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Subsidies and Sustainability in Microfinance

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Abstract: This paper gives first empirical evidence on the impact of subsidies on MFI performance. We find that Subsidy Intensity tends to be associated with a lower sustainability. However, we show that this relationship is due to the fact the institutions that receive more subsidies tend to focus on the poorest, and thus have a lower loan size per GDPpc, which raises their administrative costs per dollar of loan. We find no evidence that higher subsidy intensity is associated with shirking or rent-seeking.

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1 Introduction

Microfinance has been praised during the last twenty years as a new development policy tool. It has been built on the promise that it would create a more inclusive financial sector, increasing the efficiency and professionalism in delivering financial services to poor clients (CGAP, 2004). A key element in its growth and popularity has been the promise of financial sustainability and independence from donors' subsidies.

However, the role of subsidies in the sector remains very present. Very few MFI's have been created without subsidies, and even commercially-oriented institutions have regularly benefited from support from international donors. Microfinance investment funds have been created with large inputs from international donors (Goodman, 2005). It is estimated that donors commit between US$800 million and US$1 billion to microfinance per year (CGAP, 2004). This paper on the influence of subsidies on the strategic and operational performance of MFIs'.

The goal of the paper is to give first empirical evidence on the impact of subsidies on MFI performance, using the data from the financial statements gathered by two leading microfinance rating agencies: PlaNet Rating and Microfinanza[4]. The ratings were produced between 2002 and 2005, and provide balance-sheet and income statement information for 100 institutions, including detailed data on subsidies obtained historically.

It is hard to gauge how representative this sample of 100 MFI's is. One may argue that rated MFIs are larger and achieve better results than average. On the other hand, the concentration of microfinance clients in the largest institutions, represented in this sample, is well-established. Honohan (2004, p. 3) finds that "the largest 30 microfinance firms account between them for more than 90 per cent of the clients served worldwide by

[4] Both are specialized microfinance rating agency and have been officially accredited as leading rating agencies by the Inter-American Development Bank (IDB) and the Consultative Group to Assist the Poor[4] (CGAP) rating fund. Data were extracted from www.ratingfund.org and www.planetrating.com

the 234 top firms (and hence for more than three-quarters of those served by all of the 2572 firms reporting to the Microcredit Summit)."

Delivering credit, savings or insurance through MFIs should reduce transaction costs and informational hurdles and improve the access of the poor to financial services. To this end, donors should aim at building a more inclusive financial sector large without creating aid dependence or weakening incentives to reach sustainability (Hardy et al., 2002, p. 13).

Subsidies lower the cost of funds and help cover administrative costs, hence increasing the outreach of an MFI among the poor, less able to pay. In fact, many authors argue that subsidies are the only way for microfinance to fulfill its role in alleviating poverty, probably even for the long-run, particularly in some very remote areas, where "reaching large numbers of the poorest may therefore justify the provision of subsidies to MFIs specialized in serving them" (Zeller and Meyer, 2002). Very small loans to very poor people need to be administrated on a different basis from loans to well-established and experienced borrowers (Hulme and Mosley, 1996, p. 268).

On the other hand, many are concerned that the sector is excessively subsidized, since its expansion in the 1980s (Morduch, 2005), with potentially negative consequences for its developmental mission. Even institutions that claim to make "profits" may continuously use subsidies in their operations (Armendariz de Aghion and Morduch, 2005). CGAP (2006) argues that excessive subsidisation leads to market distortions, hurting the sector by creating hurdles for the emergence of private actors, such as the commercial banks. For many, the well-know drawback of subsidies in sustaining soft-budget constraints that provide poor incentives and induce rent-seeking, undermines operational and financial performance.[5]

Some authors emphasize the form of subsidies, rather than their size. The fresh notion of "smart subsidies" stresses that they should be transparent, rule-bound and time-limited,

[5] Yaron (1994) suggests a Subsidy Dependence Index (SDI), defined as the ratio of the total subsidy in a year to revenues from lending that same year. In Yaron's model, subsidized funds are public funds from government or donors (Schreiner and Yaron, 1999).

with donors focusing on start-up expenses, institutional capacity building and product development and foreseeing a clear exit strategy (Hendricks, 2003; Armendariz de Aghion and Morduch, 2004; Morduch, 2005). Moreover, the ability of donors to manage subsidies can also be at stake. In 2004, after a peer-review headed by CGAP and DFID, the European Commission to stop funding most credit lines, due to the lack of internal expertise and the poor management of its schemes (Domes, 2004).[6]

Despite the widespread prevalence of subsidies in microfinance and the heated debate on its consequences, an appraisal of the impacts of subsidies on the institutions' performances has been notoriously absent from the empirical literature. An exception is Cull et al. (2006) who find that the ratio of subsidies to assets averages 33% in village-banks, 28% in group-lending institutions and 11% in individual lending institutions, and that subsidies are correlated with lower levels of profitability. Hudon (2006) finds no role for Subsidies on the management ratings obtained by the MFIs, from accredited agencies.

To address the implications of Subsidies on MFI performance, we look at the statistical effect of Subsidy Intensity on the strategic and operational performance of an MFI. We begin by computing an index of sustainability for our sample of MFI's, which looks at the coverage of administrative and financial costs by revenues. This measure of sustainability provides results that are similar to the traditionally computed measures of operational and financial sustainability. We find that our measure of sustainability, like the traditional measures, is negatively correlated with Subsidy Intensity.

The interpretation of this relationship is complicated by the endogeneity of donor choices, which can imply reverse-causality. It is reasonable to suspect that less sustainable institutions manage to attract the attention of donors, who want to prevent from collapsing, thus raising their subsidy intensity. Without a good instrument, it is not possible to address this question, separately from our working hypothesis that subsidies undermine performance through their effects on strategic and/or operational variables,

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[6] Nevertheless, the Commission can still contribute to financing of credit lines managed by specialized international financial institutions such as EIB and KfW, as well as also co-finance start-up credits under the NGO co-financing budget line, provided the recipients are specialized NGOs (Domes, 2005)

from an econometric perspective. Instead, we probe deeper into this question by looking at the impact of Subsidy Intensity on several key strategic and operational indicators that make up the overall sustainability of the MFI.

In particular, we are interested in the separate role of subsidies for the MFI's price (interest rate) strategy and operational efficiency (administrative costs per unit of loan). Our results paint a consistent and interesting picture, which can be summarized in four points. First, Subsidy Intensity tends to be associated with a lower sustainability. We looked for reasons why, since this is normally used to argue against subsidies

Second, we find that the relationship with sustainability is due to the strategic segmentation, captured by the Loan Size per GDP per capita variable, an often used measured of the outreach and poverty incidence of an MFI's activity. Third, we find no evidence of moral hazard, in the form of shirking or rent-seeking. As a result, 'administrative costs per dollar of loan' of subsidized MFI's are higher, but only due to their lower loan size. Finally, fourth, MFI's with a higher Subsidy Intensity charge lower interest rates, but only after controlling for Administrative costs and Loan Size by GDP, which shows that subsidies allow MFI's serving the poorer to sustain their mission, given the high administrative costs associated with the low average loan size.

2 Sustainability

Thirty years after its inception, the promise of Microfinance of delivering financial services to the poor, and thus help fight poverty, in a financially sustainable way, remains unaccomplished. Within the *Mix Market*[7] database, less than 300 MFIs were able to cover their operational cost with their income and thus be operationally self-sufficient in 2004. When the numbers are adjusted for the financial cost of funds, only around 100 MFIs out of the estimated 10,000 cover their true costs.

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[7] The *Mix Market* is a global, web-based, microfinance information platform. It provides information to sector actors and the public at large on microfinance institutions (MFIs) worldwide, public and private funds that invest in microfinance, MFI networks, raters/external evaluators, advisory firms, and governmental and regulatory agencies. Source: http://www.mixmarket.org

2.1 Measuring Sustainability

In this paper, we focus on the role of strategic choices and operational constraints for sustainability. We begin by obtaining a measure of sustainability which allows us to focus on the strategic and operational choices of the MFI. As usual, we define Sustainability, denoted by Σ, as the coverage of operational and financial costs by revenues, as shown below

$$\Sigma = \frac{rL + O}{A + \beta D + \delta D} \tag{1}$$

The numerator captures the revenues of the MFI, where r is the net revenue per dollar of loans (accounting for delays and defaults) and L is the total volume of loans, while O is the non-loan revenue (e.g. insurance services). The denominator depicts the costs of the MFI, where A are the administrative costs, including staff, and the remainder are the financial costs. The latter are obtained as follows: β and δ are the interest-rates on borrowing and deposits, while B and D are the respective dollar volumes. Note that this measure does not impute a cost of capital to equity

Now, using a stylized version of the balance sheet of an MFI, which implies: $F + L = B + D + E$, and dividing the numerator and denominator by L, we can rewrite Σ as

$$\Sigma = \frac{r + \omega}{ks^{-1}a^{-1} + \beta b + \delta d} \tag{2}$$

In the expression, ω=O/L captures the ability to leverage the MFI's resources in non-loan, revenue generating activities. The term $\beta b + \delta d$ denotes the total financial cost of loanable funds, with b=B/L and d=D/L denoting the share of borrowing and deposits on loan financing. The term $ks^{-1}a^{-1}$ is a measure of the 'administrative costs per dollar of loan' (A/L), which we decompose in three terms: a is a measure of productivity, capturing the number of borrowers per staff member (loan officer), s is a measure of average loan size (loan volume by number of borrowers) as a share of the MFI country's GDP per capita, (a traditional measure of poverty incidence of microcredit); finally, k

measures the administrative costs per staff relative to GDP per capita. [8] If we assume that administrative costs are related to labor, then k is the ratio of the MFI's average wage to GDP per capita, which captures the wage premium paid by the MFI.[9] A higher wage premium may be related to higher productivity or the rent-seeking activities by the management and staff of the MFI.

2.2 The road to Sustainability

The expression in Eq. (2) highlights important avenues toward Sustainability. The first one is the strategic option to segment markets. The key difficulty for sustainability in MF relies on their focus on the poor as a market, which on the other hand is its fundamental *raison d'etre*. In tackling the quest for sustainability, many MFI's have chosen to target the better off among the poor. For example, 50 percent of the entering clients at Compartamos', one of the most successful cases of sustainability, were in the upper third of the community and 75 percent were in the upper two-thirds of the community (Armendariz and Morduch, 2005).

One implication of this segmentation is that the better off tend to require higher loan sizes, s, which reduces the burden of administrative costs. The average loan size to GNP per capita is a common measure of depth of outreach and poverty in microfinance. It contributes to increased administrative and operating costs for the institutions[10].

On the other hand, they are also likely to afford higher interest rates, and possibly have lower default rates, thus raising the net return from loans, r. Here, some conflicting

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[8] We can write $\frac{A}{L} = \frac{A/S}{y}\frac{y}{L/B}\frac{S}{B} = ks^{-1}a^{-1}$ where y is GDP per capita, B in the number of borrowers, and S is the number of staff.

[9] The March 2005 issue of the *MicroBanking Bulletin* reports that personnel expenses made up 55% of operating expenses.

[10] For instance, the *MicroBanking Bulletin* uses the average loan size to GNP per capita as a proxy of depth of outreach of the institution. The March 2005 issue of the *MicroBanking Bulletin* reports that institutions targeting the lowest end market have operating expense ratios (Adjusted Operating Expense/ Adjusted Average Total Assets) two times bigger than institutions targeting the less poor customers.

evidence is presented by Stephens (2005) who finds, in an analysis of 60 MFIs, that clients of the 32 sustainable institutions paid less for financial services.

An alternative road to sustainability is to reduce administrative costs through an increase in staff productivity or a decline in rent-seeking. For MFI's, loan officers are responsible for creating and safeguarding the quality of the assets (i.e. the size and arrears rate of the loan portfolio), as well as for generating the income (i.e. interest payments from clients) for the institution (Holtmann, 2001). Staff incentives (e.g. cash premiums, special awards, and public recognition) are increasingly promoted to raise the number of clients served by loan officer (Armendariz and Morduch, 2005; Bazoberry, 2001).[11]

2.3 Estimates

Our data comes from the information about some MFI's provided by rating agencies PlaNet Finance and Microfinanza. The ratings were produced between 2002 and 2005, and provide balance-sheet and income statement information for 100 institutions, including detailed data on subsidies obtained historically.

For each MFI, we obtained the average for the two last years in the sample, for each variable included in Σ, as outlined above, creating a cross-sectional database with around 100 MFI's. In the appendix, we provide detailed information on how we manipulated the information to obtain the variables. From this cross-sectional data, we computed the Sustainability Index, Σ, for each MFI (See Appendix 1).

In Table 1, we provide some summary statistics of the cross-section distribution of the main variables, along with the correlation coefficients between them, while Figure 1 presents the density of the Sustainability Index.

INSERT TABLE 1 HERE

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11 New systems like the one put forward by the Grameen Bank, so-called Grameen II, profoundly modified the role of field officers by providing them with higher responsibilities. Along this model, staff members can deliver flexible loans in case of repayment problems. These loans have their own rules in order to allow the client to repay slower consistently with their situation.

The net return on loans varies from 5% to 101%, with most institutions receiving between 20 and 50%. MFI's in the sample show high variance, as measured by the coefficient of variation, particularly in terms of its loan size to GDPpc ratio, a traditional measure of the poverty incidence of their actions. The wage premium measure also has high variability, although it should be noted that it is obtained as a residual that captures total administrative costs per staff, as a ratio to GDPpc. Figure 1 shows that about 75% of the MFI'a in our sample are sustainable, given our definition.

Remarkably, the table shows a large variability in the factors driving Sustainability across the different MFI's., creating a large volume of noise. There is no single component that explains Sustainability, when we take a significance level of 5%, given the variability in the other components. Moreover, the correlation between the various components themselves is very weak.

INSERT TABLE 2 HERE

Table 2 shows the correlation between our own measure of Sustainability and the measures of Operational and Financial Sustainability traditionally computed in the literature.[12] All measures are very highly correlated; in fact, they differentiate only slightly in the way they are constructed. Our measure is very closely associated to OSS. Financial sustainability (FSS) differs only because of the adjustments on inflation, costs of funds, loan loss provision and some in-kind donations.

While these rated institutions are certainly more committed to financial performance (Cfr p.2), a majority of rated MFIs have lower than 100% FSS. As argued by Armendariz and Morduch (2005), while some programs or institutions have achieved sustainability, most of them probably have not reached financial sustainability.

This section has highlighted how lack of Sustainability remains a key challenge for most MFI's. In these conditions, the future has three scenarios. In the first one (doomsday), we would see the sector imploding, as non-sustainable MFI's would break down one after

[12] The measures of OSS and FSS are provided in the ratings documentation. We averaged them over the years in the sample, to obtain a cross-sectional sample.

the other. In the second scenario, MFI's would improve their sustainability through the tools outlined above, including increased staff productivity and/or a strategic realignment to target the better off among the poor, or any other more traditional tools to improve corporate performance, such as technological and managerial innovation. Finally, the third scenario (donor dependence), MFI's will continuously rely on subsidies from donors to improve their outreach and, even to stay alive. In the next section, we look at the interaction of the two latter, addressing the implication of subsidies for sustainability in microfinance.

3 Subsidies and MFI's performance

3.1 Subsidy intensity

Donors support institutions through different channels. Subsidies can be awarded as cash grants. The subsidy is then not the cash grant itself but the opportunity cost of the subsidised resource from the grant (Schreiner, 2000). These grants are considered as donated equity[13]. Other sorts of subsidies are in-kind donations, for instance for training or travel costs. Discounts on the cost of funds through cheap credit lines are also subsidies. Many investment funds do not charge market rates but what is called "quasi-commercial" interest rates when they lend to MFIs. These rates are lower than the market rate that institutions would pay if they had to entirely rely on the market. Even if private investment funds have recently emerged, few investments are really commercial. Finally, one can also consider that shareholders receiving lower financial returns than what they could be offered are also someway subsidising MFIs (Goodman, 2005). Equity, quasi-equity[14] and guarantee funds are also financial products used by international donors. Nevertheless, subsidies and debt remain the main instruments used by donors.

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[13] Some organizations misleadingly consider some of the subsidies as profits (Schreiner, 2000). This enables them to foster their income statement. Nevertheless, in the rest of the paper and in our database, all cash grants are donated equity.

[14] Quasi-equity is medium to long term soft loans designed to be repaid from profits, subordinated to other more secure loans and which, in microfinance, can eventually be transformed to equity in return for good financial institutions (Helms, 2006)

We rely on data from the rating reports to obtain the subsidies of our MFI's. The rating institutions report the total amount of donated equity, capturing the discounted sum of the total subsidies received by the MFI through its history. We perform two adjustments to capture the sum of subsidies. The first one considers the in-kind donations. The second one focuses on the cost of fund, and aims at estimating the costs that the institutions would pay if it used financial financing rather than concessional rate loans..

We use this data to obtain the Subsidy Intensity, SUB, for each MFI as the ratio of Donated Equity to Total Equity, where the latter is obtained from the MFI's balance-sheet. Like before, we take the average of the years in the sample to obtain a cross-sectional database. Note that, since the measure of Donated Equity corresponds to total subsidies over the years, whereas Total Equity subtracts the funds that have been used to cover yearly operating losses, MFI's with consistent losses may have a ratio larger than one. Table 3 presents the density of the Subsidy Intensity for the MFI's in our sample, along with some descriptive statistics. On one had, 15% of the institutions, mainly from Latin America, have never received any subsidy. On the other hand, another 15% of the institutions have been hugely subsidized, with a ratio above the 100%.

4 Estimating the Impact of Subsidies

In Figure 2 we plot the Subsidy Intensity and the Sustainability of the MFI's in our sample. Their correlation coefficient is -0.3519. Linear regressions using OLS (not shown here) confirm this correlation, even when additional controls, which all fail to be significant, are included. However, the empirical implication of this statistical relationship is difficult to assess, due to the likely possibility of reverse causality. In fact, donors are likely to assist MFI's having more trouble to survive, instead of those that have achieved sustainability and can survive without subsidies.

INSERT FIGURE 1 HERE

In the absence of a good instrument, we have chosen to pursue a strategy that assesses the effects of subsidy intensity on various components of the Sustainability Index. We analyze, in turn, the effects of subsides for the poverty incidence, moral hazard

inefficiencies and pricing distortions of MFI's. Our working hypotheses are developed in each section.

4.1 Loan Size and Poverty Incidence

We begin with an analysis of the impact of subsidies on the poverty incidence of MFI's measured by the ratio of average loan size by the country's GDP (Microbanking Bulletin, 2005). Our working hypothesis is as follows

H1 – Due to donor focus on poverty fighting, subsidies tend to be directed mainly to MFI's targeting the poor, with a lower average loan size to GDP, and thus imply higher administrative costs.

To test this hypothesis, we estimate the following linear expression, using OLS,

$$s_i = \gamma_0 + \gamma_S SUB_i + \gamma_C C_i + \varepsilon_i \quad (3)$$

where C are additional controls for Size, Governance and Region, which we include as fixed effects. The Size variable depicts a threefold categorization of the size of the institutions, following the *Microbanking Bulletin's* classification[15]; Governance is captured through dummy variables for For-profit, Non-profit and Cooperatives; finally, the Region indicator uses a dummy variable for Asia, Eastern Europe, Latin America, Middle-East and Africa.

The results are show in table 4. They show that subsidy intensity is negatively correlated with the loan size measure, suggesting the MFI's lending to the poorer are more likely to attract funding from donors. In other words, donors and certain MFI's managers share the goal to achieve a double bottom line of financial and social performances. We consider beyond the scope of this paper to assess whether this relationship is driven by the donors, who force target MFI's to serve the poor, or by the MFI's, who serve the poor and are able to attract funding.

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[15] "The MicroBanking Bulletin (MBB) is the premier benchmarking source for the microfinance industry. Its benchmarks are widely used by investors, donors and other service providers to facilitate greater standardization and a better understanding of the development of the microfinance sector" See http://www.mixmbb.org. See Appendix.2, for details.

The controls included are significant. Poverty incidence tends to be more pronounced for MFI's that are smaller, as defined by our Size variable, and active in Eastern Europe, Latin America and the Middle East. Governance indicators suggest that For Profit MFI's tend to have higher loan size, although this relationship is not significant.

4.2 Moral Hazzard Inefficiencies

Second, we look at the impact of subsidy intensity for moral hazard, in terms of staff productivity, measured here by the number of borrowers per staff or rent-seeking, measured by our estimates of the wage-premium. Our hypothesis can be written as follows:

H2 - Subsidies create poor incentives and induce rent-seeking by staff, thus lowering productivity and expanding the wage premium, with negative consequences for administrative costs.

To test this hypothesis we estimated two specifications similar to (3), using our measures of productivity and wage-premium, respectively the logarithm of the number of borrowers per staff and the ratio of administrative costs per staff to GDP, as dependent variables.

In the regressions for Productivity, we include here additional controls for Savings Intensity of the MFI, measured as the ratio of savers per borrower, and for Poverty Incidence, using again the ratio of Loan Size to GDP per capita. Like before, we include controls for Size, Governance and Region. These results are shown in column A of table 5.

They show no evidence of moral hazard problem, whereby higher Subsidy Intensity lowers Staff Productivity. Actually, the coefficient is positive, although highly insignificant. A significant control is the Savings intensity which, as expected, implies a decline in productivity, since our measure accounts only for microcredit output. Another important control is the poverty Incidence of the MFI, which has a positive sign, suggesting that MFI's with a higher Loan Size, targeting the better off, have lower productivity, as better clients will require improved, time-consuming services. The additional controls for Size, Governance and Region are not significant, other than the

Governance control for cooperatives, which shows higher labor productivity for this type of institutions, once we control for Savings Intensity.

Next, we turn to the regressions in column B of table 5, which shows the results regressions that take the Wage Premium, as a dependent variable. Our results show no evidence that Subsidy Intensity raises the wage premium, as the coefficient is negative and highly insignificant. On the other hand, two controls Staff productivity and Loan Size, are related to the wage premium in a statistically significant way, with a positive sign, which shows that wage premium arise for MFI where productivity is higher and that serve the better off. In addition, regional variables show that the wage premium is higher in Africa and Asia.

Overall, the results show no evidence of moral hazard due to subsidies, as the staff of MFI's receiving more subsidies do not seem to be overpaid or any less productive. Together with the results of the previous section, this implies that subsidies tend to be associated with firm with higher administrative costs, as a proportion of loans, only because they tend to be directed at MFI's that target the poorer, with lower loan sizes, which implies that costs per loan are higher.

4.3 Pricing distortions

To conclude, we look at the effect of Subsidy Intensity on the price charged by MFI's, captured by the Net Return on Loans, NRL. Here, our working hypothesis can be summarized as follows

H3 – Subsidies induce MFI's to charge lower interest rates which undermine their sustainability

We estimate a regression similar to (3), which takes NRL as the dependent variable. We control for the administrative and financial costs of loans, including the rate of inflation, which determine the MFI's unit cost. We control also for features of the client base including the country's GDP per capita and the Loan Size to GDP ratio of the MFI.

Finally, we include dummies, as usual, for the Governance (For-profit, Non-profit and Cooperatives) and a dummy for the Middle East region[16].

Table 6 shows the regression results. Our main results are captured in the three coefficients shown on top. Beginning with regression 7, we have that, without controls for ADMIN or LOAN SIZE, the coefficient of SUB is not significant and positive. However, once a control for ADMIN is included, the same coefficient becomes negative and significant (e.g. regressions 1, 2, 4 and 5). In sum, although subsidies seem to go to MFI's charging higher interest rates, this is due to their role in sustaining MFI's that target the poorer, and thus have higher Admin costs. Once these are controlled for, Subsidies seem to allow MFI's to charge lower interest rates, which permit them to be affordable for the poorer.

The coefficient of LOAN SIZE is negative and significant, when controls for both SUB and ADMIN are present; suggesting that under market conditions poor customers will require higher interest rates (regression 1). However, a lower LOAN SIZE (i.e. poor customers) means also higher SUB and higher ADMIN, this effect disappears when we fail to control for either of these variables (regressions 3, 5, 6).

Together with previous discussion, these results imply a nuanced re-writing of our hypothesis. In fact, subsidies allow MFI's that have higher risk and administrative costs because they lend to the poor, to charge lower interest rates that can be affordable by their target clients.

5 Conclusion

In this paper we have assessed the effects of Subsidies in Microfinance. In short, our results seem to suggest that subsidies to MFI's are associated with lower sustainability because they tend to fall onto institutions that target poor customers, with high administrative costs due to their lower loan size (higher unit costs). We find no evidence of shirking or rent-seeking behavior by the staff of more subsidized institutions. Overall,

[16] Dummies for other regions were not significant. Including them in the regression does not affect our main results.

the results seem to support those arguing for a continued role of subsidies to ensure that MFI remain faithful to their mission of bringing credit to the poorest, who cannot afford commercial microfinance-based products. Of course, the issue of endogenity emerges again here, although in a more subtle and less relevant way: we have no instrument to identify whether MFI's target the poorest because their donors tell them to do so, as a condition to receive funds, of whether donors decide to subside MFI's that target the poor independently.

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7 Appendix

Appendix 1: Construction of key variables

Net Return on Loan (r): r_t = [Revenue from Loans in *t*] / [Average of Loans in *t* and *t+1*]. The ratio was generated for the years in the sample (minus the initial year) and averaged out.

Other Revenue per Loan (ω): ω_t = [Net Income from Other Operations (Financial + Non-financial) in *t*] / [Average of Loans in *t* and *t+1*]. The ratio was generated for the years in the sample (minus the initial year) and averaged out.

Deposits as a share of loans (d): Demand and Savings (Short- and long-run) deposits were aggregated from the balance sheet. Then, we obtained the ratio to outstanding loans and averaged them over the years in the sample..

Interest on deposits (δ): r_t = [Interest paid on deposits in *t*] / [Average of Deposits (d_t) in *t* and *t+1*]. The ratio was generated for the years in the sample (minus the initial year) and averaged out.

Borrowing as a share of loans (d): Yearly ratios of total borrowing by outstanding loans; averaged over the years in the sample.

Interest on borrowing (β): β_t = [Interest paid on borrowing in *t*] / [Average of Outstanding Borrowing in *t* and *t+1*]. The ratio was generated for the years in the sample (minus the initial year) and averaged out.

Productivity (a): Obtained directly from ratings. Averaged over the three?? years in the sample

Loan Size by GDPpc (s): Loan size at t was obtained dividing outstanding loans by the number of borrowers. Then, we divided this by the yearly GDPpc, in local currency.

Wage Premium (k): Take the ratio of administrative costs per outstanding loans (x_t). ln k_t was obtained as a residual: $\ln k_t = \ln x_t - \ln s_t - \ln a_t$, and averaged over the years in the sample. The statistics for k were obtained after taking the exponential of the average.

Subsidy Intensity (SUB): SUB_t = [Adjusted measures of donated equity, along the lines described n the text, at t] / [Average of Equity in *t* and *t+1*]. The ratio was generated for the years in the sample (minus the initial year) and averaged out.

Appendix 2: Size categories; The Microbanking Bulletin Methodology

Region	Scale of Operations[1] Total loan portfolio (US$)
Africa Africa/ MENA[2] Asia (Central)	Large: > 5 million Medium: 800,000 to 5 million Small: < 800,000
Asia (Pacific) Asia (South)	Large: > 8 million Medium: 1 to 8 million Small: < 1 million
Eastern Europe Latin America	Large > 10 million Medium: 1.5 to 10 million Small: < 1.5 million

1 Criteria for classification of scale of operations varies by region. See corresponding group of regions.

2 MENA = Middle East/ North Africa.

Source: http://www.mixmbb.org/en/company/our_methodology.html

Table 1: Descriptive Statistics

Variable	min	mean	max	Standard-Deviation	Coef. of variation	N
Net return on loans (r)	0.057086	0.326144	1.100813	0.178898	0.548525	100
.Other activities (ω)	-0.10819	0.018888	0.481153	0.06371	3.373045	100
Financial cost of funds (f)	0	0.024759	0.127256	0.02234	0.902305	98
Wage premium (k)	0.001646	277.7797	17271.4	1903.645	6.853072	99
Loan size by GDPpc (s)	5.64E-05	8.275176	605.2509	61.12294	7.3863	99
Productivity (a)	8.666667	121.8883	467.3333	75.18641	0.616847	100
Sustainability Index (Σ)	0.462777	1.44203	2.875365	0.479509	0.332524	98

	r	ω	f	k	s	a
Net return on loans (r)	1					
Other activities (ω)	0.1168	1				
Financial cost of funds (f)	0.1012	0.1124	1			
Wage premium (k)	0.0006	-0.0433	-0.0072	1		
Loan size by GDPpc (s)	-0.0041	-0.0057	0.0186	0.9354*	1	
Productivity (a)	-0.0451	-0.1911*	-0.1812*	0.1485	-0.0289	1
Sustainability Index (Σ)	0.0886	0.0994	0.0965	-0.1293	-0.0915	-0.0464

Figure 1 - Density of Sustainability Index

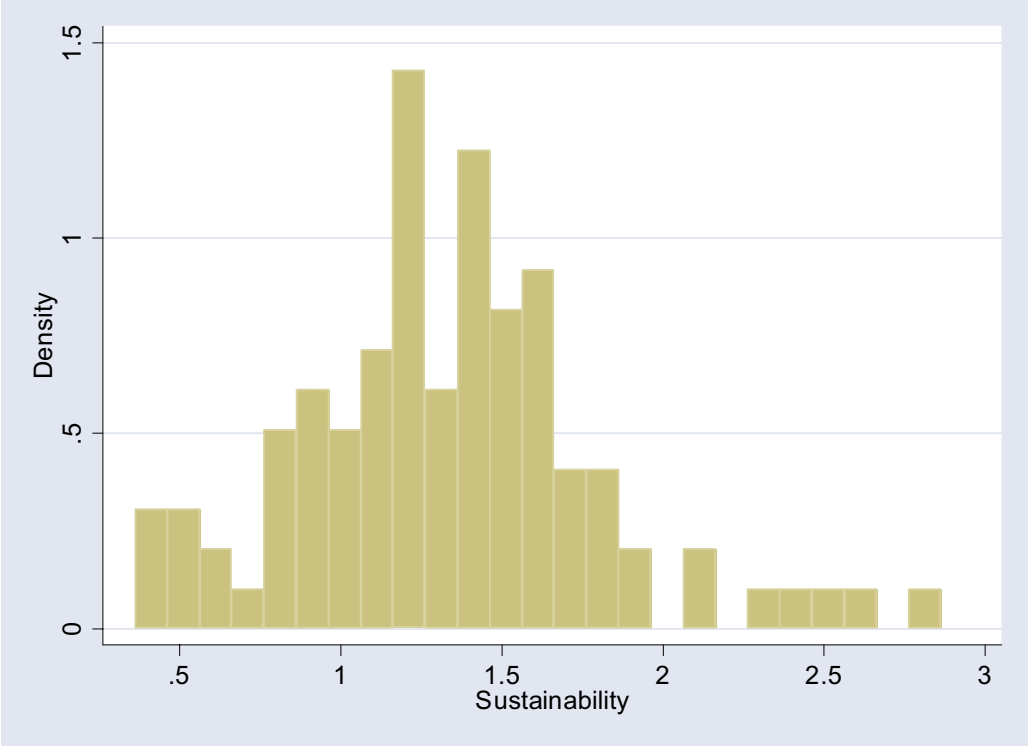
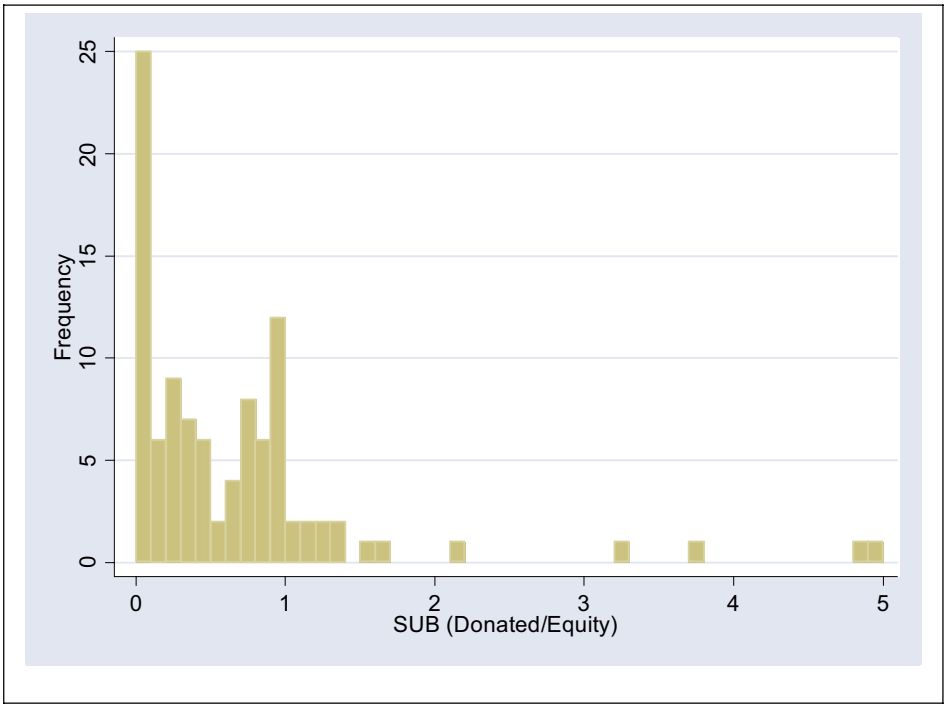


Table 2: Correlation Matrix : Σ, OSS and FSS

	Σ	OSS	FSS
Σ	1		
OSS	0.8507	1	
FSS	0.7211	0.8496	1

Table 3: Subsidy Intensity (Donated Equity / Current Equity)



Descriptive Statistics

Percentiles			
1%	0		
5%	0		
10%	0	Obs	100
25%	0.100893	Sum of Wgt.	100
50%	0.468041	Mean	0.665857
		Std. Dev.	0.864188
75%	0.91872		
90%	1.228085	Variance	0.74682
95%	1.885983	Skewness	3.040884
99%	4.881849	Kurtosis	14.1926

Figure 2 - Sustainability and Subsidy Intensity

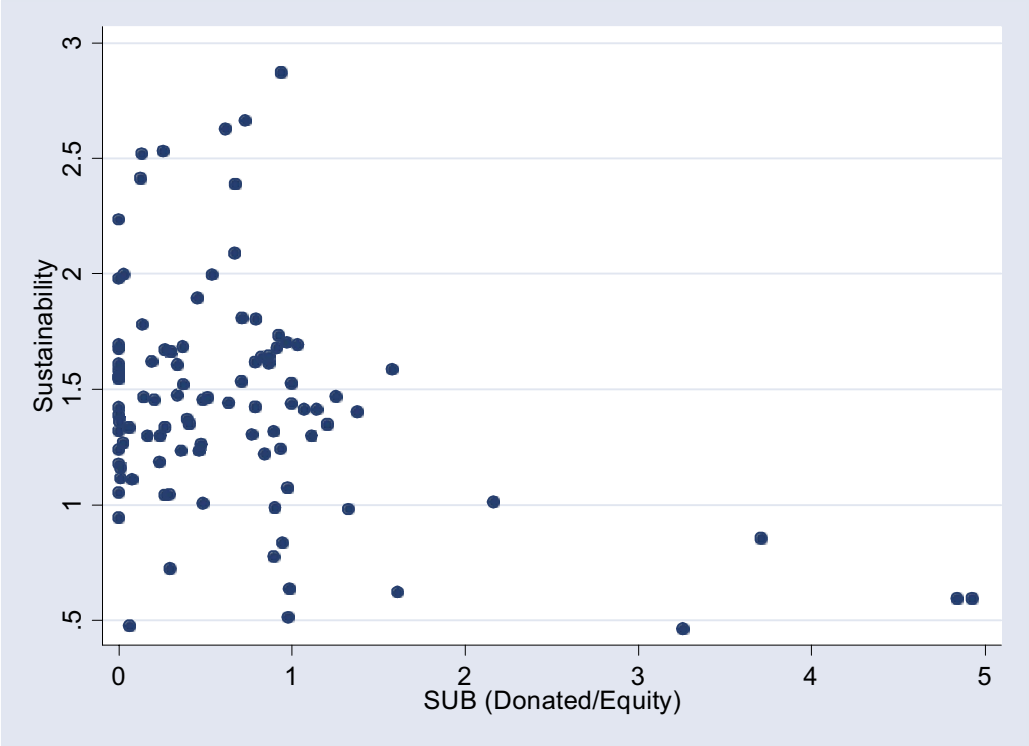


Table 4: Loan Size divided by GDP per capita: Poverty of the clients

Dep var:: Loan Size/ GDPpc [Robust t-stats]	(1)	(2)
SUB (Donated/Equity)	-0.711*	-0.588*
	[2.45]	[2.05]
Real GDP per capita (C)[1]	0	
	[1.49]	
SIZE: Medium	1.735*	1.663*
	[2.54]	[2.47]
SIZE: Larger	1.690+	1.686+
	[1.96]	[1.99]
GOV: Non-Profit	-1.129	-0.403
	[1.24]	[0.44]
GOV: Cooperative	-2.292	-1.526
	[1.62]	[1.17]
REGION: Asia	-2.358	-2.323
	[0.63]	[0.66]
REGION: East-Europe	-3.558**	-4.651**
	[3.31]	[4.57]
REGION: Latin-America	-4.225**	-5.110**
	[3.60]	[5.60]
REGION: Middle-East	-3.512**	-4.211**
	[3.44]	[4.49]
Constant	2.402+	1.427
	[1.74]	[1.11]
Observations	96	99
R-squared	0.37	0.33

+ Significant at 10%; * significant at 5%; ** significant at 1%

[1] (C) indicates a country-level variable.

Table 5: Moral Hazard

A: Dep var:: Log of Productivity [Robust t-stats]

	(1)	(2)	(3)	(4)
SUB (Donated/Equity)	0.088	0.118	0.063	
	[0.91]	[1.24]	[0.74]	
Savers per borrower	-0.114**		-0.115**	-0.115**
	[12.39]		[13.22]	[13.61]
Loan Size/GDPpc	0	0	-0.000*	-0.000**
	[0.94]	[1.27]	[2.40]	[3.50]
Real GDPpc (C)	0			
	[0.59]			
GOV: Cooperatives	0.722**	0.123	0.678**	0.653**
	[4.32]	[0.53]	[4.99]	[4.96]
Constant	4.421**	4.499**	4.529**	4.574**
	[20.24]	[49.06]	[50.79]	[66.03]
Observations	93	99	96	96
R-squared	0.22	0.03	0.2	0.2

+ Significant at 10%; * significant at 5%; ** significant at 1%

B Dep var:: Wage Premium	[Robust t-stats]	
	(1)	(2)
SUB (Donated/Equity)	-0.341	-0.284
	[0.356]	[0.352]
Productivity	0.007*	0.006+
	[0.003]	[0.003]
Loan Size/GDPpc	0.02**	0.020**
	[0.003]	[0.003]
Real GDP per capita (C)	-0.00004	
	[0.0001]	
REGION: Asia	-5.876**	-5.903**
	[2.170]	[2.16]
REGION: East-Europe	-3.179**	-3.701**
	[0.868]	[0.643]
REGION: Latin-America	-4.044**	-4.235**
	[1.104]	[0.611]
REGION: Middle-East	-2.69**	-2.820**
	[0.663]	[0.468]
Constant	3.14**	3.120**
	[0.657]	[0.65]
Observations	96	96
R-squared	0.45	0.42

+ Significant at 10%; * significant at 5%; ** significant at 1%

Table 6: Net Return on Loans

Dep var:: Net Return on Loans [Robust t-stats]

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Admin cost/Loans	0.878**	0.831**		0.833**	0.705**			0.911**
	[8.76]	[8.53]		[8.79]	[7.72]			[9.34]
Loan Size/GDP	-0.000+	0	0.000**		0	0.000*		-0.000**
	[1.84]	[1.18]	[2.79]		[0.35]	[2.49]		[2.86]
SUB (Donated/Equity)	-0.055**	-0.051**	0.024	-0.051**		0.025	0.023	-0.058**
	[4.00]	[3.91]	[1.11]	[4.07]		[1.15]	[1.10]	[4.62]
Inflation, GDP deflator (C)	0.004+	0.006*	0.010+	0.006*	0.006+	0.009*	0.008*	0.003
	[1.95]	[2.07]	[1.95]	[2.07]	[1.94]	[2.04]	[2.00]	[1.47]
Real GDP per capita (C)	0	0	0.000*	0	0.000*	0.000*	0.000*	
	[0.48]	[0.83]	[2.37]	[0.78]	[2.18]	[2.30]	[2.13]	
GOV: Non-profit	0.053*	0.051*	0.082+	0.051*	0.051+	0.085+	0.086*	0.061*
	[2.14]	[2.09]	[1.83]	[2.11]	[1.79]	[1.94]	[2.01]	[2.56]
GOV: Cooperatives	-0.043	-0.056+	-0.034	-0.063*	-0.029	-0.024	-0.043	-0.037
	[1.49]	[1.95]	[0.59]	[2.25]	[0.94]	[0.45]	[0.82]	[1.30]
REGION: Middle-East	0.073**	0.071**	0.03	0.071**	0.058*	0.03	0.025	0.071**
	[3.08]	[3.07]	[0.80]	[3.19]	[2.42]	[0.78]	[0.67]	[3.00]
Financial Cost of Loans	0.874+		-0.683					1.176*
	[1.82]		[0.81]					[2.38]
Constant	0.062	0.075+	0.116+	0.077*	0.037	0.107+	0.123*	0.059+
	[1.49]	[1.95]	[1.83]	[2.08]	[0.94]	[1.79]	[2.13]	[1.70]
Observations	95	96	95	97	96	96	97	98
R-squared	0.72	0.71	0.29	0.71	0.66	0.28	0.28	0.72

+ Significant at 10%; * significant at 5%; ** significant at 1%