Competition and Performance of Microfinance Institutions

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Abstract

This paper examines the relationship between competition and the performance of microfinance institutions (MFIs). We measure competition by constructing a Lerner index. Next, we assess the association between increased competition among MFIs on the one hand and outreach, loan repayment, efficiency and financial performance on the other. The empirical investigation is based on data from 362 MFIs in 73 countries for the period 1995-2009. Based on our measure of competition we do find a general trend of increased competition in microfinance during the last decade. Our econometric analysis provides evidence that competition among MFIs is negatively associated with various measures of performance.

JEL Codes: G21, L1, O16

Keywords: Microfinance Institutions, Competition, Financial Intermediation

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1. Introduction

During the last three decades, microfinance has captured the interest of both academics and policy makers. The industry has been growing at a significant rate and in several countries it has become an important sub-sector of the formal financial markets. Especially during the past few years the growth of microfinance has been unprecedented: during 2006-2008 annual growth rates amounted to 70-100 percent for a number of countries (Sinah, 2010). The number of microfinance service providers has also increased considerably. With the growth of the industry and the saturation of markets, increased competition has been documented in many countries (Porteous, 2006). These recent developments do raise the question what impact increased competition has on the financial and social performance of microfinance institutions (MFIs). Research on this issue is important, especially because many countries have started integrating microfinance into their poverty alleviation strategy. Understanding the effects of competition can guide the design of policies which ensure benefits for the poor as much as possible.

The literature on the consequences of increased competition for financial institutions is ambiguous. On the one hand, it has been pointed out that a competitive environment may contribute to lowering production costs and lower prices of goods and services. Moreover, it may also encourage the development of new products and efficient technologies (Motta, 2004). Similar benefits of competition may be expected with respect to microfinance. On the other hand, however, several authors have pointed

out that competition in the financial/banking sector may have adverse effects, as it may lead to lower borrower selection standards, to weakening of bank-customer relationships and to multiple loan-taking and high defaults (see, e.g. Stiglitz, 2000; Boot, 2002; McIntosh and Wydick, 2005).

Although increased competition has become an important issue for the microfinance industry, studies investigating its impact have remained limited in number. The focus of this paper is to empirically investigate the association between increased competition among MFIs and MFI performance. Specifically, it addresses: (1) whether higher levels of competition are associated with higher/lower outreach in terms of the number of clients served, as well as the poverty level of clients; (2) whether higher levels of competition are associated with higher/lower default rates; and finally (3) whether higher levels of competition are associated with higher/lower levels of efficiency and/or better financial performance.

Our main contributions to the literature on the impact of competition on the performance of MFIs are the following. First, we focus on the association between competition and financial as well as social performance of MFIs. Second, we measure competition for a large set of MFIs located in different countries, using the so-called Lerner index. This index is a measure of the extent to which an institution has market power. Although the Lerner index has been widely used in the banking literature, it has not been applied to microfinance. We perform the analysis using a panel dataset including information for 362 MFIs located in 73 countries for the period 1995-2009. The results of our empirical investigation indicate that MFIs tend to have lower outreach

when faced with more intense competition. We also find that increased competition is associated with lower levels of loan repayment, lower financial performance and lower efficiency.

The remainder of this paper is organized as follows. Section 2 presents an overview of the existing theoretical and empirical literature on the relationship between competition and the performance of MFIs. Section 3 discusses the hypotheses we focus on in the empirical analysis. In section 4 we present the methodology with respect to our measure of competition, while in section 5 we discuss our empirical methodology. The data we use in the analysis are discussed in section 6, after which we show the results of the empirical investigation of the relationship between competition and the performance of MFIs in section 7. Section 8 provides a summary and concluding remarks.

2. Competition and microfinance

In the early years of the development of microfinance, the idea of providing microloans to the poor as a way to alleviate poverty mainly appealed to and attracted social investors and non-government organizations (NGOs). Yet, over the years microfinance has proven to be a successful, and even profitable, model of financial intermediation. This has attracted increasing interest from commercially oriented providers of microfinance, among which are also (international) commercial banks. Profit-oriented MFIs thus have become increasingly important, which according to some observers has also led to a change in focus of microfinance from being socially-oriented "poverty lending" approach – focusing on reducing poverty through providing financial services

and funded mainly by donors, government subsidies and other concessional funds – to an institution-oriented "financial systems" approach – focusing on commercially viable financial intermediation to the poor with an emphasis on institutional financial self-sufficiency (see, e.g., CGAP, 2001; Hulme and Arun, 2009; Cull *et al.*, 2009a). Increased competition among MFIs is one of the outcomes following the increasing role of profit-oriented institutions and the change of status by NGOs from non-profit to profit making (commercialized) institutions.

Before the commercialization of the microfinance business, many MFIs were operating as monopolists (CGAP, 2001; McIntosh *et al*. 2005). In the literature on competition, monopolistic market power has been associated with allocative and technical inefficiencies, leading to welfare losses. Moreover, it does not provide incentives to invest in efficient technology and introduce new products. In contrast, increased competition among MFIs may contribute to well-functioning markets, protection of consumers, promotion of allocative and technical efficiency, and the provision of incentives to develop new products (Motta, 2004). In particular, it may stimulate them to reduce costs and increase the efficiency of their operations by improving the quality of their services in order to retain clients. Moreover, competitive pressure from banks may stimulate MFIs to diversify their financial services to keep clients or attract new ones. In particular, it may stimulate MFIs to offer saving accounts, demand deposits and insurance. Based on these arguments, it may be argued that increased competition in the microfinance business is expected to be beneficial as it results in lower costs and interest rates, improved and new financial product designs

and better customer services. Moreover, with respect to outreach, it is argued that financially sustainable MFIs are better able to cross-subsidize loans to poorer clients. Thus, competition may also support improving outreach.

At the same time, however, one may question whether the above arguments hold in the context of microfinance. One distinctive characteristic of the market for microfinance is that transactions are based on the use of soft-information and strongly depend on tight institution-client relationships. MFIs provide financial services to the poor who are usually not considered creditworthy by traditional banks. These institutions are able to solve problems of information asymmetry and provide loans without collateral requirements. They do so by establishing strong personal relationships with clients as well as by using other forms of collateral, such as group lending, which generates social collateral.

Yet, in the presence of increased competition MFIs may be forced to search for new clientele and/or sustain or increase market shares. At the same time, the increased focus on cost efficiency may reduce efforts to monitor and screen new clients. This may result in reducing the quality of their loan portfolio as they increasingly approve loans to riskier borrowers (Vogelgesang, 2003). Consequently, repayment rates may fall, which ultimately adversely affects efficiency levels. Moreover, increased competition makes it easier for borrowers to take up multiple loans from different MFIs, leading to increasing levels of indebtedness and repayment problems. The phenomenon of clients taking multiple loans due to increased competition has been described in the literature by, among others, Vogelgesang (2003) and McIntosh et al. (2005a and 2005b). Again,

reduced repayment rates lead to decreased financial performance, having adverse consequences for the efficiency of MFIs. The pressure on reducing costs may also lead to a reduced focus on outreach, since providing small loans to poorer clients is generally more expensive than providing loans to better off clients.

As the above discussion makes clear, in theory the impact of competition on the social and financial performance of MFIs may be either positive or negative. As the outcome is not clear, this calls for an empirical investigation. Surprisingly, however, only very few studies have examined the impact of competition on the performance of MFIs. Some of them are descriptive, some use more thorough econometric techniques; some look at impact directly, some take an indirect approach; some studies use country- or region-specific data, some use multi-country data; most studies look at one aspect of performance, only few take a broader perspective; and they all use different (and sometimes rather *ad hoc*) measures of competition.

Cull *et al.* (2009a) merely describe competition in the Latin American microfinance market where the commercial approach to microfinance proceeded swiftly during the past decade. The paper characterizes the market as witnessing rising competition, leading to market saturation in some countries. Olivares-Polanco (2005), using anecdotal and descriptive evidence from CGAP (2001), investigates the effect of competition in the microfinance business. Olivares-Polanco uses a concentration index, measured as the market share held by the four largest MFIs in a country. Higher concentration is considered to be associated with a lower competitive environment. The

analysis mainly focuses on outreach (measured by average loan size) and finds that increased competition results in lower outreach.

Navajas *et al.* (2003) study competition in the Bolivian microfinance market, focusing on two major MFIs, BancoSol and Caja Los Andes and BancoSol, which together cover around 40 percent of the total market. In particular, this study describes the impact of the entry of Caja de Los Andes on BancoSol's performance and behaviour, as well as on the behaviour of BancoSol's clients. The results of their analysis suggest that the impact of competition is ambiguous. On the one hand, it leads to innovation thereby allowing MFIs to expand outreach. On the other hand, however, it reduces the ability of lenders to cross-subsidize less profitable smaller loans.

While the above studies are merely descriptive studies, there are also a few studies that empirically investigate the impact of competition. Vogelgesang (2003) examines how competition affects loan repayment performance of Caja Los Andes. Her measure of competition is the fraction of clients of the bank with concurrent loans from other MFIs. The analysis indicates that competition is related to 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, she argues that for a given level of borrower indebtedness, the probability of timely repayment is high in areas where there is high competition and high supply of microfinance services. Again, therefore, the results remain inconclusive.

McIntosh *et al.* (2005) examine the effects of competition among MFIs in the Ugandan microfinance market, specifically focusing on its impact on borrower

behaviour. In particular, they argue that due to increased competition among MFIs – in combination with non-existing formal processes of information-sharing between lenders about borrowers' credit history – borrowers will take up more loans from different institutions, leading to a worsening of repayment rates and a reduction of savings. The empirical analysis is based on data coming from FINCA (a large microcredit lender, providing mainly group loans), from a questionnaire among clients of lending groups of FINCA, and from a country-wide survey, which includes information on credit demand. Competition is measured at the lending group level in terms of the presence, number and proximity of competitors providing group loans. It is assumed that the higher the number and presence of competitors and the smaller the distance to the nearest MFI, the stronger the competitive environment. The empirical findings of this study provide supportive evidence for the fact that more intense competition leads to multiple borrowing and a decline in repayment rates. Although McIntosh *et al.* do not directly analyse the impact of competition on the performance of MFIs, their study indirectly finds evidence for the potentially negative impact of increased competition on repayment performance of MFIs.

Hermes *et al*. (2009) analyze the impact of formal financial development on microfinance efficiency using data for 435 MFIs over the period 1997-2007. They argue that in a more developed formal financial environment efficiency of MFIs improves due to competitive pressure. At the same time, cost reductions reduce the outreach of MFIs. In their analysis, Hermes *et al.* use various standard measures of financial development,

such as the liquid liabilities to GDP ratio, the interest rate margin and the private credit to GDP ratio. The empirical analysis in the paper provides support for both these effects.

In a related paper, Cull *et al.* (2009b) investigate the performance of MFIs under the pressure of competition from formal banks, measuring competitive pressure by using bank penetration variables such as the number of bank branches per capita and per square kilometre. The dataset they use consists of 342 MFIs located in 38 developing countries. Their results show that MFIs faced with high competition tend to reduce the breadth of outreach but will focus more on the depth of outreach, i.e., more loans to women borrowers and smaller loans. However, the effect on other performance indicators, such as profitability, appears to be weak. Both Hermes *et al.* (2009) and Cull *et al.* (2009b) use country-level measures of competition, rather than measures reflecting competition at the institutional level.

To conclude, the recent interest for the impact of competition on the financial and social performance of MFIs has not been matched by a surge in academic research. The subject remains understudied. Moreover, measures of competition differ between studies and are sometimes rather *ad hoc*, making comparisons of results difficult. This paper adds to the empirical literature on microfinance performance and competition and improves on the measurement of competition by using the so-called Lerner index, a generally accepted measure in the banking literature. Before going into the measurement of competition, we first discuss the hypotheses we test regarding the association between competition and social and financial performance of MFIs.

3. Hypotheses

When discussing the impact of competition, we focus on outreach, loan collection, efficiency and profitability as measures of social and financial performance of MFIs. These are generally accepted outcome measures of MFI performance (Jansson et al. 2003; UNDP, *undated*).

Competition and Outreach

The relationship between competition and outreach of microfinance institutions is ambiguous. On the one hand, a decrease of monopoly rents and market shares associated with increased competition may compel MFIs to expand their market base and explore new markets and (poorer) clients, implying an increase of outreach. On the other hand, however, if increased competition is associated with rising defaults and falling profits (see also below), MFIs may engage in more cautious lending by extending loans only to borrowers they consider safe and cost effective. This may reduce outreach, as lending to new and unexplored markets, as well as lending to poorer clients, is generally considered to be more risky and costly.

Competition and Loan Repayment and Portfolio Quality

Increased competition may trigger an increase in loan supply in case new institutions enter the market. Research has shown that increased loan supply may lead to multiple-loan taking (referred to as "double-dipping" in the literature) by clients, resulting in

heavy debt burdens and low repayment rates (see, e.g., McIntosh and Wydick, 2005 and McIntosh *et al.*, 2005). Moreover, increased competition may also put pressure on MFIs to increase output and lower costs, which may lead them to relax lending and client selection standards and reduce costly monitoring and screening procedures. This in turn may increase default rates. We therefore expect a negative association between increased competition and loan repayment performance and/or loan portfolio quality due to increased default rates. Increased competition and the associated deterioration of lending portfolios of MFIs is a growing concern and some microfinance experts have expressed their frustration regarding the upward trend in defaults and over-indebtedness (Rosenberg, 2010).

Competition and Cost Efficiency

In principle, increased competition puts pressure on MFIs to become cost efficient. With increased competition, MFIs need to find ways of delivering services at lower costs to ensure them a competitive edge. Yet, competition may also lead to higher costs. First, as argued above, competition may result in borrower over-indebtedness, lower repayment performance and increased default rates. Lower levels of repayments and increased default rates add to the costs MFIs' lending activities. Second, with increased competition in the market for microfinance, MFIs may also not only have to compete for clients and market shares, but also for capital and labour inputs. Thus, interest rates at which they borrow money and loan officer salaries may rise, leading to higher costs. To

conclude, the association between intensified competition and cost efficiency is not clear a priory.

Competition and Profitability

Increased competition is expected to be associated with falling profit rates. As MFIs come under competitive pressure, leading to declining market shares and monopoly rents, they are expected to report lower profit rates, to the point where it is no longer attractive for new institutions to enter the microfinance market.

Table 1 provides a summary of the expected associations between competition on the one hand and various measures of social and financial performance of MFIs.

<Insert Table 1 here>

4. Measuring competition

One important contribution of this paper is the measurement of competition. Here, we borrow from the banking literature. Studies on competition in banking have applied a range of measures of competition. Concentration indices, such as the Herfindhal-Hirschman index, are one of the early and frequently used measures of competition, where low concentration is associated with high competition (see, e.g., Olivares-Polanco, 2005). However, the use of this measure is criticized on the ground that first, the relation

between concentration and competition is not straightforward and second, that higher concentration does not always imply a lack of competition (Bikker and Haaf, 2002).

Another measure used frequently is the Panzar-Rosse (PR) measure. The PR measure is an empirical method, measuring the impact of variations in factor input prices on firm-level revenues and uses cross-sectional data to assess competitive behaviour (Bikker and Haaf, 2002). The degree of competition in a market is reflected by an index called the H statistic, which is the sum of input price elasticities of total revenue of firms with respect to their factor input prices. The H statistic represents the degree of competition within an industrial sector, where H=0 implies perfect competition and H=1 refers to a full monopoly situation. The PR measure is also not without limitations, however. Koetter *et al.* (2008) point out that, first the H statistic does not vary over time, making it less relevant to investigate the evolution of competition, and second that it is a measure at the industry level, thus not allowing for the measurement of competition at the individual firm level.

A third and frequently used measure of competition in banking is the Lerner index (see, e.g., 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). This index is a firm-level measure of competition and may vary over time, which is why we prefer this measure over the PR approach. The index measures competition by examining the difference between the output price and the marginal cost of production (scaled by the output price) at the firm level. The Lerner index ranges between 0 and 1. In a perfectly competitive market, where price is equal to marginal cost,

the value of the Lerner index equals 0, whereas in a monopolistic market, where firms can set prices above marginal cost, the index will be close to 1 (Fernández de Guevara *et al.*, 2005).

Applying the Lerner index to microfinance poses a challenge. Especially in the early years of the business, but even today, several MFIs obtain subsidies to financially support their activities. This means that in those cases output prices (i.e. lending rates) may not reflect associated costs. Ideally, the measurement of the individual MFI-level Lerner index should be corrected for the amount of subsidies received. Unfortunately, however, the data we apply, which we take from the *MIX market* (see below), does not contain information on subsidies received. We therefore focus the measurement and analysis of the consequences of competition on commercially oriented MFIs for three main reasons. First, given their profit maximizing behaviour, these MFIs are less likely to depend on subsidies. As a result, their revenues are assumed to be a fairly good reflection of underlying costs. Second, during the last decade commercially oriented MFIs have become increasingly important. This is partly due to the growing movement of many established non-profit MFIs to start operating on a commercial basis. Moreover, several established commercial banks and financial institutions have started a process of scaling-down by moving into the microfinance business. Third, the *MIX market* data set is based on self-reporting, which creates a selection bias in that it mainly provides data for the better established commercially driven MFIs.

Estimating the Lerner index

The Lerner index is defined as:

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

Here, p is the output price and MC total marginal cost. In the banking literature, the output price, which is a measure of average revenue, is generally calculated as the ratio of total operating income (i.e. interest income plus other operating income) to total assets (Maudos and Fernández de Guevara, 2004). The marginal cost is derived from the following standard translog cost function:

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

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

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

Here, C_{it} is the total production cost of MFI i at year t. The explanatory variable y represents output and w_j represents different input prices. All variables are transformed into logs. Applying the cost function in the context of the microfinance business, we follow a specification similar to Hermes *et al.* (2009). Total cost (C) is the

sum of financial and operating costs of MFIs. We use total assets as a measure of output (y).[1] We include two inputs relevant for MFIs, i.e. labour (w_1) and capital (w_2).[2] The cost of labour is calculated as the ratio of personnel expenses to the number of employees. The cost of capital is measured as the ratio of total operating expenses (less personnel expenses) to net fixed assets. Finally, the cost function includes time trend dummy variables to capture the effect of technological change, as well as MFI specific fixed effects to deal with unobserved MFI heterogeneity and associated differences in cost structures between MFIs.

After we have estimated the cost function, marginal cost (MC) is obtained by taking the first derivative of the cost function with respect to $\ln y_{it}$, i.e.:

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

[1] 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.

[2] In the estimation of the cost function, we would have also liked to consider a third input, deposits, and the cost associated with it, i.e. the interest expense by using ratio of financial expenses to total deposits as a proxy. However, since only a limited number of MFIs take deposits, this would substantially reduce our sample.

[3] See the appendix for the derivation of the marginal cost. Data for MFI-level marginal cost are obtained by using MFI-level data for total cost, total output, input variables and the trend variable, in combination with the estimated coefficients from the trans-log cost function (α_1, α_2, γ_js and δ_3). Appendix table 1 provides information on the outcomes of the estimation of the cost function. The estimations have been carried out using fixed effects.

5. Empirical approach

We estimate a linear regression model in which we regress the Lerner index (our measure of competition) and a set of other explanatory variables on several social and financial performance measures. The estimation equation takes the following form:

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

Here, y is a measure of social or financial performance of MFI i at year t, located in country j; L is our measure of competition, the Lerner index; *trend* is a trend dummy variable to take into account that MFI performance may vary over time, for instance due to technological change; x_{it} and z_{jt} are vectors of MFI characteristics and country characteristics, respectively, that may influence MFI-specific social and financial performance. Since our data has a panel structure we use an MFI-specific effect estimator. We apply a Hausman test to compare between fixed and random effects estimates. Based upon the results of the test, the estimations presented below have been carried out using fixed effects.

As discussed above, we look at four dimensions of social and financial performance of MFIs: outreach, loan repayment, cost efficiency and profitability. We use three widely used measures for *outreach* of an MFI (Olivares-Polanco, 2005; Ahlin *et al.*, 2010; Cull *et al.*, 2009b; Hermes *et al.*, 2009). First, we measure the breadth of outreach by the number of active borrowers of an MFI (*NBORROW*). Moreover, loan size, measured

as the average loan balance per borrower (*LOANSIZE*) and the number of women borrowers as a share of all borrowers (*WOMEN*) of an MFI are included in the analysis. The latter two measures are proxies for the depth of outreach, referring to the extent to which an MFI reaches out to poor clients.

We have two commonly used measures of the *cost efficiency* of an MFI, i.e. the operating expenses ratio (*OER*), which is the ratio of operating expenses to average gross loan portfolio and the average cost per borrower (*CPB*).

With respect to the performance in terms of *loan repayment performance and loan portfolio quality* we use three measures: the portfolio at risk greater than 30 days (*PAR30*) and 90 days (*PAR90*), and the write-off ratio (*WOR*). The first two are measures of the share of the loan portfolio of an MFI that is overdue (30 or 90 days) and is at risk of not being repaid. *WOR* measures the share of outstanding loans that is expected not to be repaid.

We measure *profitability* of MFIs in terms of the return on assets (*ROA*), the profit margin (*MARGIN*) and financial sustainability as measured by their operational self-sufficiency *(OSS)*.

Next to the Lerner index, our measure of competition at the MFI-level, we use the following MFI-specific explanatory variables: *AGE* (number of years since establishment) and *AGE* squared, *SIZE* (measured as the log of total assets) and *YIELD* (measured as the average interest charges customers of the MFI face). Moreover, we add a number of country-level variables, controlling for the macroeconomic environment (i.e. real GDP growth (*GDPGR*), inflation (*INFL*), industry value added to GDP (*IND*), share

of rural population (*RPOP*) as well as rural population growth (*RPOPGR*)), the quality of institutions (i.e. *control of corruption, political stability, regulatory quality and rule of law*) and the level of financial development (i.e. private credit to GDP ratio (*CREDIT*) and the net interest rate margin (*SPREAD*)). These variables have been used in other cross-country studies focusing on explaining MFI performance (see, e.g., Ahlin *et al.*, 2010; Cull *et al.*, 2009b, Vanroose and d'Espallier, 2009; Hermes *et al.*, 2009).[4] Table 2 provides a description of all variables used in the analysis.

<Insert Table 2 here>

6. Data

As was already discussed above, we use the *MIX market* data base for the measurement of the Lerner index. Moreover, data for MFI-specific variables, including our measures of social and financial performance, are also taken from this source. This database has been widely used in the microfinance literature. Reporting to *MIX market* by MFIs is done on a voluntary basis, which may, at least potentially, have consequences for the reliability of the data. In order to ensure quality and availability of data, we limit ourselves to commercially oriented MFIs with three or more diamonds.[5] By the time of

[4] See these references for a more elaborate discussion of the relationship between the macroeconomic, institutional and financial development variables on the one hand and MFI social and financial performance on the other hand.

[5] The *MIX market* data base employs a diamond system indicating the availability and quality of the data obtained from MFIs. Higher levels of diamonds indicate higher level of disclosure and data quality. Three diamonds represents MFIs reporting for two or more consecutive years with respect general information, outreach and financial data; four diamonds implies data as with

constructing the dataset for this study (March 2010), there were 461 commercially oriented MFIs with three or more diamonds, rendering 2,544 observations. The information collected for this study covers the period 1995-2008. More than 90 per cent of the data is from year 2000 onwards.

Yet, due to missing values with respect to either of components of the Lerner index (i.e. price and/or marginal cost) several MFIs had to be dropped from the initial dataset. Moreover, in very few cases we found values for the Lerner index outside the 0 to 1 range. These observations were treated as outliers.[6] The final sample contains 1,247 observations relating to 362 commercially oriented MFIs located in 73 countries. Table 2 summarizes the regional distribution and legal status of the MFIs in our dataset.

<Insert Table 3 here>

Table 3 provides information on the average value of the Lerner index for the whole sample of MFIs, as well as for MFIs in different regions. The average Lerner index is 0.58. This outcome suggests that MFIs in our dataset are confronted with modest levels of

three diamonds plus audited financial statements; five diamonds represent data as with four diamonds plus rating and other benchmarking assessments.

[6] Theoretically it is possible to observe values for the Lerner index below zero. This would indicate that organizations are making losses as marginal costs are higher than marginal returns. In the context of our analysis, if we observe MFIs still being in business while they have a Lerner index below zero, this may indicate that they obtain substantial subsidies to cover costs. A Lerner index with a value above one means that either price or marginal cost is negative, which seems to be unrealistic. For these reasons, we have considered these cases to be outliers. We estimated the cost function and calculated the Lerner index in two steps. In the first step we calculated the cost function and Lerner index using the full sample and deleted values of the Lerner index below 0 and above 1 (eight observations were below zero, one above one) cases); in the second step we repeated the calculation of the cost function and Lerner index, returning observations for the Lerner index that range between 0 and 1 only (one observation below zero).

competition, at least if we compare our results with those of other studies using the Lerner index to investigate competition in the banking industry. For example, Maudos and Fernández de Guevara (2004) report an average Lerner index of 0.15 based on a large sample of European banks for the period 1993-2000. Fernández de Guevara et al. (2007), using a sample of banks from a larger number of European countries for the same period, the average Lerner index is reported to be similar in size. They also show, however, that whereas for some countries, such as Denmark, Germany and Luxemburg banking competition has increased, in other countries (e.g., Finland, UK, Italy and Spain), market power of banks has actually increased over the period under investigation. Koetter et al. (2008) present results on the Lerner index for a sample of around 4,000 US bank holding companies, indicating that the index is between 0.20 and 0.25 (depending on the methodology used to calculate the cost function). Koetter and Vins 2008 find an average Lerner index of 0.23 for a set of German savings banks covering the period 1996-2006. Angelini and Cetorelli (2003) show that for a sample of Italian banks the Lerner index drops from above 0.15 in 1984 to slightly below 0.10 in 1997.

The above findings suggest that for commercial banks in European countries and the US, competition appears to be relatively strong. In contrast, the average MFI in our dataset seems to enjoy quite some level of market power, enabling them to charge interest rates above marginal costs.

Table 3 also shows that competitive environments differ for MFIs located in different regions of the world. In particular, for MFIs in Latin America and Eastern Europe competition appears to be lower on average than for MFIs in South Asia (the

Lerner index being 0.62, 0.61 and 0.49, respectively). Figure 1 shows that the average value of the Lerner index gradually declines from 2000 to 2007, suggesting that competition in the microfinance business increases over time.[7]

<Insert Table 4 here>

<Insert Figure 1 here>

Data on institutional quality is obtained from Worldwide Governance Indicators (WGI), also known as the Kaufmann governance indicators. Information with respect to the macroeconomic and financial development variables is taken from the Wold Development Indicators (WDI) of the World Bank. Combining micro and macro variables results in a further loss of observations, since for several of these variables information is not available for all years. Tables 6 and Table 7 provide descriptive statistics of the dependent and explanatory variables, respectively. Table 8 presents correlation coefficients of the explanatory variables. The results in table 8 suggest that most of the correlations between explanatory variables are low, with the exception of the correlation between some of the institutional variables, as well as between rural population and rural population growth.

<Insert Table 5 here>

[7] The increase of the value of the Lerner index in 2008 may be due to the relatively small number of observations we have for this year.

<Insert Figure 6 here>

<Insert Table 7 here>

7. Empirical analysis

Next, we estimate the empirical model described in equation (4). The results of the multivariate analysis are described in tables 8a (with outreach and loan repayment performance as dependent variable) and 8b (dependent variables: cost efficiency and profitability). The focus of the analysis is on the relationship between competition and social and financial performance, controlling for macroeconomic, institutional and financial development variables.

As explained above, the Lerner index, our measure of competition, takes a value between 0 and 1; a low (high) value of the index indicates high (low) competition. For ease of interpretation of the estimation results, we have multiplied the values for the Lerner index with -1. The results are presented in tables 8a (with outreach and loan repayment performance as dependent variable) and 8b (dependent variables: cost efficiency and profitability).

The results in table 8a with respect to social performance in terms of *outreach* show that there is some evidence that higher competition is associated with lower outreach. The coefficient for our competition measure is negative for all three measures

of outreach; it is significant in only one case (i.e. the number of active borrowers). This supports the hypothesis that increased competition forces MFIs into more cautious lending operations.

For *loan repayment performance* table 8a shows that there seems to be support that competition is associated with this dimension of financial performance of MFIs. The coefficient of the competition measure is positive for all three measures of repayment performance and it is significant for two (*PAR90* and *WOR*). These results strongly suggest that more competition leads to more loans at risk and higher levels of loan write-offs (i.e. lower loan repayment performance).

<Insert Table 8 here>

With respect to *cost efficiency* we find evidence that more competitive markets are associated with higher costs for MFIs (see table 8b). For both measures of cost efficiency (i.e. operating expenses ratio and the cost per borrower) the coefficient for the competition is positive and significant. This lends support to the hypothesis that higher competition leads to lower repayment rates and default rates, adding to the costs of lending. It may also support the notion that in highly competitive environments MFIs are not only competing for clients and market shares, but also for inputs such as capital and labour. Increased competition for these inputs may lead to rising interest rates at which they borrow money and to higher loan officer salaries, leading to higher costs.

Finally, table 8b shows that with respect to *profitability* higher competition is associated with lower return on assets, lower operational self-sufficiency and lower profit margins, since the coefficient of the competition measure is positive and significant in all three cases. These results support the hypothesis that increased competition is associated with falling profitability: due to competitive pressure, market shares and monopoly rents decline, forcing MFIs to reduce profit rates.

The results for the control variables in the model are not significant in several cases, but the general picture that emerges is that the association between macroeconomic conditions, institutional quality and financial development on the one hand, and social and financial performance of MFIs on the other hand, are in line with those that have been reported in previous empirical work (see, e.g., Ahlin et al., 2010; Cull et al. 2009b; Hermes et al., 2009). Our contribution in this paper, however, is focused on measuring competition in the microfinance business and investigating the association between competition and MFI performance, which is why we do not further go into details with respect to the empirical results for the macroeconomic, institutional and financial development variables.

To summarize, our empirical results by and large point towards adverse associations between competition and social and financial performance of MFIs. Competition appears to be negatively associated with outreach, loan repayment, efficiency and profitability. Table 9 summarizes the results of the empirical analysis.

<Insert Table 9 here>

8. Summary and conclusions

The microfinance business has been enjoying increased attention. One consequence of this is that the number of microfinance service providers has increased rapidly over the last 10 to 15 years. Yet, this has also led to strongly increasing competition between microfinance providers. As we have argued in the first part of this paper, the literature on the consequences of competition for the performance of MFIs is ambiguous. On the one hand, it may contribute to lowering production costs and lower prices of goods and services and encourage the development of new products and efficient technologies. On the other hand, however, competition may lead to lower borrower selection standards, to weakening of bank-customer relationships, and to multiple loan-taking and high defaults.

We have also discussed the empirical evidence on the consequences of increased competition for the microfinance business. Studies on this issue appeared to be scarce. Moreover, measurement was a critical issue, as the few studies available generally used sometimes rather ad hoc measures of competition. The contribution of this paper, therefore, was first to add to the limited empirical evidence on competition and its consequences for microfinance in the broadest sense, and second, to elaborate on the measurement of competition in the context of the microfinance market. With respect to the latter issue we applied the Lerner index, a measure of competition widely used in

the banking literature, measuring the extent to which an institution has market power. As far as we, this study is the first to apply the Lerner index to the microfinance business.

The results of our empirical investigation indicate first that since 2000 competition in microfinance has indeed increased. Moreover, competition appears to be especially strong in South Asia, while it is less strong in Latin America and Eastern Europe. The results of the multivariate analysis further indicate that MFIs have lower outreach when faced with more intense competition. We also find that increased competition is associated with lower levels of loan repayment, lower financial performance and lower efficiency.

All in all, then, the analysis seems to support the view of those who see increased competition and the related commercialization of the microfinance sector as a threat to its longer term stability and success, both in terms of its social and financial objectives. The results may also support calls for designing ways to ensure the (negative) effects of increased competition on the sector are minimized. These calls may include improved regulatory measures, reducing the risk MFIs compromise lower lending standards for increased market share. Moreover, it may stimulate initiatives focusing on promoting information sharing between MFIs. This may contribute to lower delinquency rates as well as helping to improve borrowers' welfare by preventing borrowers from taking multiple loans. In addition, promoting financial literacy among clients may also help them in their borrowing decisions and reduce the risk of multiple loan-taking.

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Appendix: Derivation of the Marginal Cost

We have the following trans-log function:

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

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

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

Scale economies can be defined in terms of cost function, i.e. by how much will total cost change in response to a unit in output. This can be written as (and is similar to elasticity):

$$\varepsilon_c = \left(\frac{\partial TC_{it}}{\partial y_{it}} \right) \left(\frac{y_{it}}{TC_{it}} \right) \quad \text{(b)}$$

The first term in equation (b) is marginal cost (MC). Therefore, we can re-write the equation as:

$$MC = \left(\frac{TC_{it}}{y_{it}} \right) \varepsilon_c \quad \text{(c)}$$

Given the above cost function a measure of scale economies defined in terms of cost function is derived as:

$$\varepsilon_c = \frac{\partial \ln C_{it}}{\partial \ln y_{it}}$$

$$\varepsilon_c = \alpha_1 + \alpha_2 \ln y_{it} + \sum_{j=1}^{2} \gamma_j \ln w_{ijt} + \delta_3 trend \quad \text{(d)}$$

By substituting equation (d) into equation (c) we get the marginal cost expression:

$$MC = \left(\frac{C_{it}}{y_{it}} \right) \left(\alpha_1 + \alpha_2 \ln y_{it} + \sum_{j=1}^{2} \gamma_j \ln w_{ijt} + \delta_3 trend \right) \quad \text{(e)}$$

Appendix table: Results of the cost function

Independent variables in the model	ln (Total cost)
ln$y$	0.737***
	(0.137)
lnw_1	0.502*
	(0.280)
Lnw_2	0.124
	(0.177)
trend	-0.00383
	(0.00413)
(ln$y$)^2	0.0206***
	(0.00507)
(lnw_1)^2	0.0619***
	(0.0188)
(lnw_2)^2	0.00399
	(0.00990)
trend^2	-6.08e-06
	(4.53e-06)
ln$y$ *lnw_1	-0.0725***
	(0.0152)
ln$y$ *lnw_2	0.00352
	(0.00799)
ln$y$ *trend	0.000261
	(0.000213)
llnw_1*lnw_2	-0.0149
	(0.0219)
lnw_1*trend	-0.000363
	(0.000399)
lnw_2*trend	0.000271
	(0.000180)
Constant	-1.121
	(1.505)
Observations	1247
R-squared	0.929
Number of mfiid	362

***, **, * - significant at 1%, 5% and 10%, respectively; standard errors in parentheses

Table 1: Summary of hypotheses

Expected association between increased competition and:	
Outreach	+/–
Repayment	–
Cost efficiency	+/–
Profitability	–

Table 2: Description of variables and data sources

	Variable	Description	Source
Microfinance Institutions Data	*AGE*	Years functioning as an MFI; age at year *t* is *t*-years of establishment	MIX Market
	SIZE	Total of all net asset accounts	MIX Market
	YIELD	Interest and fees on loan portfolio/loan portfolio adjusted for inflation	MIX Market
	NBORROW	The number borrowers who currently have an outstanding loan balance or are primarily responsible for repaying any portion of the loan portfolio	MIX Market
	WOMEN	Ratio of number of women borrowers to number of active borrowers	MIX Market
	LOAN SIZE	Average loan size in USD	MIX Market
	OER	The ratio of operating expenses to gross loan portfolio	MIX Market
	CPB	The ratio of operating expense to number of active borrowers	MIX Market
	PAR30	The ratio of portfolio at risk > 30 days to gross loan portfolio	MIX Market
	PAR90	The ratio of portfolio at risk > 90 days to gross loan portfolio	MIX Market
	WOR	The share of total amount of loans that are written-off from the gross loan portfolio (write-off ratio)	MIX Market
	OSS	The ratio of financial revenue to financial expenses, loan provision expenses and operating expenses	MIX Market
	ROA	Net operating income, less taxes / assets	MIX Market
	MARGIN	Net operating income/ financial revenue	MIX Market
	LERNER (Lerner Index)	Price minus marginal cost scaled by price	Own calculation
Country level Data	*GDP*	Real GDP per capita growth	WDI
	INFL	Inflation rate, GDP deflator	WDI
	IND	Industry value added as percentage of GDP	WDI
	RPOP	Share of rural population (percentage)	WDI
	RPOPGR	Growth in rural population	WDI
	CREDIT	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

MIX Market = the Microfinance Information Exchange (www.mixmarket.org); WDI = World Development Indicators (WDI Online); WGI = Worldwide Governance Indicators

Table 3: Regional distribution and legal status of MFIs

Regional distribution	Number of MFIs
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
Legal status	
Bank	79
Credit Union / Cooperative	3
NBFI	225
Rural Bank	55

Table 4: Summary statistics of the value of the Lerner index, by region

Region	Obs.	Mean	Median	SD	Max.	Min.
Africa	220	0.577	0.596	0.128	0.930	0.078
East Asia & the Pacific	241	0.568	0.587	0.095	0.725	0.047
Eastern Europe & Central Asia	264	0.607	0.617	0.107	0.811	0.068
Latin America & The Caribbean	349	0.617	0.630	0.085	0.830	0.140
Middle East & North Africa	7	0.622	0.625	0.016	0.638	0.589
South Asia	166	0.492	0.505	0.132	0.763	0.034
Total	1247	0.582	0.600	0.114	0.930	0.034

Table 5: Descriptive statistics of dependent variables

	Variable	N	Mean	S.D.	Max.	Min.
Outreach	*Active borrowers (in thousands)*	1236	92.2	403.47	6210	0
	% 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
Repayment	*PAR30*	1205	0.054	0.070	0.764	0
	PAR90	1223	0.036	0.056	0.590	0
	WOR	1144	0.016	0.032	0.350	-0.001
Profitability	*OSS*	1247	1.187	0.321	5.219	0.398
	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 population	1241	52.57	21.32	90	7
Rural population growth	1241	0.53	1.09	4	-5
Private Credit to 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 8a: Estimation results – Effect of competition on outreach and loan repayment

	NBORROW[a]	*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)
SIZE[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)
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)
GDPGR	0.000425	0.00126	-0.00131	-0.0026***	-0.0018***	-0.000229
	(0.00404)	(0.00148)	(0.00382)	(0.000649)	(0.000511)	(0.000326)
INFL[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)
IND	0.0148*	0.00820**	-0.0127	0.000504	0.000503	0.000116
	(0.00895)	(0.00404)	(0.0113)	(0.000650)	(0.000514)	(0.000255)
RPOP	-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)
RPOPGR	0.0570	0.00812	-0.0449	0.00774*	0.00567	0.00347*
	(0.0556)	(0.0197)	(0.0612)	(0.00471)	(0.00370)	(0.00185)
CREDIT	-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; standard errors in parentheses; ***, **, *-significant at 1%, 5% and 10%, respectively.

Table 8b: Estimation results – Effect of competition on efficiency and profitability

	OER	*CPB*[a]	*OSS*	*ROA*	*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)
SIZE[a]	-0.0367***	0.0931***	-0.00127	0.00283	0.0376***
	(0.00505)	(0.0350)	(0.00798)	(0.00527)	(0.0127)
YIELD	0.244***	0.379***	-0.178***	-0.0244	-0.0210
	(0.0178)	(0.122)	(0.0643)	(0.0185)	(0.0446)
GDPGR	-0.00104**	-0.00939***	0.00389*	0.00104**	0.00442***
	(0.000483)	(0.00338)	(0.00232)	(0.000505)	(0.00121)
INFL[a]	0.00357	-0.0267	0.0153	0.00222	0.00953
	(0.00317)	(0.0216)	(0.0148)	(0.00331)	(0.00796)
IND	0.00117	-0.0160**	0.000747	7.74e-05	0.00320
	(0.00107)	(0.00732)	(0.00235)	(0.00112)	(0.00269)
RPOP	-0.00697***	-0.0747***	0.00246**	-0.00076	0.00848
	(0.00268)	(0.0187)	(0.000990)	(0.00280)	(0.00674)
RPOPGR	0.00209	-0.0436	0.00252	0.00206	-0.0430**
	(0.00665)	(0.0449)	(0.0170)	(0.00695)	(0.0167)
CREDIT	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; standard errors in parentheses; ***, **, *- significant at 1%, 5% and 10%, respectively.

Table 9: Summary of results

Effect of increased competition on	Estimated sign	Expected sign
Outreach	–	+/–
Repayment	–	–
Cost efficiency	–	+/–
Profitability	–	–

Figure 1: Evolution of the value of the Lerner index, 2000-2008