Competition and Performance of Microfinance Institutions

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Abstract

This paper examines the effect of competition among microfinance institutions (MFIs) on their performance. Specifically, by constructing a Lerner index, we assess the effect of increased competition on outreach, loan repayment, efficiency and financial performance. The empirical investigation is based on data from 362 MFIs in 73 countries for the period 1995-2009. Our constructed measure of competition reflects the general trend of competition in the microfinance market. The results show intense competition is, overall, negatively associated with performance of MFIs. However, ways that ensure lending standards, enhance information sharing and promote efficiency may help overcome the adverse effect of competition without risking growth of the microfinance sector.

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1. Introduction

At the end of July 2009, an estimated 8.8 million Euro (Rs 600 million) worth portfolio of microfinance institutions (MFIs) that operate in Kolar (a town in Karnataka district of India) was reportedly involved in defaults. Intense competition is considered among the root causes where it lowers borrower selection standards, weakens relationships with customers, leads to multiple loan-taking and high defaults. For instance, 25 percent of borrowers have been reported taking loans from six or more different (Srinivasan, 2009).[1] The figure (loan from more than one MFI) is as high as 40 percent in Morocco which, coupled with other factors, eventually leads to "repayment crisis" in the microfinance industry in late 2008 (Chen *et al.,* 2010). These and similar observations pose critical questions - what are the effects of increased competition in the microfinance market? Will MFIs, their owners and clients, benefit from increased competition? Will it lead to more financial inclusion?[2]

In the last three decades, microfinance has captured the interest of academics and policy makers alike. The industry is growing at a significant rate and is becoming to be considered as a subsector of the finance services industry. The growth over the past five years has particularly been unprecedented, which is reported to be 70-100% per annum in some countries.[3] The number of microfinance service providers is also on the rise. With growth of the industry and saturation of markets, increased competition is documented in many countries (Porteous, 2006).

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[1] The registered high default was due in part to external factors such as cultural resistance and decline of the local economy that the livelihoods largely depend. In some towns, religious leaders forbid repayment and involvement in MFIs activities generally by labeling MFIs' loans as un-Islamic. In other towns, local conflict and conflict of interest with local money lenders impaired MFIs' services.

[2] In developing countries, 2.7 billion adults (72 % of total adults) are still financially excluded (unbanked) (CGAP, 2009).

[3] Sinah, S. (2010). How to Calm the Charging Bull – An Agenda for CGAP in the Decade of the "teenies". Microfinance Focus, June 15, 2010 – (www.microfinancefocus.com/2010/06/18/how-to-calm-the-charging-bull-an-agenda-for-cgap-in-the-decade-of-the-"teenies"/)

Citing its benefits, economists have long favoured competitive environment. Competition, in most cases, is believed to increase welfare of consumers by promoting allocative and productive efficiency, i.e. lower production costs and lower prices on goods and services. It also encourages the development of new products and efficient technologies (Motta, 2004). We would, therefore, expect similar benefits of competition in microfinance market.

Although competition is becoming an important facet of the microfinance industry and its implication can be immense, studies on the subject remain very limited. In this paper we assess the effects of competition among microfinance institutions. In so doing, we aim at contributing to the important discussion of competition in the microfinance sector. Besides, as many countries started integrating microfinance into their poverty alleviation strategy, understanding the effects of competition can guide the design of policies that ensures benefits for the poor.

The focus of the study is an empirically investigation of the effects of increased competition among MFIs on different outcomes. Specifically, it addresses whether or not competition (1) leads to higher outreach in terms of the number of clients served as well as the poverty level of clients, (2) high default rates and finally (3) whether increased competition is associated with improved efficiency and better financial performance. The analysis is performed in a panel setting by making use of the new and rich dataset of the Microfinance Information Exchange (the MIX). We take a crucial first step in assessing the effects of competition, namely measuring the extent of competition. A Lerner index of market power is employed, which is a standard and widely used measure of competition but, to our knowledge, has never been used to capture the degree of competition in the microfinance market. The results indicate that the MFIs tend to have a lower outreach when faced with intense competition. We also find increased competition is associated with lower loan repayment, lower financial performance and lower efficiency.

The paper proceeds as follows. Section 2 presents an overview of literature related to the subject, puts forward the hypotheses, introduces the approach employed to measure competition and presents descriptive evidence on level of competition in the microfinance market. The constructed measure of competition is then used to empirically investigate the effect of competition on MFIs' performance, which is the subject of Section 3. The data used and the estimation method are presented in this part of the paper. Discussion of the results follows in Section 4. Section 5 offers concluding remarks.

2. Competition in Microfinance

"…once microfinance institutions are committed to managing business on a commercial basis, *competition* quickly becomes a hallmark of the environment in which they operate." (CGAP, 2001, p. 2 – emphasis original)

2.1. Related Literature

In the early stages of microfinance, the idea of providing microloans to the poor as a way to alleviate poverty has appealed to and attracted social investors and non-government organizations (NGOs). But it is the enormous market and profit opportunity that attracts the large involvement of commercial financial intermediaries such as international banks. Profit-oriented MFIs have become increasingly important and some argue that the shift in the composition of MFIs from socially oriented organizations with "poverty lending" approach (that focuses on reducing poverty through credit and other services that are funded by donors, government subsidies and other concessional funds) to institutions oriented with "financial systems" approach that focus on commercial financial intermediation among poor with emphasis on institutional self sufficiency will continue (Humle and Arun, 2009). Competition is deemed inevitable following the involvement of profit-oriented institutions and the change of status by NGOs from non-profit to profit making (commercialization). The introduction quote by the leading institution in the area of development finance, the Consultative Group to Assist the Poor (CGAP), underscores this belief.

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The economics literature states that competition ensures well functioning markets, protects consumers, promotes allocative and productive efficiency and provides incentives for the development of new products. MFIs were largely operating as a monopolist in the early years (CGAP, 2001; McIntosh *et al*. 2005). Such a market power is, however, associated with allocative inefficiency, which refers to the welfare losses as a result of high prices a monopolist charge. There is even further loss if the monopolist employs inefficient technology (productive inefficiency). Besides, there may not be pressure to invest in efficient technology and introduce new products (Motta, 2004). Therefore, it would be reasonable to assume competition can be beneficial in the context of microfinance market as it may result in improved and new financial product designs, better customer services, lower costs and lower interest rates.

The other side of the argument is that microfinance market is a distinct market that makes use of soft-information and depends on strong MFI-client relationship. MFIs provide financial services for the poor that are considered not creditworthy by the conventional banks. They are often praised for overcoming the problem of information asymmetry and providing loans without collateral requirements. They do so by establishing strong personal relationship with clients as well as by using other forms of collateral (such as group lending that generates social collateral). Competition and the effort to win clients and expand market share, therefore, may lead to low screening and lending standards. There are some indications of lose MFI-clients relationship with intense competition. Increased competition is also associated with an increase in information asymmetry, which makes it difficult for MFIs to know about the general debt level of clients. This in turn may lead to multiple borrowing, heavy debt burdens, low repayment rates and poor portfolio quality.

The effect of competition, as argued above, could go both ways and deserves an empirical investigation. However, very few examine the effect of competition among

MFIs and the literature on competition in microfinance is limited. Below is an overview of the few available related works.

The focus on making MFIs profitable (financially-sustainable), what Cull *et al.* (2009a) called "big leap", started in the 1980s and 1990s. CGAP (2001) points out that the essential elements of this approach are competition, regulation and profitability. The paper explores the Latin American microfinance market where the commercial approach to microfinance proceeded swiftly. It describes the market as witnessing rising competition, which leads to market saturation in some countries. Olivares-Polanco (2005) examines some of the anecdotal and descriptive evidences that CGAP (2001) presents. He investigates the effect of competition by mainly focusing on outreach (measured by loan size). His findings show that increased competition results in lower outreach.

Navajas *et al.* (2003) studied competition in the Bolivian microfinance market by focusing on two major MFIs (Casa Los Andes and BancoSol), which collectively have around 40 percent market share. The results suggest that outcome of competition is ambiguous since competition leads to innovation thereby expanding outreach. However, it reduces the ability of lenders to cross-subsidize less profitable smaller loans. In a similar study, Vogelgesang (2003) examines how competition affects loan repayment performance for Caja Los Andes. The analysis indicates competition is related with multiple loan taking and higher levels of borrower indebtedness. The probability of default is also shown to be high with higher levels of indebtedness. On the other hand, he argues the probability of timely repayment is high in areas where there is high competition and high supply of microfinance services. Thus, the results seem inconclusive.

A theoretical model developed by McIntosh and Wydick (2005) characterizes the effects of competition between MFIs where increased competition leads to increased information asymmetry. As a number of competing MFIs increase in a market, which

makes information sharing between them challenging, borrowers may engage in multiple borrowing which increases the debt level of clients and the probability of default. This in turn can make worse off borrowers with a single lender since this behaviour will create an externality by inciting MFIs to respond to multiple borrowing by adjusting interest rates upward. In a Ugandan microfinance market, which McIntosh *et al.*, (2005) studied, there is a rise multiple borrowing and decline in repayment rate as competition intensifies.

Other works that do not address the effect of competition among MFIs but present an argument about the possible effects of competition includes Hermes *et al.* (2009). Their work examines how overall level of financial development in a country affects the efficiency of MFIs. After presenting a balanced argument that the effect of financial development on efficiency could be both negative and positive, they empirically document a positive effect of financial development of efficiency of MFIs. They suggest competition, among other channels, through which financial development could affect efficiency.   On a related work, Cull *et al.* (2009b) investigates how MFIs perform under the pressure of competition from formal banks. Their results show that in a country where there is larger formal bank presence, MFIs tend to deepen their outreach (i.e., extend their outreach to women and also lend in small amounts). However, the effect on other performance indicators, such as profitability, appears weak.

2.2. Hypotheses
The reviews of the works highlight the importance of the topic competition yet it is a topic that is understudied. In what follows, we present our hypotheses on the effect of competition on MFIs' performance indicators, namely outreach, loan collection, efficiency and profitability. The outcome measures selected are ones that are considered core performance indicators (With the objective of empirically assessing the issue, we

discuss the specific performance (Jansson, 2003; UNDP, *undated*[4]). A detailed discussion of these measures is presented section 3.1.

Competition and Loan Repayment /Portfolio Quality

How will intensifying competition affect repayment performance of borrowers? Implied in this question is the portfolio quality of MFIs since low repayment performance (high default) is associated with low loan portfolio quality. We expect increased competition to negatively affect repayment performance for the reason that, as shown in McIntosh and Wydick (2005) and McIntosh *et al.* (2005), an increased number of lenders and competition may lead to multiple-loan taking ("double-dipping") resulting in heavy debt burden and low repayment. Low repayment rates in turn imply low portfolio quality.

Competition and Efficiency

With regard to the effect of increased competition on efficiency, one would expect a positive association between them because as competition exacerbates MFIs would be compelled to find efficient ways of delivering services that would reduce costs and ensure them a competitive edge. As a result we would expect increased competition to be associated with increased efficiency. But this may not be the whole story. As we argued in the previous paragraph, increased competition may result in more information asymmetry, borrower over-indebtedness and lower expected loan repayment. In order to overcome this problem, ensure higher expected repayment and higher loan portfolio quality, lenders would engage in more screening that raise their operational costs. Besides, MFIs may not only compete for clients and market share but also for employees. This can lead to higher costs. As a result, the direction of the effect of intense competition on operational costs is not clear a priory.

Competition and Profitability

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[4] It is available online from the following link:
http://www.uncdf.org/english/microfinance/uploads/evaluations/Core%20Indicators--UNDP%20version.pdf

We expect an increase in the level of competition to be associated with falling profit. As MFIs start operating under competitive pressure with declining market share and forgone monopoly rents, we would expect them to register low profitability, low to the point that it is not attractive for other service providers to enter microfinance market.

Competition and Outreach

Decrease in monopoly rents and market share associated with increased competition may compel MFIs to expand their market base and also to explore new markets implying a rise in outreach. On the other hand, if increased competition is associated with a rise in default and a fall in profit, MFIs will engage in cautious lending by extending loans only to borrowers they consider are safe and bring them good return, which limits outreach. For this reason, the effect of competition on outreach is ambiguous and we hope this study will shade some empirical light on effect of competition.

Table 1. Summary of the Hypotheses

Expected effect of increased competition on	
Outreach	+/-
Efficiency	+/-
Repayment	-
Profitability	_

2.3. Measurement

To empirically assess the effects of competition, we need to construct a proxy for competition. As it is discussed above, studies on competition are limited and the existing few empirical works have used ad hoc measures of competition. For instance, Olivares-Polanco (2005) has used a concentration index constructed as a percentage of the market share held by the four largest MFIs in a country. High concentration is considered as a sign of lower competitive environment and vice versa. On the other hand, McIntosh *et al.* (2005) have used three different but related measures. The first is

"presence" which indicates where there is any competition in the region. The second records the number of competitors while the last captures the proximity of competitors.

The important element of this work is the measure of competition. Competition is often assessed by the extent of market power that firms exercise, i.e. the ability of firms to set market prices above marginal costs. Applying this concept directly to all MFIs would pose a challenge. In the early years, even today to some extent, the price of MFIs may not reflect the associated cost. Subsidy is among the reasons. Subsidised MFIs, for any reason, could provide services at a price much lower than their marginal costs. As a result using these measures may render meaningless and unreliable results. For instance, if we apply a Lerner index measure of market power for MFIs operating with injected subsidies that enable them to provide loans at subsidised prices, we may find negative values while, theoretically, the value of a Lerner index is bound between 0 and 1. We focus on commercial-oriented MFIs that, given their profit maximizing behaviour, enables us to draw lessons from a vast empirical literature on bank competition. Furthermore, commercial-oriented MFIs are becoming increasingly important. This is due to the growing movement of scaling-up of many established non-profit MFIs and start operating on commercial lines while many standard banks and financial institutions start scaling-down and moving into microfinance.

Studies on bank competition have applied a range of measures of competition that have their own benefits and drawbacks. Concentration indices, such as Herfindhal-Hirschman index, are one of the early measures of competition where low concentration is associated with existence of high competition. However, the use of this measure is refuted on the ground that the relation between concentration and competition is not straightforward and higher concentration does not always imply lack of competition (Bikker and Haaf, 2002).

Another measure is the Panzar-Rosse (PR) approach. The PR measure is based on empirical observation of the impact of variations in factor input prices on firm-level

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revenues and uses cross-sectional data to assess competitive behaviour (Bikker and Haaf, 2002). The degree of competition in a market is assessed with an index called H statistics, which is the sum of input price elasticities (i.e. elasticities of firm's total revenue with respect to its factor input prices). The H statistics reflects the degree of competitive environment where H=0 implies perfect competition, 0<H<1 monopolistic competition and H≦0 monopoly equilibrium. The PR approach is also not without limitations. Kotter *et al.* (2008) pointed out two limitations and favoured the use of Lerner index. The first limitation is that the H statistics, which is the sum of the estimated coefficients and constant, does not vary over time making it less-relevant to investigate the evolution of competition over time. Besides, in the PR approach, firm-level measures of competition are not provided since the statistics is an aggregate of input price elasticities at industry level.

We employ the Lerner index measure of competition for its advantages over other measures. Using Lerner index, the extent of competition is determined by examining the extent of disparity between output price and marginal cost of production. The index is the difference between price and marginal cost scaled by price where large difference between the two implies monopoly power (Fernández de Guevara *et al.*, 2005). Generally, the index ranges between 0 and 1. A monopolistic market is characterized by values of Lerner index close to 1 whereas values close to 0 indicates a highly competitive market.

Estimation of the Lerner Index

Although their objectives vary, various studies in the banking literature have used Lerner index as a measure of competition (Angelini and Cetorelli, 2003; Fernández de Guevara *et al.*, 2005, 2007; Maudos and Fernández de Guevara, 2004, 2007; Koetter and Vins, 2008; Koetter *et al.* 2008, among others).

The Lerner index is computed to investigate the competitive behaviour of MFIs and it is empirically approximated by:

$$L = \frac{(p - MC)}{p} \qquad (1)$$

where *p* is output price and *MC* total marginal cost. The output price, which is a measure of average revenue, is calculated as the ratio of total operating income (interest income plus other operating income) to total assets (Maudos and Fernández de Guevara, 2004). The marginal cost is derived from an estimated translog cost function of the form:

$$\ln C_{it} = \alpha_0 + \alpha_1 \ln y_{it} + \frac{1}{2}\alpha_2 (\ln y_{it})^2 + \sum_{j=1}^{2} \beta_j \ln w_{jit} + \sum_{j=1}^{2} \frac{1}{2}\beta_j (\ln w_{jit})^2$$

$$+ \sum_{j=1}^{2} \gamma_j \ln y_{it} \ln w_{ijt} + \sum_{j<k}\sum \gamma_{jk} \ln w_{ijt} \ln w_{ikt} + \delta_1 trend$$

$$+ \frac{1}{2}\delta_2 trend^2 + \delta_3 \ln y_{it} trend + \sum_{j=1}^{2} \eta_j \log w_{ijt} trend + \varepsilon_{it} \qquad (2)$$

where C_{it} is the total production cost of MFI *i* at year *t*. The explanatory variable *y* represents output and w_js are input prices.

In estimating the cost frontier, we follow a specification similar to Hermes *et al.* (2009). Total cost (C) is the sum of financial and operating costs of MFIs. We total assets as a measure of output (y).[5] We also assume the use of two inputs by MFIs. These are labor (w_1) and capital (w_2).[6] The cost of labor (salary) is computed as a ratio of personnel expense to number of employees. Similarly, the price of the second input is measured by the ratio of operating expense (less personnel expenses) to net fixed assets. The cost function is estimated by including a time *trend* to capture the effect of technological change and MFI specific fixed-effect to deal with unobserved MFI heterogeneity and associated difference in cost.

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[5] This is used as a standard measure of production in the banking literature; see for example Fernández de Guevara *et al.* (2005). In the context of MFIs, Hermes *et al.* (2009) have used gross loan portfolio as a measure of output. However, we would not expect a significant difference since large share of MFIs' asset comprises loan portfolio. In our sample, more than 90 percent of the observations have a loan to asset ratio of 50 percent or more.

[6] We also consider a third input, deposit, and the cost associated with it, i.e. the interest expense by using ratio of financial expenses to total deposits as a proxy. However, limited number of MFIs take deposits that substantially reduce our sample. Data is discussed below.

Once we estimate the cost function, marginal cost (MC) is obtained by taking the derivative of the cost function with respect to $\ln y_{it}$ and given by:

$$MC_{it} = \left(C_{it} / y_{it}\right)\left(\alpha_1 + \alpha_2 \ln y_{it} + \sum_{j=1}^{2} \gamma_j \ln w_{jit} + \delta_3 trend\right) \qquad (3)$$

As for the data, it is calculated by taking the observed variables (total cost-C, total output-y and input variables-w_js and *trend*) and the estimated coefficients from the trans-log cost function (α_1, α_2, γ_js and δ_3).

Data

The source of data on MFIs for the construction of Lerner index as well as the following estimation in examining the effects of competition is the MIX. It is a widely used and extensive dataset available although reporting by MFIs is voluntary which cast doubt on reliability of the data. In order to ensure quality and availability of data, we limit ourselves to MFIs with 3 or more diamonds.[7] By the time of constructing the dataset for the study (March 2010), there were 461 MFIs with 3-plus diamonds that operate commercially. Only 20 percent of the MFIs have a bank status while the rest are non-bank financial institutions (66 percent), rural banks (13 percent) or credit unions (around 1 percent). Information collected on MFIs cover the period 1995-2009. However, more than 90 percent of the information is from year 2000 onwards. In total, we start with 416 MFIs and 2,544 observations. Although this is our initial sample, the number of MFIs and observations has dropped from the sample due to missing values and outliers, which is discussed below.

Dealing with Missing Values and Outliers

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[7] The MIX employs diamond system to indicate availability and quality of data from self reporting MFIs. Higher levels of diamonds indicate higher level of disclosure. MFIs with 3 diamonds represent those MFIs who report for two or more consecutive years on general information, outreach and financial data; 4 diamonds implies data as 3 diamonds plus audited financial statements; and 5 diamonds represent 4 diamonds plus ratings and other benchmarking assessments.

The cost function estimation and computation of Lerner index at MFI level is carried out for the 461 MFIs. The results are, however, mired with missing values and outliers as we proceed from the cost estimation to the index calculation.

For a significant number of observations, it was not possible to compute an index due to missing values on either of components of the index (price or marginal cost). There were also an issue of outliers in the sense that the values of the Lerner index are out of the theoretical 0 and 1. We compute the Lerner index as $L = (p - MC)/p$. The value of the index can be negative ($p - MC$) (also called the monopoly mark-up) is negative, i.e. the cost of MFIs is higher than the price they charge for their services. Although it may be reasonable to expect these negative mark-ups among non-commercial MFIs, for instance due to subsidies, we treat these observations as outliers given the characteristics of the MFIs in our sample (i.e., profit making MFIs). Similarly, we have excluded values greater than 1. Re-estimating the cost frontier and computing the Lerner index for the remaining MFIs results in yet another 4 outliers. The final sample contains 1247 observations net of outliers from 362 MFIs located in 73 countries.

Table 2. Regional Distribution and Legal status of MFIs

		No. of MFIs
Region	Africa	68
	East Asia and the Pacific	68
	Eastern Europe and Central Asia	76
	Latin America and the Caribbean	96
	Middle East and North Africa	2
	South Asia	52
	Total	362
Legal Status	Bank	79
	Credit Union / Cooperative	3
	NBFI	225
	Rural Bank	55

2.4. Descriptive Evidence on State of Competition

The measure that we intend to capture extent of competition is a constructed measure. Now the question is whether the results resemble reality. The average Lerner index is 0.58 although there is variation across regions and over time. The market power MFIs

hold seems reasonably high compared to, say, banks where average Lerner indices are significantly lower (see for example, Kotter and Vins 2008 that report average Lerner index of 0.23). The results also suggest, as shown in Figure 1, that there is a decline in Lerner index of market power over time, especially over the period 2002-2007. There is a slight increase in 2008 followed by a sharp rise in 2009. The latter is due to small number of observation. Overall, there appears an increase in competition over time.

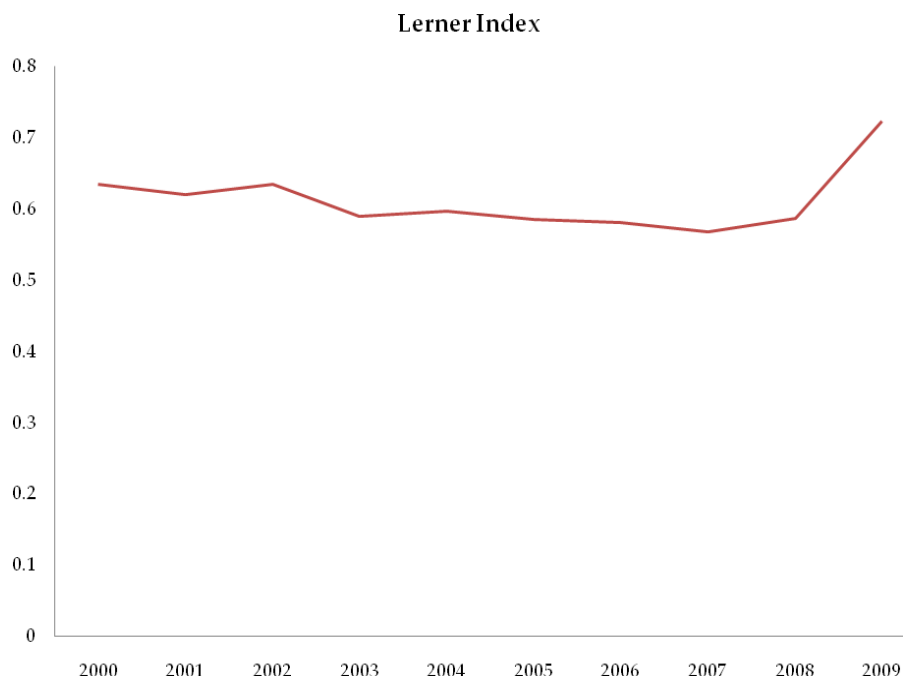Figure 1. Evolution of Lerner index over time.

The level of competition among MFIs varies across regions (see Table 3). The South Asian region, which is home for microfinance pioneers, appears to have a highly competitive microfinance market as reflected by lower average Lerner index. Higher values of Lerner index is observed in Latin America and the Caribbean as well as Middle East and North Africa regions.

Table 3. Summary of Lerner index by region

Region	Obs.	Mean	Median	SD	Max.	Min.
Africa	220	0.5770	0.5968	0.1282	0.9304	0.0783
East Asia & the Pacific	241	0.5684	0.5875	0.0950	0.7257	0.0478
Eastern Europe & Central Asia	264	0.6075	0.6171	0.1074	0.8113	0.0682
Latin America & The Caribbean	349	0.6179	0.6306	0.0857	0.8304	0.1402
Middle East & North Africa	7	0.6220	0.6256	0.0165	0.6381	0.5899
South Asia	166	0.4925	0.5054	0.1328	0.7633	0.0343
Total	1247	0.5823	0.6009	0.1143	0.9304	0.0343

3. Effects of Competition

3.1. Data and Empirical Approach

Estimating Equation

We estimate a linear regression model where the outcome measures discussed above are regressed on competition and other explanatory variables.

The estimation equation takes the form:

$$y_{i,jt} = x_{it}\alpha + z_{jt}\beta + \gamma L_{i,jt} + \eta_i + \varepsilon_{it} \qquad (4)$$

where y is a measure of performance of MFI i at year t, located in country j and L is Lerner index which is our measure of competition. x_{it} and z_{jt} are vectors of MFI characteristics and country characteristics, respectively, that influence performance. An expanded representation of the variables follows below. It is a panel data equation and is estimated by including MFI specific effects. We apply a Hausman test to compare between fixed and random effects estimates. Trend is included in the regression since it would be unreasonable to assume the relation between competition and MFIs performance is constant over time.

Dependent Variables

As discussed in section 2.1, we are interested in measuring the effect of competition on outreach, efficiency, loan repayment and financial performance. These are microfinance level data and all are obtained from the MIX.

O*utreach* is a widely used measure of performance, which is used to gauge growth in financial inclusion. For a measure of wider outreach, i.e. growth in number of clients, *number of active borrowers* is used as a proxy. In addition, *loan size* (average loan balance per borrower) and share of *woman borrowers* are included in the analysis. The first indicator measures the breadth of outreach, i.e. numbers of clients MFIs are providing financial services to while the last two measures are proxy for depth in outreach, i.e. how poor the clients are (Olivares-Polanco, 2005; Ahlin *et al.*, 2010; Cull *et al.*, 2009b; Hermes *et al.*, 2009).

The second group of performance measure is ***efficiency***. The most commonly used and best indicator of overall efficiency of a lending institution is *operating expenses ratio (OER)*, which is the ratio of operating expenses to average gross loan portfolio. In addition, we select a measure of efficiency that captures average cost of maintaining an active borrower (*cost per borrower-CPB*).

Loan repayment is another dimension of performance that is taken into account. It includes *portfolio at risk* greater than 30 days (PAR30), 90 days (PAR90) and *write-offs ratio (WOR)*. The first two show the portion of portfolio that is overdue and at risk of not being repaid. The older the delinquency the less likely the loan will be repaid. The last measure indicates loans that can no longer be repaid or defaults. These are measures that help us assess loan repayment performance of clients and portfolio quality of MFIs.

The last group of performance measures are labelled ***profitability***, which includes *return on assets (ROA)*, *profit margin* and financial sustainability of MFIs measured by *operational self sufficiency (OSS)*.

Explanatory Variables

The variable of interest is competition which is measured by Lerner indices constructed in the previous section. Additional control variables at MFI and country level are included in the estimation. The MFI level variables are *age* (number of years since establishment) and *size*, measured by total assets. In addition, *real yield* is included as a control variable. It is real portfolio yield of MFIs, which measures average interest charges that customers face and is found to positively relate to performance measures of MFIs (Cull *et al.*, 2009b).

The country level control variables are mainly macroeconomic variables that the microfinance literature identifies as possible determinants of performance of MFIs. These include general structural variables such as *real GDP growth*, *inflation*, *industry value added* to GDP, share of *rural population* as well as *rural population growth*. In addition, we control for quality of *institutions* and level of *financial development*. Measures of quality of institutions are control of corruption, political stability, regulatory quality and rule of law. As a measure of the level of (formal) financial sector development, two proxies namely, *private credit* to GDP ratio and *net interest margin* are used.

An elaborated discussion on the possible effect of these macroeconomic variables can be found in Ahlin *et al.* (2010). But briefly, high economic growth may result in expansion of MFIs services as it may increase the demand and profitable expansion opportunities for MFI clients. On the other hand, high growth may also negatively influence MFIs performance as it can raise households' incomes to the level that they are willing and able to take part in formal financial services. Inflation is also argued to influence performance since it may lower real returns to MFIs, increase default rates and lending costs. Manufacturing value added captures the existence of a potentially alternate route to development that is associated with wage labor opportunity in the economy, which may be complementary to micro-financed activities. Percentage of rural population, on the other hand, captures MFIs preference to locate themselves in densely populated urban areas in an attempt to reduce their operating costs. There also is evidence that

suggest MFIs perform better in economies with better institutional quality. Financial development of a country is also shown to contribute positively to MFIs efficiency (Hermes *et al.*, 2009).

Data on institutional quality is obtained from Worldwide Governance Indicators (WGI), also known as Kaufman governance indicators. Information on the remaining macroeconomic indicators come from Wold Development Indicators (WDI) of the World dataBank, a free online data portal of the World Bank. Combining micro and macro variables results in loss of observations since data on both levels and in all times do not overlap. Tables 5 and Table 6 provide descriptive statistics of the dependent and explanatory variables, respectively. Table 7 presents correlation coefficients of the explanatory variables.

3.3. Preliminary Analysis

Before proceeding into a detailed econometric investigation, we perform a preliminary statistical analysis (percentile analysis) to spot any significant difference in performance (outcomes) between MFIs that operate in different competitive markets. The sample is split into two sub-samples by using the value of sample median Lerner index as the dividing line. Those MIFs above the sample median are categorised as operating in less competitive market and those below the sample median in highly competitive microfinance market.

Some suggestive results emerge from mean and variance equality tests of the performance measures for the two groups. A similar test is performed for some explanatory variables. See Table 8 for the results. Although we report the mean equality test results, the variance equality tests do not deliver different results that would change the overall picture.

In almost all performance indicators, there appears a significant difference among MFIs that operate in high and low competitive environment. The only variable that was not significant was write-off ratio, which, however, turns out to be significant with variance

equality test. Generally, MFIs that operate in relatively high competitive markets tend to have lower outreach in terms of loan size, which indicates increased focus on poor borrowers in the presence of competition. On the other hand, outreach in terms of number of active borrowers and number of women borrowers is higher among MFIs in highly competitive environment. Operating expenses are higher among MFIs in a highly competitive market while profitability is lower.

This initial analysis indicates there is a significant difference in performance of MFIs that operate in different competitive markets. It also points to some direction where MFIs that face intense competition seems to have lower values in most of the outcome measures. We will assess if the association stand out in the econometric investigations.

The results for the explanatory variables are rather mixed. MFIs in high competitive markets tend to be relatively younger, smaller in size and charge lower interest rates. The difference is statistically significant. Differences in some country characteristics, such as share of rural population, also appear significant while differences in other country characteristics are marginally significant or insignificant.

4. Empirical Results

Univariate Results

Prior to estimating the full model with control variables (Equation 4), a univariate model is estimated, where we regress the outcome variables on Lerner index alone. Although it is not reasonable to assume performance of MFIs is influenced by competition alone, this analysis gives an indication of the robustness of the effect of competition to the inclusion of additional explanatory variables. The estimation is performed in a panel setting with MFI specific and time effects. The results are reported in Tables 9a and 9b. A reminder in interpreting the estimated coefficients is that there is an inverse relation between competition and our proxy for it (i.e., Lerner index). A rise in competitive behaviour is characterised by falling Lerner index and vice versa.

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All performance measures are statistically significant except the number of women borrowers and loan repayment measures. The effect of competition on outreach appears mixed. A rise in competition is associated with small loan size, which implies MFIs increased depth of outreach. Small loan size is considered as a proxy for the poverty level of clients and an increase depth of outreach. Some authors have used average loan size as a ratio of GDP per capita. We have also used this alternative measure in the univariate as well as the multivariate analyses but the results were not significant. The effect of competition on other outreach variables is negative where an increase in competition is related with a fall in overall outreach and share of women borrowers.

Competition is also related to deteriorating repayment performance and rising default rates. Similarly, MFIs register lower financial performance and lower efficiency as competition exacerbates. In the remaining part of Section 4, we have presented the results with additional control variables. But it is important to note the effects observed in the univariate analysis are remarkably similar to the results of the full model. It is also interesting to see competition alone explains as large variation in performance (especially profitability) as additional control variables.

Multivariate Results

Tables 10a and 10b present results for the full model. The first reports the estimation results for outreach and loan repayment. Results for efficiency and profitability appear in the latter. We have included various micro- and macro-institutional control variables based on the existing literature. Many of these variables turn out to be in line with previous works. To mention few, in line with Ahlin *et al*. (2010) and Cull *et al*. (2009b) young MFIs, compared with older ones, appear to fare better in depth of outreach (measured by average loan size) but fare worse in terms of reaching out to more clients (number of active borrowers) and embracing more women borrowers in their pool of clients. Similarly, our results suggest big institutions tend to have higher outreach although the outreach is more focused on relatively rich clients, as reflected in negative

association of size MFIs with share of women borrowers and positive association with average loan size. Similar results are also documented by the macroeconomic control variables.

Turning to the effect we are interested in investigating, the Lerner index enters significantly in most of the estimations. There emerges a negative effect of increased competition. Detailed discussion follows below.

Outreach

The first three columns of Table 10a display results for outreach as measured by number of active borrowers (wider outreach), percentage of women borrowers and average loan size. In the previous section, our hypothesis set out inconclusive effect of rising competition on outreach by putting forward an argument for possible positive and negative effects. The empirical results also appear inconclusive: while two of the measures show a fall in outreach while the remaining one indicates a rise in outreach. The measures that are negatively related with intense competition are wider outreach (number of active borrowers) and share of women borrowers. Intense competition, on the other hand, is associated with small average loan size that indicates a focus on poor clients and depth in outreach. Only one of the three measures (wider outreach) is statistically significant, though.

MFIs appear to respond to intense competition by lowering the extent of outreach, depth of outreach shows mixed result though. This is an interesting result given the continuing trend of increasingly varied players in the microfinance market, all with the purpose of providing affordable financial services to the poor thereby increasing outreach. However, the competitive interaction that comes along appears to result otherwise.

Loan Repayment

Loans are MFIs' largest assets and the largest source of risk resides in their loan portfolio. Therefore, maintaining better portfolio quality will mostly depend on clients'

repayment performance. Increased competition and the associated deterioration in lending standards by MFIs to grab largest market share is a growing concern and microfinance experts have expressed their frustration over the upward trend in defaults and over-indebtedness.[8]

Our results show a rise in loan delinquency and default rates as competition bounds. To recall, we have three measures of repayment performance. The first two (PAR 30 and PAR 90) captures the ratio of loan, from the total loan portfolio that is over-due and at a risk of not being paid. Both indicators enter with the hypothesized signs while only PAR 90 is statistically significant. The other indicator is write-off ratio, which measures the ratio loans from the total outstanding loan that is considered uncollectable. The effect of intense competition on write-off ratio is positive and significant, meaning rising competition leads to higher default rates. Overall, we can say there is decline in loan repayment performance and worsening in loan portfolio quality as a result of intense competition among MFIs.

Thus far, the story is from MFIs perspective. The other side of the story is wellbeing of borrowers. Client protection, even in the microfinance market, has reemerged as a burning issue after the recent financial crisis.[9] Rising level of non-performing loans and defaults, as a consequence of increased competition, imply rising level of household debt among MFI clients that has a direct consequence on their economic and social wellbeing. Although anecdotal, a story from India adds to this proposition. A borrower from rural India was faced with a problem of over-indebtedness and later with bankruptcy. As a result the borrower attempted suicide, which compels the local religious (and political) leaders to turn against microfinance loans and disrupt activities of MFIs briefly (Srinivasan, 2009).

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[8] Rosenberg, R. (2010). Perplexed about Over-indebtedness: Part 1. CGAP Microfinance Blog, April 28, 2010 – (microfinance.cgap.org/2010/04/08/perplexed-about-over-indebtedness-part-1)

[9] Morduch, J. (2010). Consumer Protection: When to Protect, and How. CGAP Microfinance Blog, April 20, 2010 – (microfinance.cgap.org/2010/04/20/consumer-protection-when-to-protect-and-how/)

Efficiency and Financial Performance

The relationship between competition and efficiency is interesting and old one. It is explored widely in other markets with two notable and competing hypotheses. The first is the "quite life hypothesis" which states firms with market power may use the power to allow for inefficient resource allocation than extracting rents from consumers, thereby enjoying a "quite life". The other hypothesis is the "efficient structure hypothesis" that argues firms with higher efficiency have lower costs and higher profits. This, in turn, may help them gain larger market shares, which leads to higher concentration. This work does not delve into unfolding any causation between efficiency and competition. However, our analysis shows increased competition among MFIs is associated with a decline in efficiency (first two columns of Table 10b). Operating expenses ratio and the cost per borrower are positively related with Lerner index and both measures of efficiency are highly significant. Further, we find evidence that provides support for our hypothesis with regard to profitability (see the last three columns of Table 10b). All indicators of financial performance are positively related with Lerner index suggesting rising competition (inverse of the index) depresses profits.

In summary, our empirical results by and large point towards adverse effects of increased competition as competition appears to be negatively related with outreach, loan repayment, efficiency and profitability.[10] Table 11 below summarises the above discussion.

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[10] The results do not appear to be context dependent. We test for differential effect of competition, i.e. whether competition affects MFIs differently depending on different institutional or country characteristics. These characteristics include age and size of MFIs, state of regulation and geographical region. However, we do not find supporting evidence for the differential effect of competition.

Table 11. Summary of the results

Effect of increased competition on		Expected sign	
		-/+	+/-
Outreach			
	Active borrowers*	-	
	Percentage of women	-	
	Loan size	-	
Repayment		-	-
	Par30	+	
	Par90*	+	
	Write-off ratio*	+	
Efficiency		-	+/-
	Operating expenses ratio*	+	
	Cost per borrower*	+	
Profitability		-	-
	OSS*	-	
	ROA*	-	
	Profit margin*	-	

* shows variables are statistically significant. Refer to Tables 10a & 10b for the level of significance

Note: the + and - signs are not of the signs the estimated coefficients. They indicate the direction of the effect of increased competition.

5. Conclusion

Given significantly large numbers of people in developing countries are financially excluded and the relative success of MFIs in promoting access to finance for the poor, it is not surprising to see MFIs get the attention they are enjoying. With the growth of the microfinance sector and increasingly varied players comes intense competition, which the effects on MFIs outcomes are not clear. In this paper, we take the first approach in measuring competition in a standard way. Interestingly, the measure that we applied (the Lerner index measure of market power) shows indeed competition is growing in the microfinance market. As a next step, a critical question is addressed, namely what is the effect of increased competition.

We consider important dimensions of MFIs' performance. These are outreach, loan repayment, efficiency and profitability. The results document strong negative effects of competition on performance of MFIs, after controlling for various macroeconomic and MFI factors. We show competition is negatively related with outreach while it is

associated with rising default rates. Furthermore, declining efficiency and deteriorating financial performance is shown to be associated with intense competition.

The results might appear rather gloomy for microfinance enthusiast, anyone for that matter, who would like to see the sector grow and bring all the positive benefits along. What could be done? This calls for measures that do not put a halt on the growth of the sector rather ensure the (negative) competitive effects are minimized. This may include designing ways that makes sure MFIs do not compromise lower lending standards for increased market share. At the same time, designing ways that promote information sharing between MFIs, so that a borrower that default on one MFI loan could not turn to another MFI in the neighbourhood and granted a loan, can contribute to lower delinquency as well as better borrowers' welfare. In addition, promoting financial literacy among clients may help them in their borrowing decisions, which in turn may limit multiple loan-taking. Finally, as we show in the results, increased competition is negatively associated with efficiency of MFIs. Innovative ways among MFIs that could enhance efficient service provision may also help in ensuring benefits from the growth in the microfinance market.

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Appendix

Table 4. Variables Description and Sources

	Variable	Description	Source
Microfinance Institutions Data	Age	Age of MFIs in years. Age at year t is t-year of establishment.	the MIX, own calculation
	Size	Total of all net asset accounts	the MIX
	Real yield	Interest and fees on loan portfolio/loan portfolio adjusted for inflation	the MIX
	Active borrowers	The number borrowers who currently have an outstanding loan balance or are primarily responsible for repaying any portion of the loan portfolio	the MIX
	Share of women	Ratio of number of women borrowers to number of active borrowers	the MIX
	Loan size	Average loan size in USD	the MIX
	Operating Expenses ratio (OER)	The ratio of operating expenses to gross loan portfolio	
	Cost per borrower (CPB)	The ratio of operating expense to number of active borrowers	the MIX
	Portfolio at risk > 30 (PAR30)	The ratio of portfolio at risk > 30 days to gross loan portfolio	the MIX
	Portfolio at risk > 90 (PAR90)	The ratio of portfolio at risk > 90 days to gross loan portfolio	the MIX
	Write-off ratio (WOR)	The share of total amount of loans that are written-off from the gross loan portfolio	the MIX
	Operational self sufficiency (OSS)	The ratio of financial revenue to financial expenses, loan provision expenses and operating expenses	the MIX
	ROA	Net operating income, less taxes / assets	the MIX
	Profit margin	Net operating income/ financial revenue	the MIX
	Lerner Index	The difference in price and marginal cost scaled by price	Own calculation
Data	GDP growth	Real GDP per capita growth	WDI
	Inflation	Inflation rate, GDP deflator	WDI

Industry	Industry value added as percentage of GDP	WDI				
Rural pop.	Share of rural population (percentage)	WDI				
Rural pop. growth	Growth in rural population	WDI				
Pr. Credit/GDP	Private credit by deposit money banks and other financial institutions as a share of GDP	WDI				
Spread	Net interest margin	WDI				
Quality of Institutions	Aggregate governance indicators of control of corruption, political stability and absence of violence, regulatory quality and rule of law	WGI				

the MIX- the Microfinance Information Exchange (www.mixmarket.org)

WDI- World Development Indicators (WDI Online)

WGI- Worldwide Governance Indicators (WGI)

Table 5. Descriptive Statistics of Dependent Variables

	Variable	N	Mean	S.D.	Max.	Min.
	Active borrowers (in thousands)	1236	92.2	403.47	6210	0
Outreach	% of women	1043	0.597	0.255	1.00	0
	Loan size (in thousands USD)	943	0.659	0.919	10.15	0.036
Efficiency	OER	1189	0.172	0.123	0.919	0.008
	CPB (in USD)	1134	192.28	191.76	1302	1.00
	PAR30	1205	0.054	0.070	0.764	0
Repayment	PAR90	1223	0.036	0.056	0.590	0
	WOR	1144	0.016	0.032	0.350	-0.001
	OSS	1247	1.187	0.321	5.219	0.398
Profitability	ROA	1189	0.022	0.069	0.600	-0.554
	Profit margin	1247	0.100	0.253	0.724	-1.511

Table 6. Descriptive Statistics of Explanatory Variables

	N	Mean	S.D.	Max.	Min.
Age (in years)	1247	11.5	11.15	52	0
Size (in million USD)	1247	85.4	311	5,500	0.057
Real yield	1185	0.264	0.191	1.824	-0.157
GDP growth	1241	5.26	3.72	33	-9
Inflation	1241	9.13	6.22	45	-2
Industry value added	1194	15.87	6.37	44	0
Rural pop.	1241	52.57	21.32	90	7
Rural pop. growth	1241	0.53	1.09	4	-5
Pr. Credit/GDP	1178	29.50	17.88	164	3
Spread	972	9.729	6.526	54	2
Control of corruption	1242	-0.627	0.355	1.4	-1.6
Political stability	1238	-0.802	0.626	0.9	-2.6
Regulatory quality	1238	-0.308	0.438	1.6	-1.7
Rule of Law	1242	-0.646	0.391	1.2	-2.1
Lerner	1247	0.582	0.114	0.930	0.034

Table 7. Correlation Coefficient Matrix of Explanatory Variables

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]
[1] Age	1.0000														
[2] Size	0.3172*	1.0000													
[3] Real yield	-0.1207*	-0.0858*	1.0000												
[4] GDP growth	-0.1788*	-0.0134	-0.1124*	1.0000											
[5] Inflation	-0.1176*	0.0233	-0.1692*	0.0374	1.0000										
[6] Industry value added	0.2732*	0.0405	0.1369*	-0.1617*	-0.1936*	1.0000									
[7] Rural pop.	-0.1046*	-0.1005*	-0.2510*	0.0901*	0.0860*	-0.3345*	1.0000								
[8] Rural pop. growth	-0.1074*	-0.1150*	-0.0332	0.0583*	-0.0244	-0.4287*	0.6641*	1.0000							
[9] Pr. Credit/GDP	0.0315	0.0791*	-0.0966*	-0.1154*	-0.0745*	0.0846*	-0.1083*	-0.1682*	1.0000						
[10] Spread	-0.1382*	-0.0506	0.0691*	0.1564*	-0.0187	-0.1365*	0.0009	0.1129*	-0.2865*	1.0000					
[11] Control of corruption	-0.0638*	0.0638*	0.1506*	-0.0769*	-0.2342*	0.0725*	-0.3495*	-0.2100*	0.4483*	-0.0865*	1.0000				
[12] Political stability	-0.1500*	-0.0160	0.2135*	0.1384*	0.0275	0.0761*	-0.3225*	-0.2114*	0.1312*	0.1907*	0.3053*	1.0000			
[13] Regulatory quality	0.0892*	0.0571*	0.3324*	-0.0354	-0.4111*	0.3032*	-0.4555*	-0.2180*	0.2742*	-0.0189	0.6637*	0.3602*	1.0000		
[14] Rule of Law	0.0649*	0.0182	0.0004	0.0098	-0.2323*	0.0563	-0.1128*	-0.0732*	0.5482*	-0.3037*	0.7599*	0.2271*	0.5787*	1.0000	
[15] Lerner	0.1361*	0.0469	0.0996*	0.0543	0.0413	0.0251	-0.1819*	-0.1142*	-0.0578*	0.1789*	0.0774*	0.1631*	0.0993*	-0.0674*	1.0000

* indicates significance at 5% level.

Table 8. Mean Equality Test

	Dependent				Explanatory		
	High competition	Low Competition	Difference		High Competition	Low competition	Difference
Active borrowers	167,121	77,738	89,383***	Age	7.3	12.3	-5.0***
% of women	0.66	0.58	0.08***	Size	35.6m	95m	-59.4m***
Loan size	310.80	736.18	-425.37***	Real yield	0.23	0.27	-0.04***
OER	0.213	0.165	0.047***	GDP growth	5.1	5.3	-0.2
CPB	152.46	199.45	-46.99***	Inflation	8.47	9.25	-0.78*
PAR30	0.068	0.052	0.016***	Industry	15.39	15.96	-0.57
PAR90	0.051	0.033	0.017***	Rural pop.	61.8	50.8	11.0***
WOR	0.017	0.016	0.001	Rural pop. growth	0.86	0.47	0.39***
OSS	0.87	1.25	-0.38***	Pr. Credit/GDP	30.48	28.54	1.94*
ROA	-0.06	0.04	-0.10***	Spread	8.00	9.99	-1.99***
Profit margin	-0.247	0.167	-0.414***				

*, **, *** indicate the difference is significant at 10%, 5% and 1% level, respectively.

Table 9a. Univariate Results on Outreach and Loan Repayment

	Active borrowers[a]	Share of women	Loan size[a]	PAR30	PAR90	WOR
Lerner	**1.518***	-0.035	**0.666***	-0.0088	-0.0154	0.0016
	(0.249)	(0.048)	**(0.168)**	(0.0251)	(0.0200)	(0.0096)
Trend	0.012***	-0.0005***	0.0086***	-0.0003***	-0.0002***	-8.33e-06
	(0.0008)	(0.0002)	(0.00056)	(8.17e-05)	(6.47e-05)	(1.58e-05)
Constant	7.418***	0.677***	4.582***	0.0908***	0.0672***	0.0171***
	(0.165)	(0.0318)	(0.109)	(0.0166)	(0.0132)	(0.0063)
R-squared	0.25	0.02	0.29	0.012	0.011	0.001
Hausman test	0.000	0.000	0.000	0.000	0.000	0.737
Observations	1234	1043	943	1205	1223	1144
No. of MFIs	361	332	284	357	357	349

[a] Logarithm of the variable is included in the estimations; robust standard errors in parentheses;
***, **, *- significant at 1%, 5% and 10%, respectively.

Table 9b. Univariate Results of Efficiency and Profitability

	OER	CPB[a]	OSS	ROA	Profit margin
Lerner	**-0.229***	**-0.745***	**2.010***	**0.515***	**1.971***
	(0.0205)	**(0.142)**	**(0.0656)**	**(0.0168)**	**(0.0350)**
Trend	-0.0006***	0.0046***	0.000322***	-8.94e-05	0.000145**
	(6.69e-05)	(0.00047)	(0.000111)	(5.48e-05)	(6.86e-05)
Constant	0.376***	4.573***	-0.0189	-0.268***	-1.067***
	(0.0137)	(0.0963)	(0.0435)	(0.0112)	(0.0239)
R-squared	0.21	0.13	0.39	0.53	0.72
Hausman test	0.000	0.000	0.1104	0.000	0.545
Observations	1189	1134	1247	1189	1247
No. of MFIs	352	332	362	352	362

[a] Logarithm of the variable is included in the estimations; robust standard errors in parentheses;
***, **, *- significant at 1%, 5% and 10%, respectively.

Table 10a. Estimation results- Effect of competition on outreach and loan repayment

	Active borrowers[a]	Share of women	Loan size[a]	PAR30	PAR90	WOR
age[a]	0.556***	0.00162	-0.225*	0.0222*	0.0315***	0.0182***
	(0.118)	(0.0404)	(0.115)	(0.0126)	(0.00981)	(0.00549)
age^2	-0.0681	0.0156	-0.00281	-0.00262	-0.00450*	-0.0041***
	(0.0589)	(0.0207)	(0.0550)	(0.00318)	(0.00248)	(0.00136)
Total assets[a]	0.644***	-0.0283*	0.298***	-0.0079***	-0.0077***	0.000993
	(0.0422)	(0.0156)	(0.0406)	(0.00222)	(0.00175)	(0.000872)
Real yield	0.551***	-0.00305	-0.662***	0.0247	-0.00609	0.0615***
	(0.149)	(0.0531)	(0.130)	(0.0178)	(0.0141)	(0.00771)
Growth	0.000425	0.00126	-0.00131	-0.0026***	-0.0018***	-0.000229
	(0.00404)	(0.00148)	(0.00382)	(0.000649)	(0.000511)	(0.000326)
Inflation[a]	0.00886	0.00489	-0.00463	-0.00387	-0.00300	0.000717
	(0.0266)	(0.00962)	(0.0243)	(0.00414)	(0.00324)	(0.00203)
Industry	0.0148*	0.00820**	-0.0127	0.000504	0.000503	0.000116
	(0.00895)	(0.00404)	(0.0113)	(0.000650)	(0.000514)	(0.000255)
Rural pop. share	-0.000785	0.00733	-0.0516**	-0.0005*	-0.0005**	-8.67e-05
	(0.0228)	(0.00906)	(0.0205)	(0.00027)	(0.00022)	(0.000103)
Rural pop. Growth	0.0570	0.00812	-0.0449	0.00774*	0.00567	0.00347*
	(0.0556)	(0.0197)	(0.0612)	(0.00471)	(0.00370)	(0.00185)
Private credit/GDP	-0.00690**	0.00182	0.0167***	0.000140	-1.28e-05	0.000138
	(0.00330)	(0.00123)	(0.00373)	(0.000259)	(0.000204)	(0.000102)
spread	0.00584	-0.00205	0.00278	0.000372	0.000390	0.000370
	(0.00528)	(0.00186)	(0.00561)	(0.000567)	(0.000440)	(0.000245)
Control of corruption	0.0238	-0.0773*	-0.238**	-0.0304**	-0.0262**	0.00896
	(0.111)	(0.0418)	(0.103)	(0.0149)	(0.0114)	(0.00706)
Political stability	-0.0502	0.0255	0.165**	-0.0277***	-0.0239***	-0.000142
	(0.0731)	(0.0275)	(0.0690)	(0.00681)	(0.00536)	(0.00280)
Regulatory quality	0.0168	-0.0549	-0.0786	-0.00371	-0.00611	0.000893
	(0.0951)	(0.0353)	(0.0950)	(0.0114)	(0.00896)	(0.00501)
Rule of law	-0.0655	-0.0236	0.0779	0.0499***	0.0452***	-0.00722
	(0.148)	(0.0550)	(0.143)	(0.0183)	(0.0142)	(0.00835)
trend	-0.00190**	-0.000535	0.00140*	6.35e-05	3.75e-05	-2.03e-05
	(0.000916)	(0.000344)	(0.000833)	(4.62e-05)	(3.63e-05)	(1.89e-05)
Lerner	*0.352**	0.0310	0.263	-0.0311	*-0.0485***	*-0.037****
	(0.191)	(0.0682)	(0.177)	(0.0263)	*(0.0209)*	*(0.0122)*
Constant	-2.12	0.390	4.13***	0.190***	0.176***	-0.0134
	(1.35)	(0.535)	(1.29)	(0.0487)	(0.0384)	(0.0204)
R-squared	0.674	0.073	0.570	0.16	0.20	0.19
Hausman test[*p*-value]	0.0000	0.0000	0.0010	0.4604	0.3912	0.2508
Observations	827	685	631	801	819	804
No. of MFIs	275	239	217	273	272	276

[a] Logarithm of the variable is included in the estimations; robust standard errors in parentheses; ***, **, *- significant at 1%, 5% and 10%, respectively.

Table 10b. Estimation results- Effect of competition on efficiency and profitability

	OER	CPB[a]	OSS	ROA	Profit margin
age[a]	-0.0230*	-0.378***	-0.165***	0.0190	0.102***
	(0.0139)	(0.0996)	(0.0445)	(0.0145)	(0.0348)
age^2	0.0237***	0.106**	0.0358***	-0.0143**	-0.0815***
	(0.00697)	(0.0489)	(0.0113)	(0.00728)	(0.0175)
Total assets[a]	-0.0367***	0.0931***	-0.00127	0.00283	0.0376***
	(0.00505)	(0.0350)	(0.00798)	(0.00527)	(0.0127)
Real yield	0.244***	0.379***	-0.178***	-0.0244	-0.0210
	(0.0178)	(0.122)	(0.0643)	(0.0185)	(0.0446)
Growth	-0.00104**	-0.00939***	0.00389*	0.00104**	0.00442***
	(0.000483)	(0.00338)	(0.00232)	(0.000505)	(0.00121)
Inflation[a]	0.00357	-0.0267	0.0153	0.00222	0.00953
	(0.00317)	(0.0216)	(0.0148)	(0.00331)	(0.00796)
Industry	0.00117	-0.0160**	0.000747	7.74e-05	0.00320
	(0.00107)	(0.00732)	(0.00235)	(0.00112)	(0.00269)
Rural pop. share	-0.00697***	-0.0747***	0.00246**	-0.00076	0.00848
	(0.00268)	(0.0187)	(0.000990)	(0.00280)	(0.00674)
Rural pop. (growth)	0.00209	-0.0436	0.00252	0.00206	-0.0430**
	(0.00665)	(0.0449)	(0.0170)	(0.00695)	(0.0167)
Private credit/GDP	3.35e-05	0.00765***	-1.31e-05	1.29e-05	0.000938
	(0.000394)	(0.00278)	(0.000940)	(0.000411)	(0.000989)
spread	-0.000362	-0.0109**	2.40e-06	-0.000319	0.000716
	(0.000631)	(0.00510)	(0.00202)	(0.000659)	(0.00159)
Control of corruption	-0.0173	-0.120	-0.0842	-0.0114	-0.0575*
	(0.0132)	(0.0906)	(0.0520)	(0.0138)	(0.0332)
Political stability	-0.00839	-0.00113	-0.0339	-0.00848	-0.00276
	(0.00868)	(0.0600)	(0.0245)	(0.00906)	(0.0218)
Regulatory quality	0.0265**	0.0864	0.0183	-0.00956	-0.0381
	(0.0113)	(0.0778)	(0.0408)	(0.0118)	(0.0284)
Rule of law	-0.0301*	0.144	0.00713	-0.000300	0.0154
	(0.0176)	(0.120)	(0.0646)	(0.0184)	(0.0443)
trend	-0.000138	0.000747	0.000591***	3.04e-05	0.000549**
	(0.000108)	(0.000752)	(0.000167)	(0.000112)	(0.000270)
Lerner	***-0.267****	***-1.065****	***2.281****	***0.617****	***2.113****
	(0.0228)	***(0.155)***	***(0.0948)***	***(0.0238)***	***(0.0574)***
Constant	1.110***	7.987***	0.249	0.340**	-2.18***
	(0.159)	(1.112)	(0.176)	(0.166)	(0.398)
R-squared	0.48	0.33	0.36	0.57	0.74
Hausman test[p-value]	0.0000	0.0000	0.2537	0.0427	0.5890
Observations	832	799	833	832	833
No. of MFIs	276	264	276	276	276

[a] Logarithm of the variable is included in the estimations; robust standard errors in parentheses;
***, **, *- significant at 1%, 5% and 10%, respectively.