0.13		0.04	0.10		0.09	0.15	
	(0.03)	(0.04)		(0.04)	(0.05)		(0.03)	(0.06)	
Observations	114	72		23	31		91	41	

This table shows mean values of the variables and their standard errors in parentheses for MFI banks (full sample, credit-only, and credit-plus-deposit).
[a]Two-sided t-test for equal means of unsubsidized and subsidized MFIs. Significance: *** p<0.01, ** p<0.05, * p<0.1

Table A8: Variance Inflation Factor (VIF) and Correlations

N	Variable	VIF	1	2	3	4	5	6	7	8	9
1	ln(number of active borrowers)	5.91	1								
2	ln(loans in USD)	9.38	0.751***	1							
			(0.000)								
3	ln(number of voluntary depositors)	2.91	0.605***	0.580***	1						
			(0.000)	(0.000)							
4	ln(deposits in USD)	6.09	0.425***	0.764***	0.670***	1					
			(0.000)	(0.000)	(0.000)						
5	ln(PLabor)	2.89	-0.105***	0.271***	0.153***	0.468***	1				
			(0.000)	(0.000)	(0.000)	(0.000)					
6	ln(PFinCapital)	1.89	-0.114***	-0.043*	-0.122***	-0.089**	0.596***	1			
			(0.000)	(0.051)	(0.003)	(0.029)	(0.000)				
7	Risk (30-day portfolio at risk)	1.10	-0.165***	-0.1513***	-0.0154	-0.008	-0.002	0.000	1		
			(0.000)	(0.000)	(0.705)	(0.848)	(0.924)	(1.000)			
8	Age (in years)	1.06	0.059***	0.138***	0.181***	0.189***	0.169***	0.055**	0.060***	1	
			(0.007)	(0.000)	(0.000)	(0.000)	(0.000)	(0.012)	(0.006)		
9	NGO (Y/N)	1.50	0.029	-0.253***	0.016	-0.366***	-0.145***	0.007	0.030	0.121***	1
			(0.192)	(0.000)	(0.698)	(0.000)	(0.000)	(0.766)	(0.175)	(0.000)	
10	Compulsory deposits (Y/N)	1.26	0.130***	-0.124***	-0.056	-0.316***	-0.194***	-0.089***	0.018	-0.029	0.142***
			(0.000)	(0.000)	(0.166)	(0.000)	(0.000)	(0.000)	(0.399)	(0.181)	(0.000)

This table shows the VIF of each variable and the Pearson correlations between pairs of variables.
Significance level of each correlation coefficient are reported in parentheses. Significance: *** p<0.01, ** p<0.05, * p<0.1

Table A9: Distribution of MFIs and MFI-year Observations by Country

Country	Number of MFIs	Number of MFI-year observations	Country	Number of MFIs	Number of MFI-year observations
Afghanistan	10	21	Macedonia	3	8
Albania	4	10	Madagascar	6	12
Angola	1	1	Malawi	3	4
Argentina	11	17	Mali	5	7
Armenia	9	22	Mexico	41	115
Azerbaijan	14	39	Moldova	3	8
Bangladesh	23	38	Mongolia	5	9
Benin	10	21	Morocco	9	52
Bolivia	24	83	Mozambique	8	15
Bosnia and Herzegovina	14	62	Namibia	1	1
Brazil	22	50	Nepal	21	27
Bulgaria	11	25	Nicaragua	25	107
Burkina Faso	4	7	Niger	2	2
Cambodia	14	34	Nigeria	2	4
Cameroon	6	8	Pakistan	17	37
Chile	3	8	Palestine	3	6
China, People's Republic of	3	3	Panama	5	14
Colombia	23	56	Paraguay	6	20
Congo, Democratic Republic of the	1	1	Peru	53	142
Cote d'Ivoire (Ivory Coast)	1	1	Philippines	55	127
Croatia	2	6	Poland	2	5
Dominican Republic	11	24	Romania	5	6
East Timor	2	3	Russia	30	53
Ecuador	40	127	Rwanda	4	4
Egypt	10	37	Senegal	5	5
El Salvador	14	41	Serbia	3	6
Georgia	12	33	South Africa	3	4
Ghana	13	19	Sri Lanka	10	16
Guatemala	16	63	Tajikistan	14	28
Honduras	15	22	Tanzania	6	18
India	76	145	Thailand	1	1
Indonesia	23	45	Togo	5	9
Jamaica	1	1	Tonga	1	1
Jordan	7	31	Tunisia	1	7
Kazakhstan	7	21	Turkey	1	2
Kenya	7	11	Uganda	4	13
Kyrgyzstan	9	21	Ukraine	2	6
Laos	4	5	Vietnam	7	10
Lebanon	3	10	Yemen	4	13
			Total	**861**	**2,096**

Table A10: Cost Equation: Credit-Only MFIs excluding India, Philippines and Peru (3 Countries with the Largest Number of MFIs)

Variables	Unsubsidized MFIs Coefficient	Standard error	Subsidized MFIs Coefficient	Standard error
ln(number of active borrowers)	0.182***	(0.053)	0.261***	(0.051)
ln(loans in USD)	0.671***	(0.053)	0.686***	(0.051)
ln(PLabor)	0.397***	(0.023)	0.390***	(0.010)
ln(PFinCapital)	0.317***	(0.013)	0.326***	(0.011)
ln(number of active borrowers)^2	-0.217***	(0.055)	0.106**	(0.047)
ln(loans in USD)^2	-0.165***	(0.049)	0.153***	(0.052)
ln(loans in USD)*ln(number of active borrowers)	0.186***	(0.051)	-0.113**	(0.046)
ln(PFinCapital)^2	0.059***	(0.010)	0.073***	(0.007)
ln(PLabor)^2	0.087***	(0.012)	0.073***	(0.008)
ln(PLabor)*ln(PFinCapital)	-0.052***	(0.007)	-0.053***	(0.006)
ln(number of active borrowers)*ln(PLabor)	0.050***	(0.009)	0.054***	(0.007)
ln(loans in USD)*ln(PLabor)	-0.061***	(0.011)	-0.076***	(0.007)
ln(number of active borrowers)*ln(PFinCapital)	-0.057***	(0.008)	-0.046***	(0.008)
ln(loans in USD)*ln(PFinCapital)	0.087***	(0.010)	0.080***	(0.008)
Risk (-day portfolio-at-risk)	0.094***	(0.022)	0.084***	(0.018)
Age (in years)	0.002	(0.004)	0.003	(0.005)
NGO (Y/N)	0.258**	(0.112)	0.079	(0.065)
Compulsory deposits (Y/N)	0.166	(0.119)	0.074	(0.066)
Constant	-0.645***	(0.204)	-0.104	(0.193)
Mills ratio	0.420***		0.101	
Country dummies	Yes		Yes	
Observations	591		1,083	
Uncensored observations	347		867	
Adjusted R-squared	0.956		0.96	
Economies of scale	0.853		0.947	
P-value Wald test H0: Constant returns to scale	0.000		0.013	

All the variables are demeaned. The prices of labor and financial capital are normalized by the price of physical capital. The total number of observations corresponds to total MFI-year observations. Uncensored observations correspond to credit-only MFIs. Standard errors are clustered at MFI level. Significance: *** p<0.01, ** p<0.05, * p<0.1

Table A11: Cost Equation: Credit-plus-Deposit MFIs excluding India, Philippines and Peru (3 Countries with the Largest Number of MFIs)

Variables	Unsubsidized MFIs Coefficient	Standard error	Subsidized MFIs Coefficient	Standard error
ln(number of active borrowers)	0.139**	(0.057)	0.093**	(0.044)
ln(loans in USD)	0.667***	(0.095)	0.723***	(0.057)
ln(number of voluntary depositors)	-0.007	(0.029)	0.098***	(0.031)
ln(deposits in USD)	0.240***	(0.044)	0.055	(0.043)
ln(PLabor)	0.302***	(0.017)	0.312***	(0.023)
ln(PFinCapital)	0.463***	(0.045)	0.331***	(0.025)
ln(number of active borrowers)^2	0.124***	(0.034)	-0.057	(0.045)
ln(loans in USD)^2	0.299***	(0.058)	0.148***	(0.055)
ln(number of voluntary depositors)^2	-0.002	(0.010)	0.028**	(0.014)
ln(deposits in USD)^2	0.128***	(0.025)	-0.027*	(0.014)
ln(number of active borrowers)* ln(number of voluntary depositors)	-0.048***	(0.009)	0.015	(0.017)
ln(loans in USD)*ln(number of active borrowers)	-0.087**	(0.037)	0.014	(0.046)
ln(deposits in USD)*ln(number of active borrowers)	0.009	(0.019)	-0.024	(0.021)
ln(loans in USD)*ln(number of voluntary depositors)	0.055***	(0.014)	-0.064***	(0.023)
ln(deposits in USD)*ln(number of voluntary depositors)	-0.010	(0.010)	0.030**	(0.012)
ln(loans in USD)*ln(deposits in USD)	-0.187***	(0.033)	0.003	(0.026)
ln(PFinCapital)^2	0.174***	(0.016)	0.129***	(0.011)
ln(PLabor)^2	0.091***	(0.015)	0.047***	(0.013)
ln(PLabor)*ln(PFinCapital)	-0.101***	(0.011)	-0.042***	(0.009)
ln(number of active borrowers)*ln(PLabor)	0.055***	(0.010)	0.047***	(0.011)
ln(loans in USD)*ln(PLabor)	-0.040***	(0.012)	-0.043***	(0.011)
ln(number of voluntary depositors)*ln(PLabor)	-0.001	(0.006)	0.005	(0.006)
ln(deposits in USD)*ln(PLabor)	-0.032***	(0.008)	-0.012*	(0.006)
ln(number of active borrowers)*ln(PFinCapital)	-0.049***	(0.010)	-0.054***	(0.012)
ln(loans in USD)*ln(PFinCapital)	0.031**	(0.015)	0.080***	(0.011)
ln(number of voluntary depositors)*ln(PFinCapital)	-0.004	(0.008)	-0.011	(0.007)
ln(deposits in USD)*ln(PFinCapital)	0.026***	(0.010)	-0.001	(0.007)
Risk (-day portfolio-at-risk)	0.021	(0.014)	0.011	(0.022)
Age (in years)	-0.003	(0.003)	0.000	(0.004)
NGO (Y/N)	-0.106	(0.291)	0.070	(0.178)
Compulsory deposits (Y/N)	0.124**	(0.063)	0.044	(0.089)
Constant	-0.857**	(0.376)	0.327**	(0.157)
Mills ratio	0.247		-0.198	
Country dummies	Yes		Yes	
Observations	591		1,091	
Uncensored observations	244		224	
Adjusted R-squared	0.984		0.985	
Economies of scale	1.039		0.969	
P-value Wald test H0: Constant returns to scale	0.362		0.208	

All the variables are demeaned. The prices of labor and financial capital are normalized by the price of physical capital. The total number of observations corresponds to total MFI-year observations. Uncensored observations correspond to credit-plus-deposit MFIs. Standard errors are clustered at MFI level.
Significance: *** p<0.01, ** p<0.05, * p<0.1

Table A12: Cost Equation: Credit-Only MFIs Excluding MFIs with Only One Observation

	Unsubsidized MFIs		**Subsidized MFIs**	
Variables	Coefficient	Standard error	Coefficient	Standard error
ln(number of active borrowers)	0.236***	(0.064)	0.223***	(0.051)
ln(loans in USD)	0.640***	(0.067)	0.714***	(0.053)
ln(PLabor)	0.402***	(0.013)	0.377***	(0.009)
ln(PFinCapital)	0.353***	(0.017)	0.341***	(0.012)
ln(number of active borrowers)^2	-0.099	(0.067)	0.077*	(0.043)
ln(loans in USD)^2	-0.010	(0.070)	0.172***	(0.052)
ln(loans in USD)*ln(number of active borrowers)	0.062	(0.064)	-0.116***	(0.044)
ln(PFinCapital)^2	0.080***	(0.013)	0.082***	(0.008)
ln(PLabor)^2	0.092***	(0.013)	0.084***	(0.007)
ln(PLabor)*ln(PFinCapital)	-0.069***	(0.008)	-0.063***	(0.006)
ln(number of active borrowers)*ln(PLabor)	0.033***	(0.011)	0.050***	(0.007)
ln(loans in USD)*ln(PLabor)	-0.045***	(0.014)	-0.073***	(0.007)
ln(number of active borrowers)*ln(PFinCapital)	-0.034***	(0.010)	-0.038***	(0.008)
ln(loans in USD)*ln(PFinCapital)	0.072***	(0.013)	0.075***	(0.008)
Risk (-day portfolio-at-risk)	0.120***	(0.026)	0.063***	(0.017)
Age (in years)	0.013***	(0.005)	0.006	(0.005)
NGO (Y/N)	-0.067	(0.081)	0.053	(0.075)
Compulsory deposits (Y/N)	0.079	(0.099)	0.010	(0.068)
Constant	0.353***	(0.017)	-0.118	(0.189)
Mills ratio	0.108		0.140	
Country dummies	Yes		Yes	
Observations	597		1174	
Uncensored observations	358		988	
Adjusted R-squared	0.95		0.957	
Economies of scale	0.876		0.937	
P-value Wald test H0: Constant returns to scale	0.000		0.001	

All the variables are demeaned. The prices of labor and financial capital are normalized by the price of physical capital. The total number of observations corresponds to total MFI-year observations. Uncensored observations correspond to credit-only MFIs. Standard errors are clustered at MFI level. Significance: *** p<0.01, ** p<0.05, * p<0.1

Table A13: Cost Equation: Credit-plus-Deposit MFIs Excluding MFIs with Only One Observation

Variables	Unsubsidized MFIs Coefficient	Unsubsidized MFIs Standard error	Subsidized MFIs Coefficient	Subsidized MFIs Standard error
ln(number of active borrowers)	0.279***	(0.057)	0.080	(0.057)
ln(loans in USD)	0.514***	(0.072)	0.758***	(0.064)
ln(number of voluntary depositors)	-0.010	(0.034)	0.088**	(0.037)
ln(deposits in USD)	0.246***	(0.046)	0.035	(0.028)
ln(PLabor)	0.267***	(0.015)	0.294***	(0.027)
ln(PFinCapital)	0.415***	(0.020)	0.349***	(0.039)
$\ln(\text{number of active borrowers})^2$	0.202***	(0.039)	0.001	(0.051)
$\ln(\text{loans in USD})^2$	0.298***	(0.066)	0.089	(0.058)
$\ln(\text{number of voluntary depositors})^2$	-0.002	(0.011)	0.013	(0.015)
$\ln(\text{deposits in USD})^2$	0.094***	(0.030)	-0.010	(0.014)
ln(number of active borrowers)* ln(number of voluntary depositors)	-0.036***	(0.012)	0.008	(0.021)
ln(loans in USD)*ln(number of active borrowers)	-0.165***	(0.042)	-0.020	(0.051)
ln(deposits in USD)*ln(number of active borrowers)	-0.007	(0.021)	-0.019	(0.025)
ln(loans in USD)*ln(number of voluntary depositors)	0.049***	(0.017)	-0.050*	(0.027)
ln(deposits in USD)*ln(number of voluntary depositors)	-0.008	(0.012)	0.012	(0.011)
ln(loans in USD)*ln(deposits in USD)	-0.129***	(0.033)	0.013	(0.030)
$\ln(\text{PFinCapital})^2$	0.195***	(0.011)	0.116***	(0.013)
$\ln(\text{PLabor})^2$	0.109***	(0.016)	0.068***	(0.017)
ln(PLabor)*ln(PFinCapital)	-0.108***	(0.011)	-0.048***	(0.011)
ln(number of active borrowers)*ln(PLabor)	0.068***	(0.009)	0.070***	(0.015)
ln(loans in USD)*ln(PLabor)	-0.059***	(0.011)	-0.066***	(0.014)
ln(number of voluntary depositors)*ln(PLabor)	0.002	(0.004)	-0.003	(0.007)
ln(deposits in USD)*ln(PLabor)	-0.027***	(0.007)	-0.006	(0.006)
ln(number of active borrowers)*ln(PFinCapital)	-0.073***	(0.012)	-0.059***	(0.013)
ln(loans in USD)*ln(PFinCapital)	0.066***	(0.015)	0.081***	(0.013)
ln(number of voluntary depositors)*ln(PFinCapital)	0.000	(0.009)	-0.005	(0.008)
ln(deposits in USD)*ln(PFinCapital)	0.018*	(0.010)	-0.000	(0.006)
Risk (-day portfolio-at-risk)	0.006	(0.011)	0.044**	(0.021)
Age (in years)	-0.001	(0.002)	-0.000	(0.003)
NGO (Y/N)	-0.559***	(0.179)	-0.054	(0.128)
Compulsory deposits (Y/N)	0.169***	(0.050)	0.040	(0.060)
Constant	-0.653***	(0.132)	-0.146	(0.287)
Mills ratio	0.100		-0.214*	
Country dummies	Yes		Yes	
Observations	597		1,176	
Uncensored observations	239		188	
Adjusted R-squared	0.985		0.989	
Economies of scale	1.029		0.961	
P-value Wald test H0: Constant returns to scale	0.408		0.308	

All the variables are demeaned. The prices of labor and financial capital are normalized by the price of physical capital. The total number of observations corresponds to total MFI-year observations. Uncensored observations correspond to credit-plus-deposit MFIs. Standard errors are clustered at MFI level.
Significance: *** p<0.01, ** p<0.05, * p<0.1

Table A14: Cost Equation: Credit-Only MFIs with NGO Interaction Terms

	(1) Unsubsidized MFIs		(2) Subsidized MFIs	
	Panel A: Coefficients and Standard Errors			
Variables	Coefficient	Standard error	Coefficient	Standard error
ln(number of active borrowers)	0.200***	(0.066)	0.207***	(0.058)
ln(loans in USD)	0.672***	(0.063)	0.733***	(0.060)
ln(number of active borrowers)*NGO	0.176	(0.142)	-0.003	(0.056)
ln(loans in USD)*NGO	-0.181	(0.183)	-0.002	(0.058)
ln(PLabor)	0.386***	(0.047)	0.378***	(0.009)
ln(PFinCapital)	0.343***	(0.040)	0.343***	(0.012)
ln(number of active borrowers)^2	-0.147*	(0.078)	0.070	(0.044)
ln(loans in USD)^2	-0.087	(0.074)	0.164***	(0.050)
ln(loans in USD)*ln(number of active borrowers)	0.115	(0.077)	-0.103**	(0.045)
ln(PFinCapital)^2	0.083***	(0.011)	0.083***	(0.007)
ln(PLabor)^2	0.094***	(0.023)	0.084***	(0.007)
ln(PLabor)*ln(PFinCapital)	-0.070***	(0.011)	-0.063***	(0.006)
ln(number of active borrowers)*ln(PLabor)	0.043***	(0.007)	0.050***	(0.006)
ln(loans in USD)*ln(PLabor)	-0.057***	(0.011)	-0.074***	(0.007)
ln(number of active borrowers)*ln(PFinCapital)	-0.028**	(0.014)	-0.037***	(0.007)
ln(loans in USD)*ln(PFinCapital)	0.059***	(0.020)	0.074***	(0.007)
Risk (-day portfolio-at-risk)	0.117***	(0.023)	0.065***	(0.015)
Age (in years)	0.008	(0.006)	0.005	(0.004)
NGO (Y/N)	0.030	(0.131)	0.022	(0.060)
Compulsory deposits (Y/N)	0.112	(0.357)	0.066	(0.063)
Constant	-0.586**	(0.235)	-0.137	(0.185)
Mills ratio	0.367***		0.172	
Country dummies	Yes		Yes	
Observations	789		1,307	
Uncensored observations	457		1,054	
Adjusted R-squared	0.952		0.954	
	Panel B: Economies of scale			
Economies of scale non NGOs	0.872		0.94	
P-value Wald test H0: Constant returns to scale	0.000		0.038	
Economies of scale NGOs	0.867		0.935	
P-value Wald test H0: Constant returns to scale	0.029		0.002	
P-value Wald test H0: Economies of scale non NGOs = Economies of scale NGO	0.925		0.850	

All the variables are demeaned. The prices of labor and financial capital are normalized by the price of physical capital. The total number of observations corresponds to total MFI-year observations. Uncensored observations correspond to credit-only MFIs. Standard errors are clustered at MFI level.
Significance: *** p<0.01, ** p<0.05, * p<0.1

Table A15: Cost Equation: Credit-plus-Deposit MFIs with NGO Interaction Terms

	(1)		(2)	
	Unsubsidized MFIs		**Subsidized MFIs**	
	Panel A: Coefficients and Standard Errors			
Variables	Coefficient	Standard error	Coefficient	Standard error
ln(number of active borrowers)	0.191***	(0.045)	0.154**	(0.074)
ln(loans in USD)	0.588***	(0.055)	0.696***	(0.069)
ln(number of voluntary depositors)	-0.001	(0.032)	0.084**	(0.035)
ln(deposits in USD)	0.234***	(0.035)	0.045	(0.040)
ln(number of active borrowers)*NGO	-0.262	(0.249)	-0.240	(0.169)
ln(loans in USD)*NGO	0.327	(0.236)	0.176	(0.145)
ln(number of voluntary depositors)*NGO	0.009	(0.072)	-0.012	(0.055)
ln(deposits in USD)*NGO	-0.189*	(0.097)	-0.013	(0.066)
ln(PLabor)	0.287***	(0.014)	0.313***	(0.024)
ln(PFinCapital)	0.401***	(0.016)	0.321***	(0.025)
ln(number of active borrowers)^2	0.131***	(0.037)	-0.046	(0.062)
ln(loans in USD)^2	0.254***	(0.061)	0.094	(0.080)
ln(number of voluntary depositors)^2	-0.000	(0.012)	0.006	(0.019)
ln(deposits in USD)^2	0.100***	(0.028)	-0.029	(0.018)
ln(number of active borrowers)* ln(number of voluntary depositors)	-0.044***	(0.011)	0.019	(0.025)
ln(loans in USD)*ln(number of active borrowers)	-0.109***	(0.042)	0.030	(0.066)
ln(deposits in USD)*ln(number of active borrowers)	0.026	(0.018)	-0.029	(0.034)
ln(loans in USD)*ln(number of voluntary depositors)	0.060***	(0.015)	-0.051**	(0.024)
ln(deposits in USD)*ln(number of voluntary depositors)	-0.014	(0.015)	0.035**	(0.015)
ln(loans in USD)*ln(deposits in USD)	-0.156***	(0.032)	0.004	(0.034)
ln(PFinCapital)^2	0.188***	(0.009)	0.129***	(0.011)
ln(PLabor)^2	0.097***	(0.012)	0.050***	(0.013)
ln(PLabor)*ln(PFinCapital)	-0.101***	(0.008)	-0.046***	(0.009)
ln(number of active borrowers)*ln(PLabor)	0.056***	(0.008)	0.051***	(0.011)
ln(loans in USD)*ln(PLabor)	-0.045***	(0.010)	-0.047***	(0.011)
ln(number of voluntary depositors)*ln(PLabor)	0.001	(0.005)	0.004	(0.006)
ln(deposits in USD)*ln(PLabor)	-0.027***	(0.007)	-0.011*	(0.006)
ln(number of active borrowers)*ln(PFinCapital)	-0.057***	(0.010)	-0.055***	(0.011)
ln(loans in USD)*ln(PFinCapital)	0.047***	(0.012)	0.079***	(0.011)
ln(number of voluntary depositors)*ln(PFinCapital)	-0.002	(0.009)	-0.008	(0.007)
ln(deposits in USD)*ln(PFinCapital)	0.023**	(0.009)	0.002	(0.006)
Risk (-day portfolio-at-risk)	0.012	(0.010)	0.015	(0.022)
Age (in years)	-0.004***	(0.002)	-0.002	(0.003)
NGO (Y/N)	0.047	(0.285)	0.194	(0.130)
Compulsory deposits (Y/N)	0.180***	(0.053)	0.055	(0.066)
Constant	-0.413***	(0.116)	0.421***	(0.163)
Mills ratio	-0.008		-0.277*	
Country dummies	Yes		Yes	
Observations	789		1,307	
Uncensored observations	332		253	
Adjusted R-squared	0.984		0.983	
	Panel B: Economies of scale			
Economies of scale non NGOs	1.012		0.979	
P-value Wald test H0: Constant returns to scale	0.646		0.509	
Economies of scale NGOs	0.897		0.890	
P-value Wald test H0: Constant returns to scale	0.157		0.049	
P-value Wald test H0: Economies of scale non NGOs = Economies of scale NGO	0.140		0.141	

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Significance: *** p<0.01, ** p<0.05, * p<0.1