



# IMF Working Paper

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## The Impact of the Global Financial Crisis on Microfinance and Policy Implications

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**IMF Working Paper**

Western Hemisphere Department

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**Abstract**

The global financial crisis affected microfinance institutions (MFIs) as lending growth was constrained by scarcer borrowing opportunities, while the economic slowdown negatively impacted asset quality and profitability. It also brought to the fore the relatively high interest rates that MFIs charge to their (low-income) customers. This paper revisits the issue of systemic risk of MFIs, and finds that contrary to the evidence before the crisis, MFI performance is correlated not only to domestic economic conditions but also to changes in international capital markets. It also presents an empirical analysis of lending rates with the purpose of informing policy decisions, and finds that loan sizes, productivity, and MFI age contribute to explain differences in lending rate levels. This suggest that regulation (and policies) promoting MFI competition, and innovation in lending technologies have a better chance to result in decreased lending rates.

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## I. INTRODUCTION <sup>1</sup>

Microfinance institutions (MFIs) provide financial services to low-income, economically active, borrowers who seek relatively small amounts to finance their businesses, manage emergencies, acquire assets, or smooth consumption (CGAP 2002). These borrowers usually lack credit histories, collateral, or both, and thus, do not have access to financing from mainstream commercial banks (Banerjee and Duflo, 2007). For this reason, MFIs are seen as playing a role in the creation of economic opportunity, and in poverty alleviation. Recognizing the importance that a number of donors had placed on microfinance as a tool to achieve the millennium development goals (MDGs), the United Nations declared 2005 as the “year of micro-credit”. (Morduch, 1999; United Nations, 2006).

MFIs are a heterogeneous group that includes different types of institutions (e.g., banks, rural banks, non-bank financial institutions –NBFIs-, non-government organizations –NGOs-, credit unions, cooperatives), legal status (some are regulated and other unregulated), and purpose (including for profit and non profit institutions). MFIs lending portfolios vary greatly depending on the type of institution: banks and NBFIs usually concentrate on larger clients (including small enterprises), while loan sizes per client in cooperatives and NGOs are smaller (in particular as the latter are more likely to lend to groups). That said, lending portfolios of cooperatives and NGOs also differ, as the former are mostly member-based institutions that favor consumption smoothing to a larger extent than other microfinance providers.

Location contributes to heterogeneity, as MFIs adapt to different national regulations, and operate in countries with diverse access to international capital markets. Additionally, MFIs include both mature and young institutions, as the boom observed in this industry for the most part of the last two decades implied that a large number of new institutions entered into a market in which a number of mature institutions had operated for some time, and thus had time to build a reputation, and to “learn by doing”.

From a macroeconomic perspective, this boom has meant that for some countries, microcredit has come to represent a significant portion of both gross domestic product (GDP) and of total credit to the private sector (Figure 1). For these countries, that include low-income countries (LICs) (e.g., Bolivia, Cambodia, Kenya, Mongolia Nicaragua, Tanzania, Vietnam), transition economies (e.g. Armenia, Bosnia & Herzegovina, Kyrgyz Republic, Tajikistan) and emerging economies (e.g. Peru), abrupt changes in microcredit could have macroeconomic implications, as a large number of borrowers (usually larger than those served by banks) are either incorporated to or excluded from credit markets.<sup>2</sup> Conversely, the

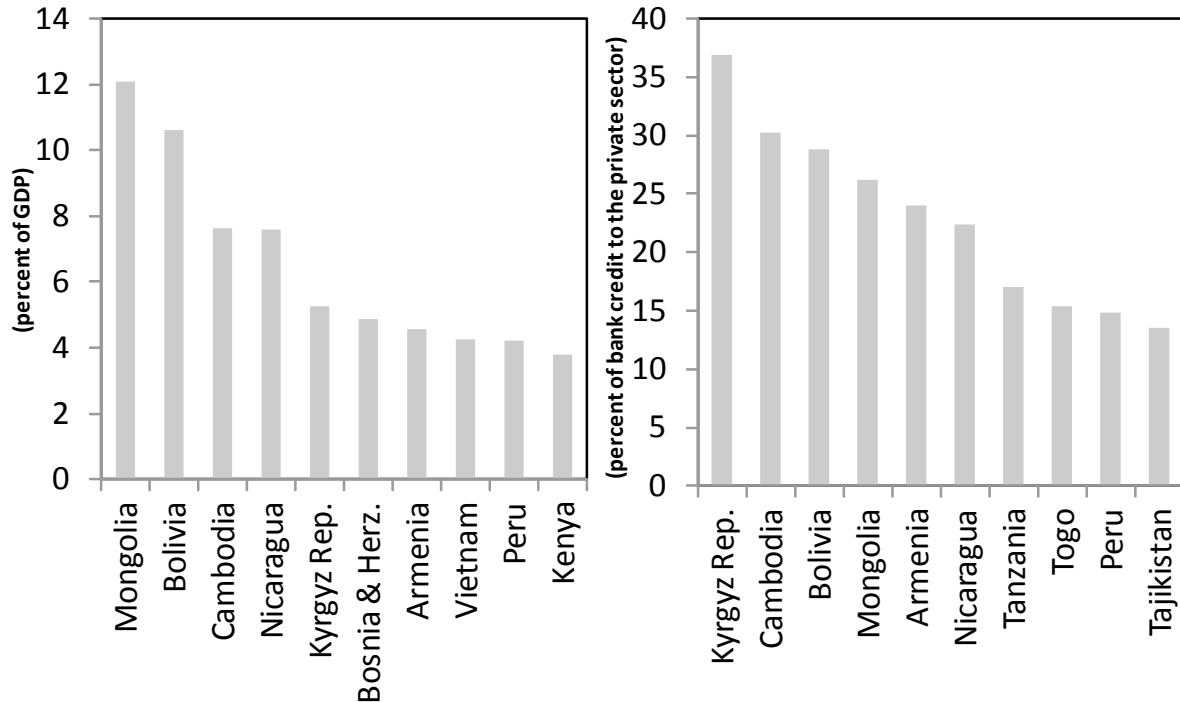
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<sup>1</sup> I would like to thank Mike Goldberg, Adrián Gonzalez, Juan Vega, Juan Buchenau, and Gaston Gelos for useful comments. Maria Jose Sobalvarro provided helpful research assistance. All errors are mine.

<sup>2</sup> Ratios reported in Figure 1 are only indicative as they were calculated using a sample of MFIs. Total microcredit is defined to correspond to the sum of the lending portfolio (on a country basis) of the MFIs included in the sample. Although in absolute terms the number of clients served is most important in countries like India, Indonesia, Bangladesh or Pakistan, microcredit in these countries appear to represent only a small fraction of GDP and of bank credit to the private sector.

increase in the size of MFIs balance sheets and a lower reliance on traditional financing sources (like aid agencies and non-profit entities) have increased the exposure of MFIs to changes in domestic and international economic conditions.

Figure 1. Microcredit in Selected Countries



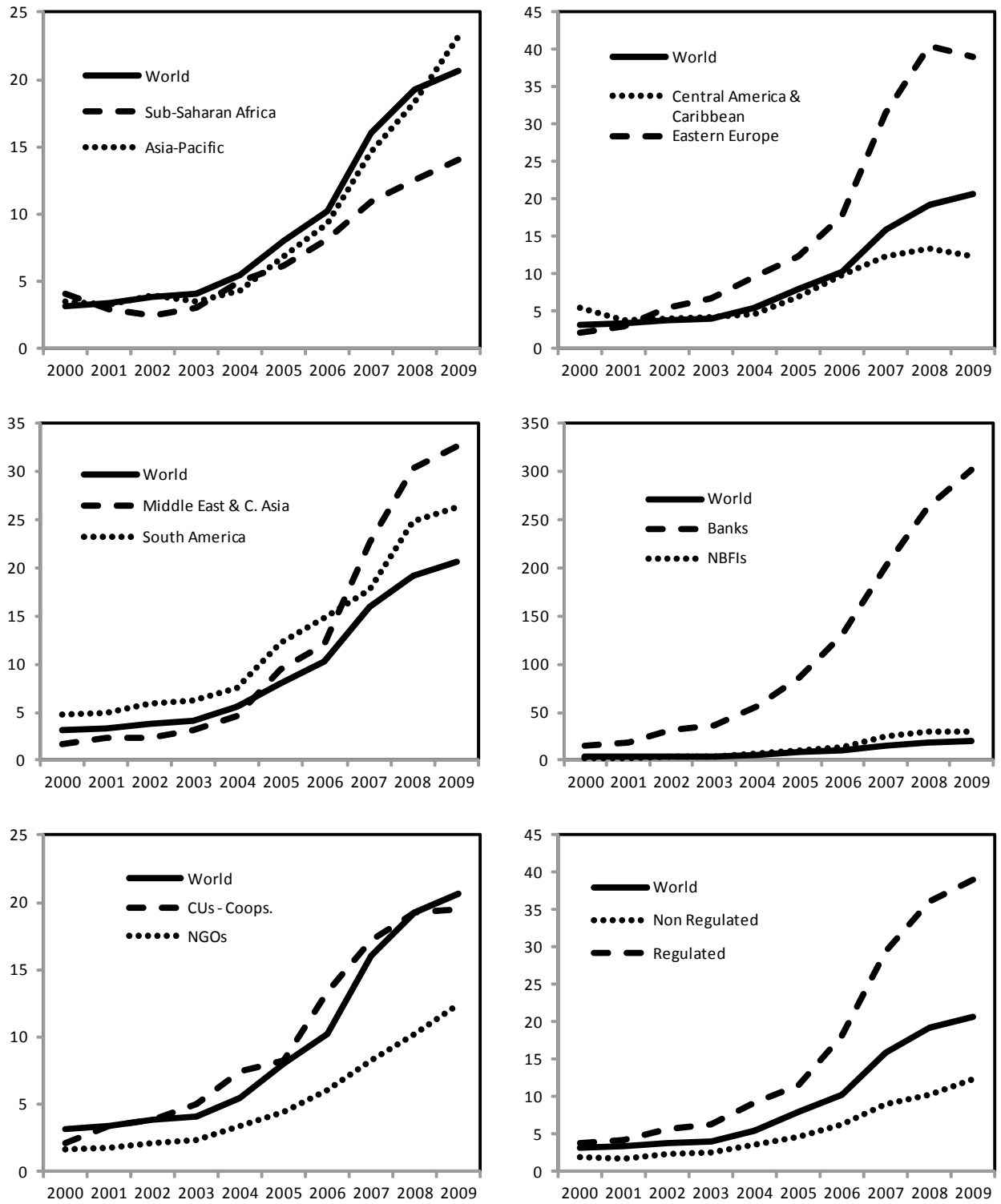
Note: Values correspond to the average for 2008-09.

Source: International Financial Statistics (IFS), Microfinance Information Exchange (MIX) and author's calculations

Until the global financial crisis that erupted in late 2007, available data suggested at most a weak relationship between usual performance indicators in the microfinance industry and international capital market developments, and even domestic macroeconomic conditions (Krauss and Walter, 2006, 2009; Gonzalez, 2007; Ahlin, Lin and Maio, 2010). This was presented as an attractive feature of the microfinance sector as an asset class for fund managers interested in risk diversification. The lack of strong correlation was attributed to, among other things, to the apparent insulation of MFI clients to developments in formal domestic and international markets, and the lower financial leverage of MFIs in comparison with other types of financial institutions. However, these results were based on samples that, though rich from a cross section perspective, comprised a relatively short period of time. In this regard, the period analyzed largely coincided with a period of expansion of the world economy (except for the mild recession of 2001), and most importantly, with what seems to represent a period of “diffusion” of the microfinance industry (Figure 2).<sup>3</sup> Both facts probably contributed to the apparent weak relationship between developments in microcredit

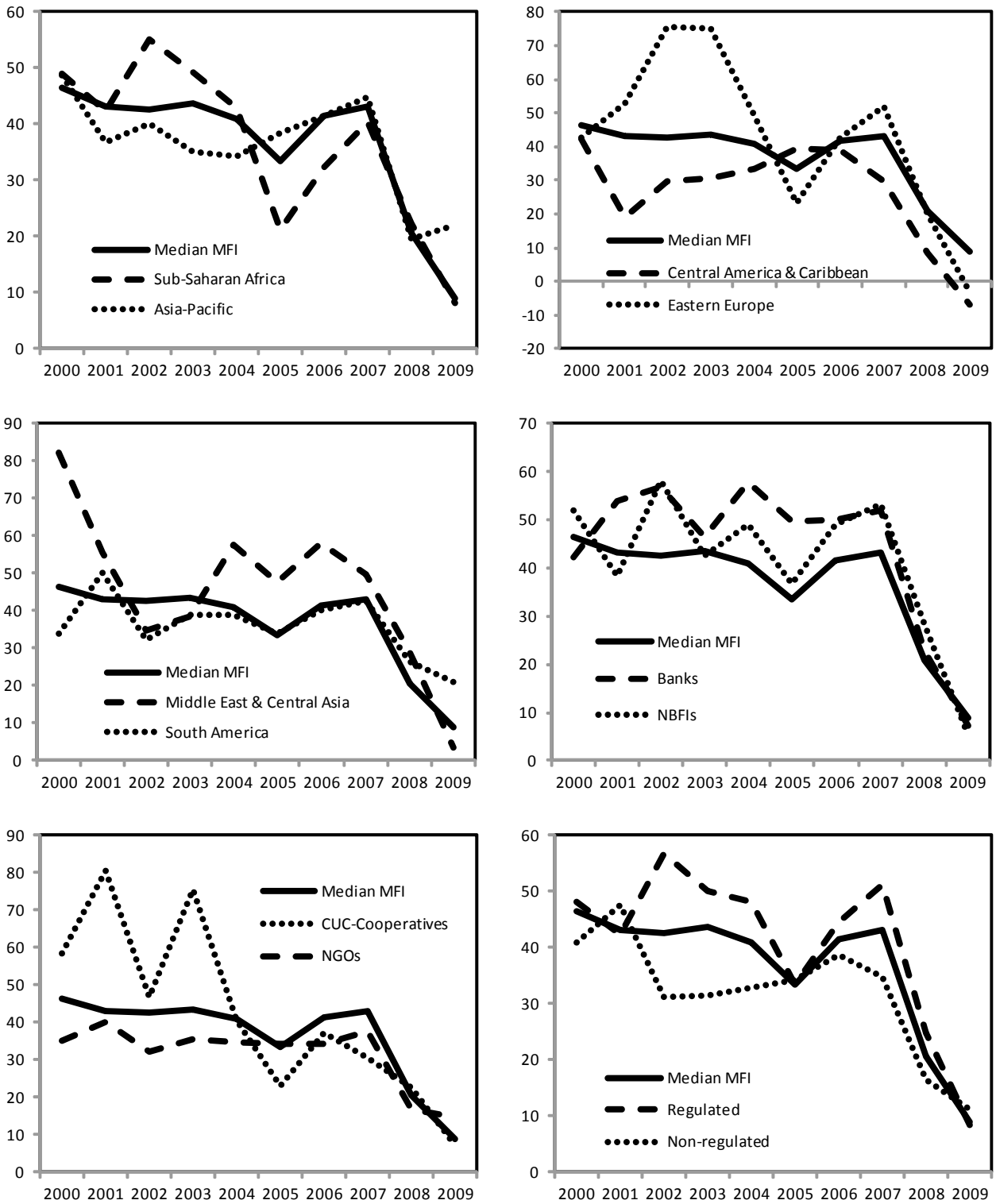
<sup>3</sup> Note the “S” shaped curves in Figure 2, which show the increase in the asset size (in current US\$ million) of the median MFI across world regions, types of institutions and legal status.

Figure 2. Assets of the median MFI  
(in US\$ million)



Source: Microfinance Information Exchange (MIX) and author's calculations.

Figure 3. Lending Growth  
(in percent; over values in US\$)



Source: Microfinance Information Exchange and author's calculations.

and international capital markets (which are volatile, even during expansions) and domestic macroeconomic conditions (as most emerging and LICs were growing at relatively high rates during this period).

The global financial crisis changed all this. The boom growth rates observed in microcredit across the globe decreased strongly as MFI's balance sheets were shocked both on the liability side, as fund providers of all types were affected by the abrupt decrease in liquidity, and on the asset side, as loan delinquency and write offs began to increase together with the deterioration of domestic macroeconomic conditions (Figure 3).

Additionally, as the financial crisis began to take its toll, the relatively high rates charged by MFIs (as well as their lack of transparency), gained the spotlight. This meant that in some countries, MFI deterioration was compounded by political initiatives aiming at introducing ceilings to interest rates or to force blanket restructurings of debts. The relatively high rates (even when justified by industry fundamentals) were difficult to defend in the context of uninformed public discussion, or when the issue was exploited for political advantage.

This paper revisits the issue of microfinance systemic risk, by analyzing the performance of a large sample of top MFIs against domestic economic conditions and international capital markets. This allows assessing whether previous results about the lack of a strong relationship between microfinance and general economic conditions are robust to the incorporation of data corresponding to the global financial crisis. The analysis is also carried over for alternative MFI groupings, in order to establish whether relative systemic risk is stronger (or weaker) depending on location, legal status, institution type, purpose, and age.

The empirical findings suggest that correlations between microfinance's performance and both domestic and international economic conditions are stronger than previously found. In particular, MFIs in Central America and the Caribbean (including Mexico), Eastern Europe, and the Middle East and Central Asia appear most sensitive to changes in the domestic and international economic environment, while from an institutional perspective, banks and non-bank financial institutions show the closest links. These results suggest that the increasing attention that MFIs have given to "sustainability", a diversification in their funding structure towards more commercial sources, some commercialization of portfolios, and an increase in their scale (among other factors), have made them more similar to financial institutions with more traditional lending portfolios.

In addition, this paper presents an empirical analysis of the factors behind MFI lending rates and interest rate spreads. A better understanding of lending rate fundamentals is essential for informing policy decisions, and reducing the bias in public discussions (CGAP 2009). This could result in better regulation, and thus in an improvement in MFIs' sustainability prospects. With this in mind, the paper discusses the MFIs' cost structure, and estimates models of the lending rate and absolute spread in order to identify their fundamentals. As before, regressions are estimated for different MFI groupings, in order to assess whether the factors explaining interest rates are consistent (or not), regardless of location, institution type, legal status, purpose or age.



In this regard, the results of the empirical analysis suggest that the average loan size (as a proxy for administrative costs), and a number of variables tracking MFI productivity and efficiency (including the ratio of borrowers per staff, and the operational cost per staff), all have the expected signs (and are, in most cases, statistically significant), regardless of MFIs characteristics. The empirical evidence also suggest, in line with theory, that more mature MFIs charge lower lending rates. Other variables tracking asset quality and MFI funding structure, also appear to matter. There is no strong evidence, however, linking lending rates (spreads) with domestic economic conditions. These results suggest that if the aim of regulation is to reduce lending rates, it would likely produce better outcomes if it creates an enabling environment for MFIs to develop, and concentrates in promoting MFI competition, and innovation in lending technologies.

The paper is organized as follows. Section II provides a stylized description of global trends in microfinance before and after the global financial crisis of 2007-08. Section III describes the data and MFI groupings that are used in the paper. Section IV evaluates the empirical evidence to assess whether the absolute systemic risk of microfinance has increased during the last few years, and whether there are differences in the relative systemic risk of alternative MFI groupings. In turn, section V analyzes the empirical evidence on lending rates and spreads with a view of identifying their determinants for alternative MFI groupings. Section VI discusses the findings and concludes.

## **II. GLOBAL TRENDS IN MICROFINANCE 1998-2009**

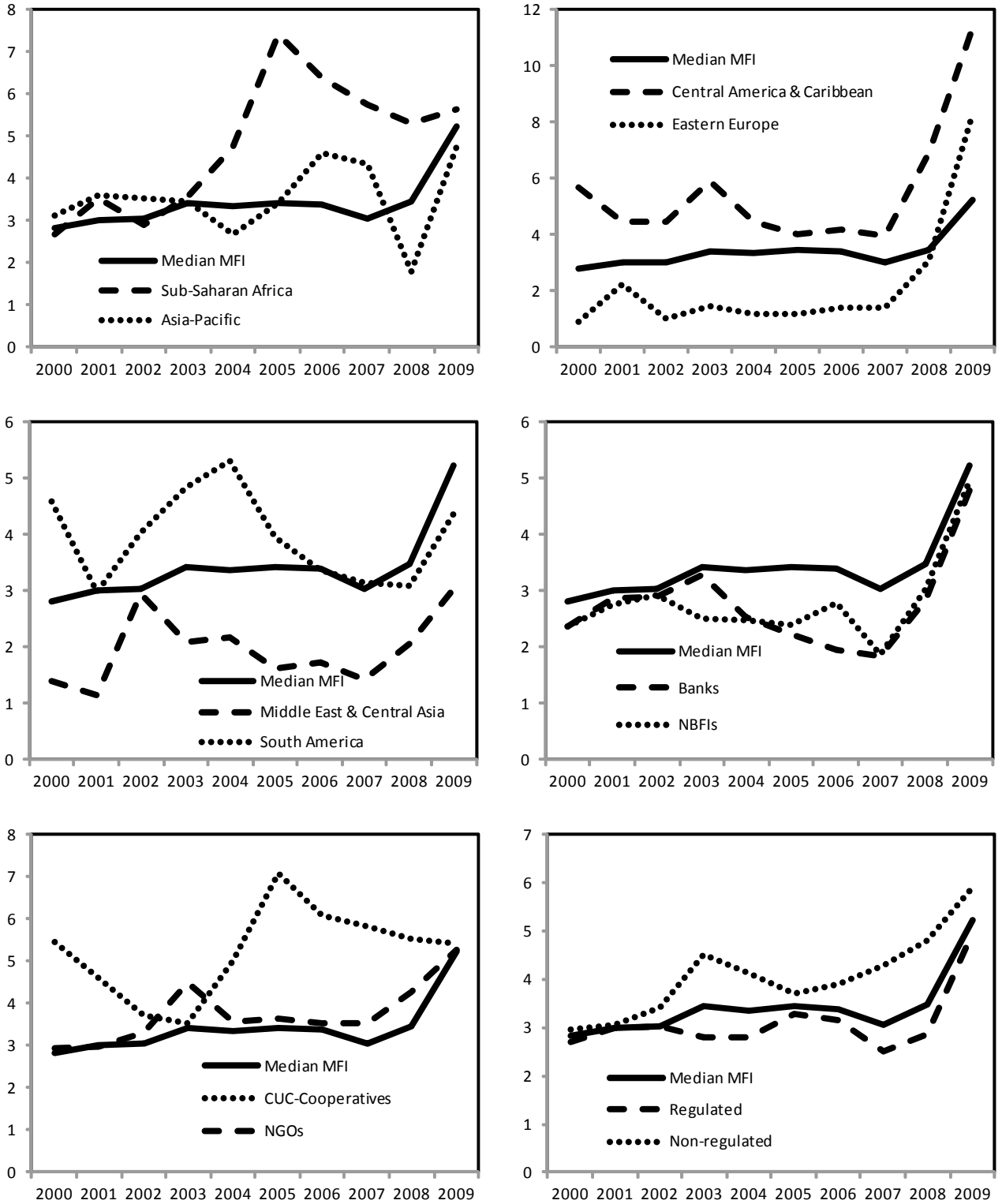
### *Overall Trends*

Before the crisis (1998-2006), the median MFI's performance was characterized by strong growth, good asset quality and profitability, regardless of region, institution type, or legal status (Table 1 and Figures 3 to 5). From an investor's point of view, the period appears to correspond to one of diffusion of a new asset class, as lending to MFIs expanded strongly, (though from a low base), and new products and financing institutions specialized in lending to MFIs appeared.

Accordingly assets of the median MFI grew at an annual rate of 36 percent, and lending at a rate of almost 40 percent; in turn, borrowing increased at a median annual rate in excess of 50 percent, suggesting a decrease in capital-asset ratios as MFIs expanded. The profitability of the median MFI was high, with return on equity (ROE) close to 10 percent, and asset quality characterized by relatively low portfolio at risk (PAR-30) and write off ratios (3 and of 1 percent of total portfolio respectively).

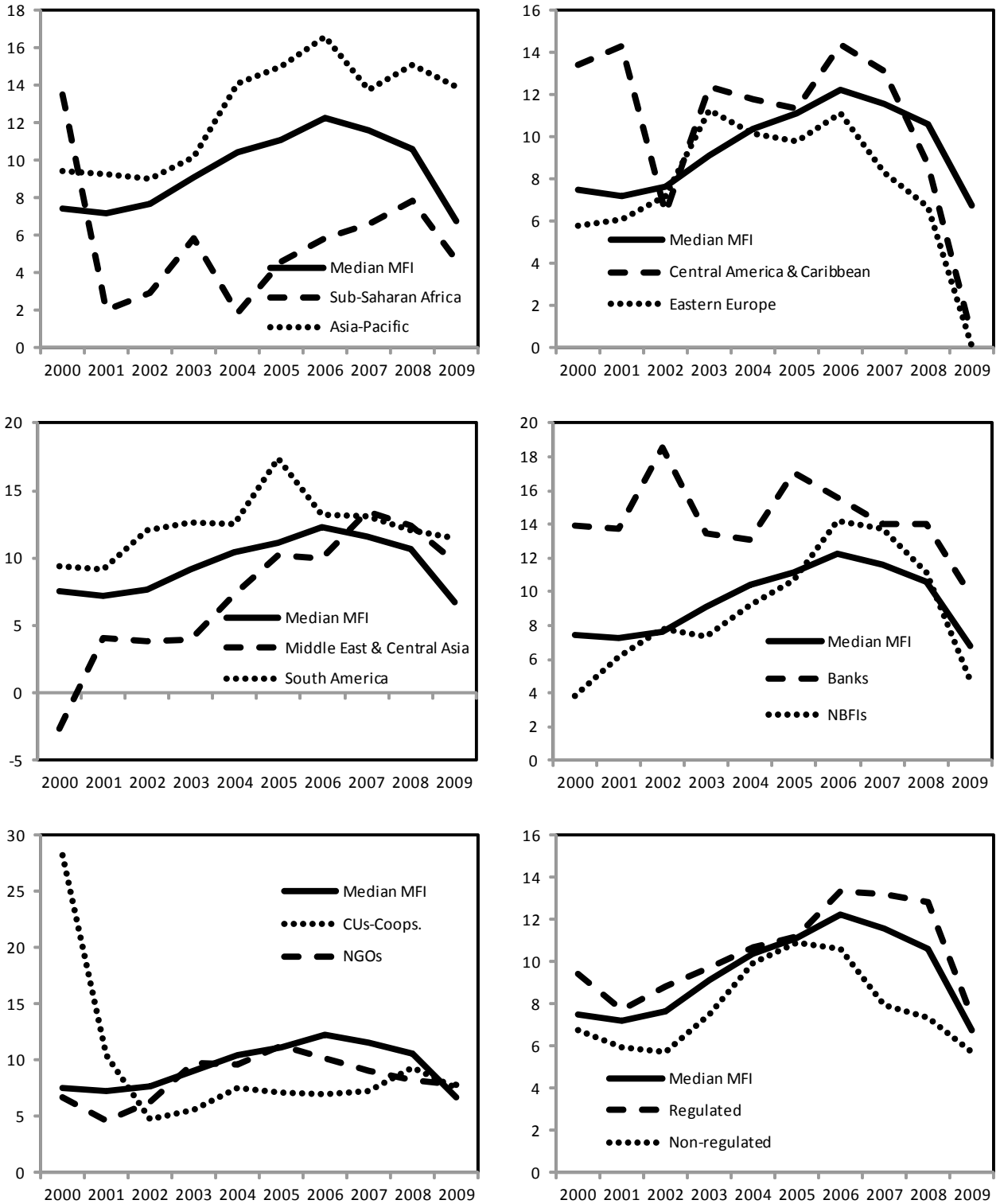
From a regional perspective the median MFI in Eastern Europe (EUR) and in the Middle East and Central Asia (MCE) regions grew faster and had better asset quality ratios than those in other regions, though profitability was largest for the median MFI of Central America and the Caribbean (CAC) and of South America (SAC). From an institutional perspective, banks outperformed other types of institutions in terms of strength of expansion, asset quality and profitability, with NBFIs following banks. In turn, regulated institutions outperformed non-regulated MFIs in the strength of their expansion, in asset quality and profitability. Interestingly, the expansion of the microfinance industry appeared to be mostly

Figure 4. Portfolio at Risk (PAR-30)  
(in percent of Loans)



Source: Microfinance Information Exchange and author's calculations.  
Note: Trends for Write-off ratios are broadly similar.

Figure 5. Return on Equity (ROE) (in percent)



Source: Microfinance Information Exchange and author's calculations.  
 Note: Trends for Return-on-Assets (ROA) are broadly similar.

untouched by the recession of 2001; this could be seen by a fairly consistent performance across the period for all regions, types of institutions and legal status (with, maybe, the exception of the median MFI for the CAC region which appeared to have been affected by the 2001 crisis).

In spite of the fact that overall performance of the median MFI was still characterized, *on average*, by continuing expansion during and after the global crisis (2007-2009), the expansion occurred at significantly lower (and decreasing throughout the period) rates when compared with those observed during 1998-2006. Assets of the median MFI increased at about 22 percent per year and lending by 24 percent, while borrowings grew by 23 percent, i.e. 28 percentage points lower than the rate observed during 1998-2006. Though profitability (measured by ROE) of the median MFI appeared only slightly lower than that observed during 1998-2006, the mean ROE was about 5 percentage points lower. Asset quality deteriorated, with both PAR-30 and write offs ratios showing increases. The median rates for the period mask, however, a strongly deteriorating situation as the effects from the crisis sunk in. Indeed, while performance during 2007 was broadly similar to that observed during the previous years, performance deteriorated sharply during 2008-2009.<sup>4</sup>

From a regional perspective, the impact of the crisis was felt most strongly in CAC and EUR, as these regions not only showed lower expansion rates, worse asset quality ratios and profitability indicators than other regions, but also the worse changes in performance with respect to the previous period; indeed, the median MFI for both regions showed negative rates of growth for lending and borrowing in 2009, coupled with sharp deteriorations in asset quality and profitability ratios when compared to other regions. In contrast, the median MFIs in the SAC and Asian-Pacific (ASP) regions appeared to have weathered the crisis better (though there was some deterioration in the ASP region during 2010, in particular in India).<sup>5</sup> From an institutional perspective, banks and NBFIs performed better than other types of institutions, though the observed changes in asset quality and profitability for these types of institutions suggest a deterioration that was worse than that observed for the median MFI. Regulated institutions also performed better than the median unregulated MFI during the period.

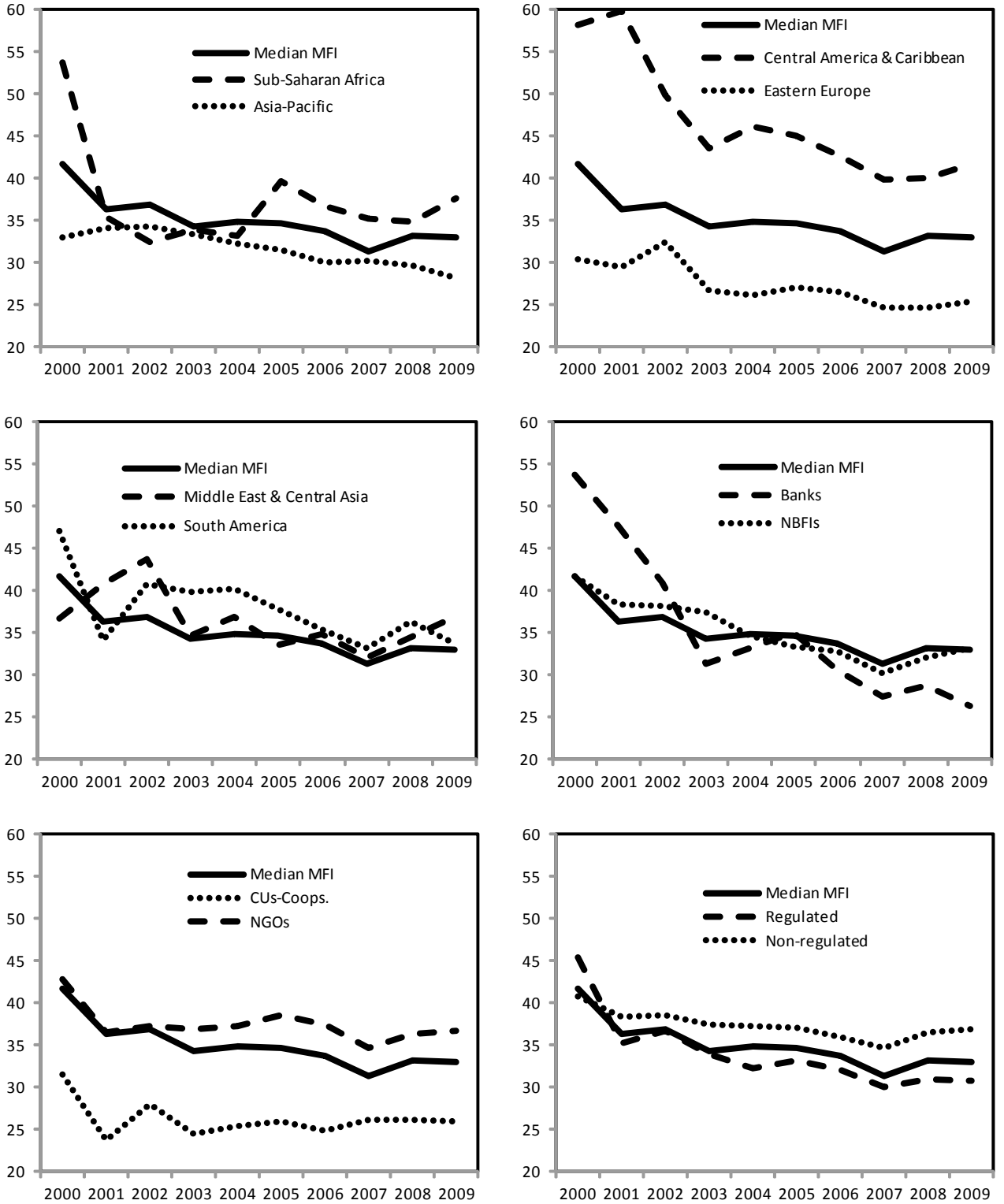
A number of analyses by industry specialists indicate that in addition to the effects of the global financial crisis, the deterioration in MFIs' performance responded to credit oversupply in some markets. In this regard, the marginal increases in lending during 2006-2007 were of lower quality, and for larger sized loans, so when the crisis hit, asset quality and profitability deteriorated on impact and also, through the increase in the operational costs needed to control delinquency. In the liability side, MFIs faced lower financing opportunities

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<sup>4</sup> It is clear that as the industry matures, asset/lending growth and ROE should decrease toward more sustainable rates. However, the sharp decreases observed in these variables during 2008-09 across regions, institution types, and MFI legal status suggest (together with the strong deterioration in portfolio quality), that something else was going on.

<sup>5</sup> See CGAP (2010).

Figure 6. Lending Rate  
(in percent; over values in US\$)



Source: Microfinance Information Exchange and author's calculations

**Table 1. MFIs Performance Indicators, 1998-2009.**

	All	Sub-Saharan Africa	Asian Pacific	Central America & Caribbean	Eastern Europe	Middle East & C. Asia	South America	Banks	CUCs	NBFIs	NGOs	Regulated	Non-Regulated
<b>Stylized Facts 1998-2006 (A)</b>													
Assets (% increase)	36.0	34.8	36.1	31.7	43.9	36.8	33.5	43.7	39.4	39.3	30.7	39.0	30.8
Lending (% increase)	39.9	40.8	38.4	33.1	49.0	52.1	34.5	48.4	40.4	45.8	34.9	44.5	33.7
Borrowing (% increase)	51.7	40.9	49.2	51.0	52.0	76.8	43.6	43.0	25.6	62.3	49.1	55.5	46.4
PAR	3.3	4.3	3.6	4.2	1.2	1.7	4.1	2.5	5.0	2.7	3.3	3.0	3.6
Write-off ratio (% portfolio)	1.0	1.4	0.9	1.4	0.6	0.6	1.2	0.9	1.1	1.0	1.0	1.0	1.0
ROE	9.8	4.5	11.8	13.6	9.1	6.0	12.0	15.2	6.8	9.1	8.7	10.5	8.5
<b>Stylized Facts 2007-2009 (B)</b>													
Assets (% increase)	21.9	22.2	28.0	10.2	17.3	19.7	29.2	26.4	20.8	25.2	20.3	24.1	18.3
Lending (% increase)	23.7	24.1	28.6	9.7	16.2	25.4	27.8	28.0	22.5	28.2	21.2	26.5	19.4
Borrowing (% increase)	23.3	21.7	34.9	10.8	18.4	25.9	22.6	12.2	15.5	27.5	22.7	26.3	19.0
PAR	3.9	5.7	3.7	6.7	3.4	2.2	3.5	2.9	5.6	3.2	4.4	3.4	4.9
Write-off ratio (% portfolio)	1.2	1.8	0.5	2.3	1.3	0.7	1.2	0.9	1.4	1.2	1.5	1.1	1.6
ROE	9.7	6.4	14.0	7.3	4.8	12.5	11.7	12.8	7.6	10.6	8.3	11.4	7.3
<b>Differences (B - A)</b>													
Assets (% increase)	-14.1	-12.6	-8.1	-21.5	-26.6	-17.1	-4.3	-17.3	-18.6	-14.1	-10.3	-14.9	-12.5
Lending (% increase)	-16.2	-16.7	-9.8	-23.4	-32.8	-26.7	-6.7	-20.5	-17.9	-17.6	-13.7	-18.0	-14.4
Borrowing (% increase)	-28.4	-19.2	-14.3	-40.2	-33.6	-50.8	-21.0	-30.8	-10.1	-34.8	-26.4	-29.2	-27.3
PAR	0.7	1.4	0.1	2.5	2.2	0.5	-0.7	0.4	0.6	0.5	1.0	0.4	1.3
Write-off ratio (% portfolio)	0.2	0.4	-0.4	0.9	0.8	0.1	0.0	0.0	0.3	0.2	0.5	0.0	0.6
ROE	0.0	1.9	2.1	-6.4	-4.3	6.5	-0.3	-2.4	0.8	1.5	-0.4	0.9	-1.2

Note:

Shaded cells indicate a better performance than that for the median global MFI

**Table 2. MFIs Lending Rate Fundamentals, 1998-2009.**

	All	Sub-Saharan Africa	Asian Pacific	Central America & Caribbean	Eastern Europe	Middle East & C. Asia	South America	Banks	CUCs	NBFIs	NGOs	Regulated	Non-Regulated
<b>Stylized Facts 1998-2006 (A)</b>													
Lending rate (percent)	35.7	37.6	32.3	47.3	28.0	36.9	39.9	36.3	25.4	35.5	38.5	34.7	38.1
Spread (percent)	30.9	35.0	27.4	41.1	24.2	33.3	33.2	29.2	22.0	31.2	33.6	29.8	33.0
Loan Size (US\$)	361	214	94	442	1817	340	642	895	688	500	179	515	205
Borrowers/staff ratio	115	142	140	97	72	91	132	85	104	104	130	108	127
Operational cost/staff (,000 US\$)	1160	1087	332	1423	2389	1015	1725	1773	1184	1407	962	1298	999
Capital/Asset ratio	34.3	32.2	20.6	41.9	41.8	69.7	25.4	17.5	20.6	36.4	50.4	27.3	46.0
<b>Stylized Facts 2007-2009 (B)</b>													
Lending rate (percent)	32.4	36.4	28.0	40.7	24.9	34.5	34.1	27.7	26.1	31.4	36.1	30.7	36.1
Spread (percent)	26.7	32.7	23.8	33.3	19.9	29.8	28.5	22.0	22.7	25.1	31.1	24.5	30.9
Loan Size (US\$)	631	402	155	610	3060	757	1028	2167	1167	963	283	978	338
Borrowers/staff ratio	123	123	156	100	72	107	130	76	94	114	137	109	133
Operational cost/staff (,000 US\$)	1546	1441	508	1554	3082	1388	2120	2646	1834	1853	1266	1831	1331
Capital/Asset ratio	21.7	24.2	15.4	28.4	22.7	26.5	22.8	12.5	18.9	21.7	32.7	18.9	32.5
<b>Differences (B - A)</b>													
Lending rate (percent)	-3.3	-1.2	-4.3	-6.7	-3.1	-2.3	-5.8	-8.6	0.7	-4.2	-2.4	-4.0	-2.0
Spread (percent)	-4.2	-2.2	-3.6	-7.9	-4.3	-3.6	-4.8	-7.2	0.7	-6.1	-2.6	-5.3	-2.1
Loan Size (US\$)	270	188	61	168	1243	417	386	1273	479	463	104	463	133
Borrowers/staff ratio	8	-20	16	3	0	16	-2	-9	-10	10	7	2	6
Operational cost/staff (,000 US\$)	386	354	175	130	693	373	395	873	650	446	304	533	331
Capital/Asset ratio	-12.7	-8.1	-5.3	-13.6	-19.1	-43.3	-2.6	-5.1	-1.8	-14.6	-17.7	-8.4	-13.5

Note:

Shaded cells indicate a better performance than that for the median global MFI. For loan sizes, shaded cells indicate groupings that present values larger than the global median.

and deteriorated financing terms, including higher borrowing rates and shorter maturities (Multilateral Development Fund, 2010; CGAP, 2010; MIX, 2010a).

### *Lending rate trends*

A look at the data shows that the lending rate charged by the median MFI was about 36 percent during 1998-2006, and decreased to 32 percent during 2007-2009 (Table 2 and Figure 6). Interest rate spreads also decreased, from about 31 percent to 27 percent. Median loan sizes almost doubled (increasing from about US\$ 360 to US\$ 630 per borrower). Productivity of the median MFI (as measured by the borrowers per staff ratio) increased slightly (from about 115 to 123) between periods, while operational costs per staff (in US\$) increased by more than 30 percent. In turn, MFI expansion was consistent with a reduction in capital-asset ratios from about 34 percent to 22 percent.

Although these trends are broadly shared across regions, institution types and legal status, there are some differences that deserve to be highlighted. Interest rates and spreads were largest in CAC, with differences in excess of 6 percentage points with respect to the SAC region, which showed the second largest values; in turn, interest rates and spreads were lowest in EUR. There is a large dispersion in loan sizes among different MFI groupings. From a regional perspective loan sizes are lowest for MFIs in sub-Saharan Africa (AFR) and ASP, and largest for EUR; from an institutional perspective, they are lowest for NGOs and largest for banks, what in turn means that loan sizes for regulated institutions are higher than for unregulated MFIs. As expected, MFIs with lower loan sizes have the largest borrowers per staff ratios, though MFIs in the SAC region show both loan sizes that are larger than for the median MFI and a larger ratio of borrowers per staff. Measures of cost per staff also vary significantly; although from a regional perspective these differences also respond to differing cost of living, from an institutional perspective banks have the largest costs and NGOs the lowest; from a legal status perspective, unregulated MFIs have lower costs per staff than regulated ones. Looking at capital-asset ratios, it is possible to conclude that NGOs and unregulated institutions expanded more strongly during the last decade, as well as MFIs in the MCE, EUR, and CAC regions.

### **III. DATA**

All MFI data was obtained from the “Microfinance Information Exchange (MIX)” database (available online).<sup>6</sup> This dataset covers the period 1995-2009 and includes information for 1774 MFIs in 107 countries. This dataset has been used in a number of studies including Gonzalez (2007), Kraus and Walter (2009) and various reports by industry analysts and the Consultative Group to Assist the Poor (CGAP). The MIX website points out that participation in this sample is voluntary, though participants need to provide supporting documentation (external audits, financial statements, annual reports, etc.) for the figures

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<sup>6</sup> <http://www.themix.org/>. Adrian Gonzalez points out that one of MIX goals is to increase data comparability by standardizing reporting following IFRS, so even if local practices differ, figures reported by MIX are broadly comparable. Moreover, 75 percent of the information is supported by audited financial statements; MFI data is then standardized for comparability. Ratios are calculated using same formulas and principles for all MFIs.



reported. Reporting serves the purpose of increasing MFI exposure, and implies that participating institutions have some form of information systems in place. In spite of problems of data comparability and quality (as reporting and accounting standards vary in each country and for MFIs of different legal status), Krauss and Walter (2009) conclude that the database represents the best available source of information for top MFIs.<sup>7</sup>

*Sample.* In order to ensure some minimum quality of the dataset, the paper uses a sample of 353 MFIs (out of the 1774) that report at least 7 years of data during the period 1998-2009; that also report three years of consecutive data for the period 2007-09 (as the paper is interested in analyzing the effect of the global crisis); and, that are included in the largest top 75 percent in terms of asset size, (as including smaller MFIs, which are subject to larger volatility, would potentially bring into the sample a relatively large number of outliers). These criteria imply that the sample will have entrants during the period but not exits, so there will be no survivorship bias. However, results could be biased by a different performance of younger (entrants) institutions during the period. The paper analyzes the performance of MFIs for different age groups to assess this possible bias.

*MFI Groupings.* The sample is diverse enough to allow analyzing the behavior of a number of different MFI groupings (Table 3). In this regard, MFIs are grouped by region (Sub-Saharan Africa –AFR-, Asia-Pacific –ASP-, Central America and the Caribbean -including Mexico, CAC-, Eastern Europe –EUR-, Middle East and Central Asia –MCE-, and South America –SAC-), institution type (banks, credit unions and cooperatives –CUCs-, non bank financial institutions –NBFIs-, non government organizations –NGOs-, and rural banks), legal status (regulated and non-regulated), purpose (for-profit and non-profit), and age (young and mature). Regarding the latter, mature institutions are defined as those that by 2009 had been in operation for 8 years or more.<sup>8</sup>

*Variables of MFI performance.* Asset and lending growth are expressed in 2005 real annual (end of period) percentage terms; return on equity (ROE) is expressed in annual percentage terms over values in US\$ terms; the portfolio at Risk (PAR-30) ratio denotes the percentage of loans that have been in arrears for the past 30 days, while the write-off ratio is calculated as percentage of lending.

*Variables of global and domestic market risk.* Following Krauss and Walter (2009), domestic economic conditions are represented by real GDP growth, which is expressed in percent per year for each country in the sample. In turn, global market conditions are represented by the annual average percentage change of three indices, the S&P Index, the Morgan Stanley Capital International (MSCI) World Index, and the MSCI Emerging Markets Index. The underlying assets that the three indices track are expressed in US\$ terms.

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<sup>7</sup> Krauss and Walter (2009) point out data problems (including data comparability given the application of different reporting standards), likely reduce determination coefficients and increase coefficient standard errors.

<sup>8</sup> See annex for a list of the countries included in each regional sub grouping and data description tables.

*Variables for lending rate (and spread) determination.* Lending rates are calculated as total financial income divided by net lending portfolio (i.e., excluding non-performing loans), and are expressed in percent per year in US\$ terms. Funding costs are calculated as total financial costs divided by total assets, and are also expressed in percent per year in US\$ terms.<sup>9</sup> The (absolute) spread is defined as the difference between lending and borrowing rates.<sup>10</sup> The average loan size is calculated as total lending portfolio (in US\$ terms) divided by the number of MFI borrowers. The ratio of borrowers per staff denotes the number of MFI active borrowers divided by the number of total staff. Operational cost per staff is calculated as total operational cost per year (in US\$ terms) divided by the number of MFI staff. The capital-asset ratio (expressed in percent) denotes net-worth divided by total assets, both in US\$ terms. Age is a qualitative variable; institutions that are less than 5 years old at any given year (“young”), were assigned a value of zero; institutions between 5 and 8 years old at any given year (“middle-aged”), were assigned a value of one; and institutions that were older than 8 years old at any given year (“mature”), were assigned a value of two.

Table 3. Selected MFI Sample

Region	Institution Type						Institution Type	Legal Status		Purpose		Age	
	Bank	CU / Coop.	NBFI	NGO	Rural Bank	Total		Reg.	Non Reg.	For Profit	Non Profit	Young	Mature
Sub-Saharan Africa	6	18	23	20	0	67	Bank	38	1	39	0	8	30
Asia-Pacific	5	2	23	34	18	82	C. Union/Coop.	28	5	0	33	6	27
Central America & Caribbean	5	0	9	25	0	39	NBFI	105	19	81	43	25	98
Eastern Europe	10	6	29	4	0	49	NGO	27	111	2	136	18	119
Middle East & C. Asia	5	0	23	21	0	49	Rural Bank	1	0	18	0	1	0
South America	8	7	17	34	0	66	Other	18	0	0	1	3	15
Total	39	33	124	138	18	352	Total	217	136	140	213	61	289

## Note

MFIs do not add up to 353 as the institution type of the remaining MFI (in the Middle East and Central Asia region) was labeled as "other". MFIs by age do not add up to 353 as there are 3 MFIs for which this variable was unavailable.

*Robustness of results.* In order to have a measure of the robustness of the results reported, all regressions were also performed for alternative cross sections and time periods. Alternative cross-sections include all MFIs (when possible) and a sample that adds the lowest quartile (by asset size) to the main sample used (a sample of 390 MFIs). In addition, two alternative time periods were considered (1995-2009 and 2002-2009). Robustness checks were also performed by using the main cross-section sample for two alternative time periods (1995-2009, and 2002-2009). In turn, lending rate and spread regressions for 2002-2009 were also estimated with an alternative definition of borrowing rate (total financial cost divided by total borrowings, expressed in percent per year in US\$ terms).

<sup>9</sup> Borrowing rates are calculated using assets instead of total borrowing, as borrowing data is mostly available from 2002 onwards.

<sup>10</sup> Although spreads are common indicators for commercial banks, their use in the case of MFIs has created some confusion among non-experts. See MIX (2010b) and MIX (2011). This was pointed out by Adrian Gonzalez.

#### IV. AN EMPIRICAL ANALYSIS OF MICROFINANCE SYSTEMIC RISK

Krauss and Walter (2006) conducted the first empirical analysis of panel data covering large numbers of MFIs with the purpose of assessing the systemic risk of microfinance.<sup>11</sup> Using emerging market commercial banks as a benchmark, they found low correlations between MFI performance and international capital markets, mainly due to low asset exposure. Their findings also suggest low correlation with domestic GDP due to lower income and profitability exposure. Gonzalez (2007) examined 639 MFIs in 88 countries during the period 1999-2005 using MIX data. After controlling for MFI and country characteristics, he found no evidence suggesting a strong (in magnitude) and statistically significant relationship between changes in gross national income per capita and several indicators of asset quality (portfolio at risk –PAR-30-, loan loss rate and the write-off ratio). He concluded that MFI portfolios have high resilience to domestic economic shocks.

In turn, Krauss and Walter (2009) further investigated the systemic risk of microfinance activity by regressing a number of key financial variables (related to profitability, asset value, and asset quality) against the S&P 500, MSCI Global and MSCI Emerging Markets indices (as proxies of global market risk) as well as against domestic GDP (as proxy for domestic market risk). For that purpose they used MIX data for 325 MFIs for the period 1998-2006, using emerging market commercial banks and emerging market institutions as benchmarks. They found that MFIs display no statistically significant relationship with global market movements, though they are not detached from their respective domestic economies. They also enumerated possible reasons that may explain the lack of correlation with global markets. In particular, they argued that the difference observed in market risk between MFIs and other emerging market financial institutions was based on a generally nonpublic ownership structure that reduced their dependence on capital markets, lower national and international exposure of MFI clients, and lower operational and financial leverage. With data through 2006, they concluded that the correlation with global markets may increase as, for instance, the difference in financial leverage between MFIs and other financial institutions diminished.

This paper follows Krauss and Walter (2009) methodology to analyze once more the systemic risk of microfinance when the period under consideration is extended so as to include the global financial crisis. The objective is to analyze the absolute systemic risk of MFIs and identify whether the relative risk of specific MFI grouping is higher (or lower) than for the general case, when a larger cross section of MFIs is considered and for a longer period of time (1998-2009). With that in mind, a number of key variables linked with MFI performance (asset and lending real annual growth in 2005 terms, loan portfolio at risk - PAR-30-, and return on equity –ROE-), are regressed against variables that track international capital markets and domestic economic conditions. The reason behind choosing a number of indicators is that calculating the *historical market beta* is not possible for the

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<sup>11</sup> See Hermes and Lensink (2007) for a reference on other types of empirical analysis on microfinance that can be found in the literature.

MFI industry.<sup>12</sup> The working assumption is that changes in these variables must be associated with changes in the market value of these institutions.

In this regard, Table 4 shows the results of individual OLS panel regressions for the whole sample (*All MFIs*) and alternative MFI groupings. In particular, a horizontal look at Table 4 allows to see whether the performance of a specific sub-group within each MFI grouping is correlated to domestic and international conditions with the expected sign (and whether the coefficient is statistically significant at usual confidence levels); looking at the table vertically allows to see whether a specific variable linked to domestic conditions (GDP growth) or international market conditions (S&P, MSCI World, and MSCI Emerging Markets indices) are associated with the performance of different MFI groupings with the expected sign, and whether those coefficients are significant at usual confidence levels.<sup>13</sup> In turn, Table 5 shows the results of OLS panel regressions using the whole sample and an interaction term of a dummy variable for different groupings and the explanatory variable. The significance level of the interaction term provides a test for differences between institutions in different regions, institution types, legal status, purpose, and age.<sup>14</sup>

*All MFIs.* Regressions for the whole sample indicate a relatively strong association between MFI performance and indicators of domestic economic conditions and international capital markets. In this regard, asset growth (in real terms) show positive and statistically significant coefficients when regressed against domestic GDP growth, world, US and emerging capital markets conditions. Asset quality regressions show negative and statistically significant coefficients for both domestic GDP growth and all (but one) capital market performance measures. Lending growth (in real terms) and profitability show positive (as expected) and statistically significant associations against domestic economic conditions, though in the case of capital markets, the association is statistically significant only in the case of the MSCI emerging markets index.

*Regional Groupings.* Performance of MFIs in the CAC, EUR and MCE regions show the most consistent associations with both domestic and international markets. Coefficients are all positive and statistically significant for regressions linking asset growth (in constant terms) with GDP and with US and international capital markets. They are also positive and statistically significant in all cases for lending growth regressions for the CAC and MCE

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<sup>12</sup> Krauss and Walter (2009) discuss at length the differences between the historical market beta, the fundamental beta and the accounting beta, and the reasons why the use of the two former is not possible for MFIs, as these institutions are mostly non-listed with no peer group of listed firms. They point out that the use of the accounting beta may result in weaker correlations due to biases related to earnings smoothing and data constraints, (though correlations of accounting and market betas for the banking industry are generally strong).

<sup>13</sup> The results were obtained in all cases through the estimation of fixed effects regressions using OLS. The significance level of each coefficient was evaluated using White robust standard errors (that takes into consideration the possibility that errors are contemporaneously -cross-sectionally- correlated).

<sup>14</sup> Krauss and Walter (2009) use this method to compare the market risk of MFIs as a whole (i.e., without differentiating institutional type, legal status or purpose), with other financial institutions, including what they label as emerging market institutions, and emerging market commercial banks.

**Table 4. Performance Regressions (Selected Sample, 1998-2009)**

	Return on Equity (ROE)				Assets Growth				Lending Growth				Portfolio at Risk (PAR)			
	GDP growth	S&P 500	MSCI World	MSCI Emerging Markets	GDP growth	S&P 500	MSCI World	MSCI Emerging Markets	GDP growth	S&P 500	MSCI World	MSCI Emerging Markets	GDP growth	S&P 500	MSCI World	MSCI Emerging Markets
<b>All MFIs</b>	0.92***	0.23	0.32	0.39**	1.34*	0.59*	0.51*	0.38*	2.11*	0.43	0.36	0.51*	-0.28*	-0.04***	-0.03	-0.03***
R <sup>2</sup>	0.123732	0.123775	0.124210	0.125492	0.255434	0.275861	0.273452	0.273964	0.178646	0.177835	0.177090	0.189676	0.435820	0.428067	0.427155	0.428330
<b>Sub-Saharan Africa</b>	-0.41	0.84	1.05	0.70	0.75	0.45	0.37	0.27	2.67***	0.62	0.47	0.55*	-0.40***	0.00	0.01	0.01
R <sup>2</sup>	0.114961	0.115962	0.116885	0.116510	0.218710	0.256413	0.250483	0.248708	0.184632	0.185456	0.183594	0.190972	0.321137	0.307860	0.308017	0.308086
<b>Asia-Pacific</b>	2.72	-0.15	0.07	0.72	2.02*	0.39***	0.38**	0.26***	3.82*	0.21	0.26	0.44*	-0.24*	-0.03	-0.03	-0.03***
R <sup>2</sup>	0.099088	0.098226	0.098140	0.104534	0.468662	0.473687	0.475472	0.474146	0.388070	0.365121	0.367794	0.395362	0.457328	0.455333	0.455494	0.458882
<b>Central America &amp; Caribbean</b>	1.14	0.27	0.25	0.18	3.48*	0.79*	0.69*	0.51*	2.42**	0.49***	0.48**	0.56*	-0.74*	-0.15*	-0.13*	-0.09**
R <sup>2</sup>	0.584142	0.586752	0.586810	0.586899	0.230627	0.270235	0.265641	0.268622	0.117133	0.127285	0.132422	0.189487	0.329669	0.353277	0.348565	0.338692
<b>Eastern Europe</b>	1.49	0.25	0.22	0.24	2.67*	0.94*	0.80*	0.60*	2.73*	0.58	0.47	0.57*	-0.51**	-0.12***	-0.09	-0.08***
R <sup>2</sup>	0.292035	0.264203	0.262712	0.279423	0.297079	0.356654	0.341967	0.346591	0.211045	0.196809	0.190796	0.235724	0.515728	0.462658	0.447668	0.468171
<b>Middle-East &amp; Central Asia</b>	0.66*	0.19***	0.24***	0.19**	1.11**	1.20*	1.07*	0.79*	1.38*	0.96*	0.81**	0.82*	-0.02	-0.03**	-0.02	-0.01
R <sup>2</sup>	0.454380	0.453935	0.455515	0.456098	0.207435	0.274480	0.274929	0.273998	0.194784	0.210537	0.207880	0.224239	0.614711	0.617193	0.616214	0.615417
<b>South America</b>	0.89*	0.07	0.11	0.13*	-1.11	0.14	0.04	0.07	0.85	-0.01	-0.09	0.28***	-0.18**	0.01	0.01	0.00
R <sup>2</sup>	0.288235	0.281403	0.284169	0.291730	0.153529	0.152632	0.151923	0.152228	0.110182	0.109748	0.109914	0.112902	0.470554	0.458872	0.457224	0.456804
<b>Bank</b>	1.18*	0.48**	0.41**	0.16**	2.05*	0.99*	0.81*	0.61*	1.82**	0.73	0.60	0.79*	-0.21*	-0.04	-0.04	-0.03
R <sup>2</sup>	0.094191	0.104378	0.101349	0.090821	0.240145	0.304069	0.287293	0.290947	0.197918	0.201690	0.200402	0.212192	0.426866	0.413127	0.415442	0.412304
<b>NGO</b>	0.03	0.24	0.22	0.18***	-0.29	0.56*	0.47*	0.36*	0.62	0.44***	0.37	0.48*	-0.22	-0.06*	-0.05**	-0.04**
R <sup>2</sup>	0.231394	0.232631	0.232679	0.232885	0.176047	0.192239	0.190652	0.191374	0.132126	0.136056	0.135391	0.143313	0.443595	0.449158	0.448104	0.449033
<b>NBFI</b>	1.26*	-0.24	-0.04	0.50	1.77*	0.68*	0.60*	0.44*	2.41*	0.43	0.41	0.58*	-0.28*	-0.04	-0.03	-0.03***
R <sup>2</sup>	0.092010	0.091465	0.090846	0.097141	0.400748	0.422525	0.421487	0.421119	0.301023	0.287208	0.288820	0.330528	0.427009	0.410091	0.409308	0.412975
<b>Credit Union/Cooperative</b>	0.80	1.79	2.24	1.42	0.77	0.19	0.13	0.10	3.73***	0.05	-0.11	0.18	-0.52	-0.03	-0.02	-0.01
R <sup>2</sup>	0.112607	0.114822	0.116963	0.115883	0.198389	0.198851	0.193835	0.194724	0.159342	0.120909	0.121418	0.123944	0.379584	0.339794	0.338645	0.338425
<b>Rural Bank</b>	1.48*	0.05	0.06	0.05	0.68	0.17	0.17	0.11	0.76	0.21	0.19	0.15	0.24	0.10	0.10	0.07
R <sup>2</sup>	0.478659	0.466077	0.467224	0.467214	0.456761	0.466214	0.469058	0.465760	0.441140	0.452430	0.451680	0.453896	0.329641	0.395318	0.412582	0.395332
<b>Regulated</b>	0.69	0.17	0.31	0.49**	1.62*	0.62*	0.54*	0.40*	2.39*	0.45	0.39	0.56*	-0.26*	-0.02	-0.01	-0.01
R <sup>2</sup>	0.109240	0.109224	0.109581	0.111212	0.367355	0.390306	0.388302	0.388153	0.218115	0.212846	0.212292	0.231355	0.460499	0.447027	0.446247	0.446918
<b>Non Regulated</b>	1.93*	0.33**	0.34**	0.24**	0.12	0.56*	0.46**	0.35*	1.01	0.40	0.31	0.43*	-0.38*	-0.07*	-0.06*	-0.05*
R <sup>2</sup>	0.283461	0.283753	0.284659	0.284314	0.172711	0.189046	0.186479	0.187391	0.138652	0.141466	0.140593	0.147227	0.393569	0.398137	0.398359	0.399862
<b>For Profit</b>	1.09*	-0.12	0.02	0.41	1.89*	0.69*	0.60*	0.43*	2.13*	0.46	0.41	0.60*	-0.20*	-0.01	-0.01	-0.01
R <sup>2</sup>	0.098863	0.098216	0.098043	0.102655	0.388668	0.411766	0.408397	0.407492	0.234777	0.233741	0.233505	0.250775	0.397408	0.384990	0.385034	0.386278
<b>Non Profit</b>	0.78	0.47***	0.53	0.38***	0.80**	0.53*	0.45*	0.34*	2.09*	0.40***	0.32	0.45*	-0.34*	-0.06**	-0.05**	-0.04**
R <sup>2</sup>	0.129752	0.130547	0.131063	0.131017	0.178397	0.196607	0.194673	0.195744	0.135354	0.134736	0.133702	0.143521	0.443395	0.437956	0.436201	0.437151
<b>Young</b>	0.63**	0.15	0.18	0.15***	1.11**	0.78*	0.64*	0.48*	1.26*	0.75	0.55	0.67**	-0.04	-0.04	-0.02	-0.02
R <sup>2</sup>	0.468941	0.468375	0.469105	0.469401	0.269431	0.301974	0.295161	0.296954	0.196752	0.201259	0.199251	0.206435	0.593330	0.595992	0.594803	0.594608
<b>Mature</b>	1.04	0.24	0.35	0.44**	1.46*	0.55*	0.48**	0.35**	2.47*	0.36	0.32	0.48*	-0.39*	-0.04***	-0.04***	-0.03**
R <sup>2</sup>	0.115507	0.115561	0.116013	0.117449	0.250776	0.268703	0.267132	0.267403	0.159720	0.154932	0.154613	0.171766	0.398386	0.382709	0.381926	0.383600

Notes

The first number represents the regression coefficient; R<sup>2</sup>=R-squared value. Shaded cells represent coefficients with both the expected sign and that are statistically significant.

- \* 99% level of confidence.
- \*\* 95% level of confidence.
- \*\*\* 90% level of confidence

Table 5. Performance Regressions (Selected Sample, 1998-2009)

	Return on Equity (ROE)				Assets Growth				Lending Growth				Portfolio at Risk (PAR)			
	GDP growth	S&P 500	MSCI World	MSCI Emerging Markets	GDP growth	S&P 500	MSCI World	MSCI Emerging Markets	GDP growth	S&P 500	MSCI World	MSCI Emerging Markets	GDP growth	S&P 500	MSCI World	MSCI Emerging Markets
<b>Sub-Saharan Africa</b>	-1.63	0.75	0.89	0.37	-0.68	-0.18	-0.17	-0.14	0.69	0.24	0.13	0.05	-0.14	0.05***	0.05***	0.04**
R <sup>2</sup>	0.123850	0.124260	0.125041	0.125757	0.255657	0.276264	0.273893	0.274491	0.178742	0.178078	0.177185	0.189704	0.436297	0.429121	0.428813	0.430395
<b>Asia-Pacific</b>	2.00	-0.48	-0.33	0.42	0.77	-0.26*	-0.17	-0.15**	1.92	-0.28	-0.13	-0.10	0.05	0.02	0.01	0.00
R <sup>2</sup>	0.123842	0.124005	0.124341	0.125881	0.255669	0.276823	0.273966	0.274668	0.179128	0.178214	0.177191	0.189777	0.435854	0.428225	0.427227	0.428330
<b>Central America &amp; Caribbean</b>	0.23	0.05	-0.09	-0.24	2.29*	0.22***	0.21***	0.15***	0.34	0.07	0.14	0.05	-0.49***	-0.12*	-0.11*	-0.07*
R <sup>2</sup>	0.123732	0.123776	0.124216	0.125569	0.256727	0.276234	0.273853	0.274381	0.178655	0.177848	0.177152	0.189692	0.438327	0.433284	0.432310	0.432149
<b>Eastern Europe</b>	0.72	0.03	-0.12	-0.18	1.65**	0.41*	0.34**	0.26*	0.75	0.17	0.12	0.06	-0.29	-0.08	-0.07	-0.06***
R <sup>2</sup>	0.123758	0.123775	0.124223	0.125539	0.257164	0.277424	0.274807	0.275413	0.178752	0.177923	0.177146	0.189702	0.438012	0.430595	0.429178	0.431004
<b>Middle-East &amp; Central Asia</b>	-0.37	-0.05	-0.10	-0.24	-0.37	0.71*	0.66*	0.48*	-1.05	0.62*	0.52*	0.36**	0.38*	0.01	0.01	0.02
R <sup>2</sup>	0.123740	0.123776	0.124218	0.125580	0.255560	0.280663	0.278732	0.279046	0.178962	0.179128	0.178221	0.190678	0.440670	0.428104	0.427229	0.428627
<b>South America</b>	-0.03	-0.20	-0.27	-0.33***	-2.80**	-0.55*	-0.57*	-0.38*	-1.49	-0.55*	-0.57*	-0.29*	0.12	0.07*	0.05***	0.03
R <sup>2</sup>	0.123732	0.123810	0.124288	0.125719	0.258914	0.279405	0.278192	0.277902	0.179031	0.179207	0.178801	0.190539	0.436139	0.430613	0.428763	0.429590
<b>Bank</b>	0.28	0.27	0.07	-0.28	0.81***	0.38*	0.29*	0.22*	-0.39	0.31	0.25	0.29	0.09	0.00	0.00	0.00
R <sup>2</sup>	0.123735	0.123821	0.124214	0.125603	0.255846	0.277018	0.274266	0.274862	0.178676	0.178134	0.177312	0.190262	0.436016	0.428071	0.427163	0.428338
<b>NGO</b>	-1.09	0.03	-0.16	-0.35	-2.09***	-0.10	-0.09	-0.06	-1.93	0.00	-0.01	-0.08	0.07	-0.03	-0.03	-0.02
R <sup>2</sup>	0.123791	0.123776	0.124250	0.125876	0.257954	0.276056	0.273645	0.274142	0.179430	0.177835	0.177091	0.189775	0.435960	0.428763	0.427867	0.428915
<b>NBFI</b>	0.62	-0.74	-0.58	0.16	0.90***	0.15**	0.16***	0.11**	0.55	0.00	0.08	0.12***	0.01	0.01	0.00	0.00
R <sup>2</sup>	0.123760	0.124486	0.124738	0.125567	0.256256	0.276286	0.274005	0.274498	0.178746	0.177835	0.177139	0.189876	0.435823	0.428087	0.427167	0.428350
<b>Regulated</b>	-1.02	-0.18	-0.05	0.24	1.58***	0.06	0.07	0.05	1.46	0.02	0.05	0.12***	0.11	0.05*	0.05*	0.04*
R <sup>2</sup>	0.123780	0.123818	0.124214	0.125667	0.257004	0.275925	0.273576	0.274069	0.179122	0.177837	0.177108	0.189906	0.436143	0.429879	0.429556	0.430499
<b>For Profit</b>	-0.36	-0.13	-0.26	-0.42***	0.69	0.16*	0.16*	0.12*	-0.24	0.27	0.26***	0.18**	0.26**	0.02	0.01	0.01
R <sup>2</sup>	0.123741	0.123796	0.124319	0.126013	0.255917	0.276308	0.274050	0.274505	0.178665	0.178278	0.177608	0.190161	0.438543	0.428342	0.427256	0.428373
<b>Mature</b>	1.29	0.60	0.40	-0.29	-1.78**	-0.56	-0.38	-0.42**	-0.92	0.26	0.31	-0.40	0.01	-0.01	-0.01	0.01
R <sup>2</sup>	0.123988	0.124136	0.124401	0.125686	0.261990	0.278415	0.275182	0.278966	0.179251	0.178172	0.177659	0.191553	0.435724	0.428077	0.427082	0.430395

Notes

The first number represents the regression coefficient; R<sup>2</sup>=R-squared value. Shaded cells represent instances in which differences between regression coefficients is statistically significant.

\* 99% level of confidence.

\*\* 95% level of confidence.

\*\*\* 90% level of confidence

regions. In turn, all coefficients are negative (as expected) and all (but one) are statistically significant for asset quality regressions in the cases of CAC and EUR regions. There is also some evidence of links between MFI performance and domestic economic conditions and international markets in the ASP and SAC regions, in particular for asset and lending growth as well as asset quality (in the ASP region), and profitability (in the SAC region). MFIs in AFR show the weakest links with general economic conditions, with some evidence of lending growth and asset quality being associated with domestic economic conditions. In turn, Table 5 shows highly significant differences for MFIs in CAC, EUR and MCE with respect to other regions as to how responsive asset growth and asset quality are to domestic economic conditions and international capital markets. Conversely, there are highly significant (but negative) differences for MFIs in SAC and ASP with respect to the strength with which asset and lending growth are associated with domestic economic conditions and international capital markets in comparison to other regions. In turn, there is evidence that asset quality in CAC is significantly more responsive to domestic and international market conditions than that for other regions (with some evidence pointing that MFIs in EUR are more responsive to changes in international capital markets). In turn, there is evidence that asset quality of MFIs in AFR and SAC are less responsive to changes in international capital markets, and MFIs in MCE are less responsive to changes in domestic economic conditions.

*Institutional Groupings.* Banks and NBFIs performance show the most consistent links with domestic economic conditions and those of US and international markets. In this connection, the coefficients of asset growth regressions for both banks and NBFIs are all positive and statistically significant, though lending growth regressions show positive and statistically significant coefficients only against domestic economic conditions and the MSCI emerging markets index. Asset quality regressions for banks and NBFIs all show the expected negative sign and are statistically significant against domestic economic conditions, while NGOs regressions show the expected negative sign in all cases, though they are statistically significant only against international market conditions. Profitability regressions show the expected positive sign and are all statistically significantly in the case of banks, with evidence that NBFIs profitability is linked to domestic economic conditions. There is no strong empirical evidence of links between MFI performance and domestic and international capital market conditions for CUCs and rural banks. Among the reasons that explain this result are that their funding is mostly domestic (and thus links between their funding and international markets is weaker), and that their lending is mostly for consumption smoothing. Table 5 confirms these results as it shows highly significant and positive differences in coefficients for asset growth in the case of banks and NBFIs with respect to other institution types. There is some evidence that asset growth for NGOs is significantly less responsive to domestic economic conditions than for other types of institutions.

*Legal Status.* Non regulated MFIs show the most consistent associations with domestic and international economic conditions. In this regard, profitability and asset quality regressions show the expected signs and are statistically significant in all cases, while asset and lending growth, show statistically significant coefficients against indicators of international market conditions. In turn, asset and lending growth, as well as asset quality regressions for regulated MFIs show coefficients of expected signs that are statistically significant in all cases (but two). However, profitability regressions for regulated MFIs show positive

coefficients that are not statistically significant, except for that corresponding to the MSCI emerging markets index. In turn, Table 5 shows some evidence that asset and lending growth for regulated MFIs are somewhat more responsive to changes in domestic and international economic conditions, while they are less responsive to changes in international capital markets in the case of asset quality.

*Purpose.* Non-profit MFIs performance are more consistently linked with domestic and international capital market conditions. In this regard, asset growth and asset quality regressions all show coefficients with the expected sign that also are statistically significant, with strong evidence of links also for lending growth. Profitability regressions, however, show positive signs which are statistically significant only for the S&P and the MSCI emerging markets indices. Asset growth regressions in the case of for-profit MFIs show coefficients that are positive in sign and statistically significant, though asset quality and profitability regressions show expected signs, that are not statistically significant in most cases; regarding the latter, the coefficient for asset quality is statistically significant only against domestic market conditions, with the same happening for the profitability regression. Table 5 shows, in turn, that in spite of the fact that regressions for non-profit institutions show more consistent links with both domestic economic conditions and international capital markets, coefficients in asset and lending growth regressions of for-profit institutions show positive and statistically significant differences with respect to those of non-profit MFIs. Moreover there is some evidence that asset quality in the case of for-profit MFIs is less responsive to changes in domestic economic conditions, while their profitability is less responsive to changes in international capital markets.

*Age.* The performance of mature MFIs show the most consistent associations with that of domestic and international economic conditions. Asset growth and asset quality regressions all show coefficients of the expected sign that also are statistically significant; lending growth also shows positive signs that are statistically significant against domestic economic conditions, though the evidence for linkages with international capital markets is more limited. In turn, profitability regressions all show coefficients that are positive in sign, but only the coefficient against the MSCI emerging markets index is statistically significant. Asset growth regressions for younger MFIs show positive and statistically significant coefficients in all cases, though lending growth regressions show positive signs that are statistically significant only for domestic economic conditions and emerging capital markets. Asset quality regressions show negative signs but no coefficient is statistically significant. Profitability regressions show coefficients that are positive but statistically significant only for GDP growth and emerging markets. In turn, Table 5 shows that in spite of the fact that mature institutions appear more consistently linked with domestic and international market conditions, asset growth of mature MFIs are less responsive to changes to the economic environment.

### *Robustness of Results*

The results are broadly similar when regressions are estimated extending the period to 1995-2009. However, the consistency of the relationship between MFI performance and domestic economic conditions and international capital markets improves when the period considered



is shrunk to 2002-2009. In this regard, the number of coefficients with the right sign and that are statistically significant increases with respect to those obtained in regressions estimated using the period 1998-2009. In particular ROE regressions (which are the weakest for 1998-2009) show coefficients with the right sign and that are statistically significant in all cases for the CAC, MCE and SAC regions; banks and NBFIs; non-regulated MFIs; and for-profit institutions. Coefficients also show the right sign and are statistically significant in most cases for NGOs; regulated MFIs; non-profit institutions; and both young and mature MFIs. Lending growth and asset quality regressions also show the expected results at statistically significant levels in more cases than when the period 1998-2009 is considered. These results reinforce the notion that as MFIs mature, their linkages with domestic and international market conditions get stronger.

Results are also broadly similar, though somewhat weaker, when larger cross sections of MFIs are considered, in particular for the longer time periods (1995-2009 and 1998-2009). The weaker results are partially the consequence of the larger volatility introduced when smaller MFIs are considered.<sup>15</sup>

## V. AN EMPIRICAL ANALYSIS OF MICROFINANCE LENDING RATE DETERMINANTS

Lending rates on micro-credits are significantly higher than those charged by mainstream commercial banks. As the effects of the financial crisis began to be felt, the relatively high rates charged by MFIs gained the spotlight. Public debate (including criticism from the press) concentrated on the small loan sizes, the high rates, and the large profits obtained by institutions whose stated objective was to help the poor.<sup>16</sup>

As CGAP (2002) points out, the relatively high rates (even when justified by industry fundamentals) are difficult to defend in the context of uninformed public discussion, or when politicians, with full awareness of the benefits that could be derived from the increasingly large MFI clientele, exploit the issue for political advantage.<sup>17</sup> National legislatures and the

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<sup>15</sup> Results are also similar when regressions are estimated without fixed effects. The results for all regressions estimated with alternative MFI cross sections and time periods are available upon request.

<sup>16</sup> In this regard, *The New York Times* published in April 2010 that, “The fracas over preserving the field’s saintly aura centers on the question of how much interest and profit is acceptable, and what constitutes exploitation....Promotion aside, the overriding question facing the industry...remains how much money investors should make from lending to poor people...” (Neil MacFarquhar, “Banks Making Big Profits From Tiny Loans”); or in January 2011, “Politicians in developing nations, some of whom had long resented microlenders as competitors for the hearts and minds of the poor, have taken to depict lenders as profiteering at the expense of borrowers...Microloans have prompted political hostility in Bangladesh, India, Nicaragua... political activists have urged borrowers not to repay their loans in Nicaragua, Pakistan and Bolivia (Vikas Bajaj, “Microlenders, Honored with Nobel, Are Struggling”). In turn *The Guardian* published that, “Microfinance greatest challenge must be to reestablish its reputation as a force of good (Tom Cropper, “Microfinance and the fallout from the Muhammad Yunus case). Similar articles in content were published during 2010 by *The Economist* (“Microfinance in India: Discredited”, November 2010), and the *Wall Street Journal* (Eric Bellman, and Arlene Change “India’s major crisis in Microlending”, October 2010). See also MIX (2011).

<sup>17</sup> CGAP (2002) indicates that financial education (of both the public and politicians) could help reduce the bias in public discussions and result in better regulation. Moreover, CGAP (2004) points out that if MFIs are unable

(continued...)

public are usually not sufficiently informed about MFIs' cost structure, so debates are biased even when the high rates are not the result of inefficiency or excessive profits.

In consequence, the policy response has been, at times, to establish interest rate ceilings using commercial banks as the benchmark, in spite of their substantially lower administrative costs per unit of dollar lent. Interest rate caps, when set at levels that are lower than the sustainable rate, result in limited access to formal financial services by the poor. This is the case as MFIs, unable to cover their costs, reduce the scale of their operations and concentrate in the market segments that are easier to serve (usually urban and for higher sized loans). Also, interest rate caps can lead to less transparency about the costs of credit, as MFIs need to add a number of fees and commissions to break even. It goes without saying that, high interest rates do reflect, at times, higher than warranted operational costs (CGAP 2002, 2004).<sup>18</sup>

The poor generally consider ongoing access to credit more important than its cost, as the alternatives (including moneylenders, local saving circles, etc.) are usually more expensive (CGAP 2004). It is then clear that as MFI lending rates turned into a political issue, lack of understanding of the factors that contribute to their determination could result in wrong policies, affecting the access to credit of large segments of the population with the associated losses in economic efficiency.

### *The Model*

The cost structure of financial institutions that devote a substantial part of their portfolio to microcredit is fundamentally different than that of other more mainstream institutions. As CGAP (2002, 2004) point out, MFIs' lending rates need to cover the cost of funds for on-lending, the cost of risk (i.e., the expected loan loss), and administrative costs (including searching, identifying, appraising and screening clients, processing loan applications, disbursing loans, monitoring and auditing clients, collecting repayments, and following up on non-repayment). While the costs of funding and risk are proportional to loan size, administrative costs are not. In other words, for two identically-sized financial institutions, the institution with a lower average loan size per borrower will, by necessity, have a larger number of accounts, and thus will have to charge a higher interest rate to break even.

In addition to having lower average loan sizes, MFI portfolios are of a significantly shorter duration than those of more traditional financial intermediaries. The combination of a larger number of accounts with lower portfolio duration implies that, for a portfolio of a given size,

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to cover their costs and make a profit that can fuel their growth, they would likely operate only if and until their subsidies last, reaching only a small number of clients; they stress that MFIs that work in this way usually tend to be driven by the those providing the subsidies and not by client needs.

<sup>18</sup> Disintermediation would result in an effective increase in average lending rates, as moneylenders and other types of informal credit markets (in which interest rates are higher), substitute lending by MFIs. The higher average lending rates act as a disincentive to investment by low-income entrepreneurs and otherwise constrain it to suboptimal levels.

the number of transactions that MFIs need to process per unit of dollar lent are significantly higher than those for traditional commercial banks. Client and product characteristics add to administrative costs, as illiteracy, absence of formal collateral and of basic business documentation (including financial statements) make personal, face-to-face, interaction essential for loan recovery. Personal interaction can be very onerous when clients are geographically dispersed and communications are relatively costly.

Although the cost of risk is proportional to loan size, the nature of risk facing MFIs is different than that of conventional financial institutions. As CGAP (2002) highlights MFIs' portfolios are more volatile and can deteriorate faster, as they are mostly unsecured. Borrowers' incentive to repay is the expectation of future access to new loans, so delinquency can be contagious, as an increase in delinquency makes it less likely that the MFI will be able to provide future loans. As MFI costs per US\$ lent are higher than those for commercial banks, a given level of delinquency will decapitalize an MFI more quickly.<sup>19</sup> MFI institutions that maintain higher capital-asset ratios might be acknowledging this risk, and consequently, charge higher rates.

Interest rates are also influenced by MFI productivity. Even though administrative costs are usually proportionally higher for microcredit than for mainstream commercial bank lending, MFIs are much more productive than commercial banks, in the sense that each of their staff handles a significantly higher number of borrowers. Note, however, that in spite of how many clients each staff can handle, the larger the operational cost per staff (including staff compensation), the higher the lending rate that would have to be charged for the MFI to break even. Staff compensation is particularly important, because in the absence of proper supervision it could mask the payment of dividends.

Administrative costs may be higher for young MFIs that are too small to take advantage of economies of scale (CGAP 2004). Moreover, improvements in MFI productivity are likely to occur with the passage of time, as the lending technology is proven and improved through experimentation, development and adjustment, and staff becomes more experienced. Time also allows accumulating information about successful clients and the environment, establishing a stable clientele and a good reputation in the market (Caudill, Gropper and Hartarska, 2009).<sup>20</sup> Moreover, the passage of time allows establishing connections with international networks, technology transfer, and improved access to financing. Thus, more mature MFIs would be in a position to charge lower interest rates, other things equal.

Finally, a stable macroeconomic situation is a critical pre-condition for competitive microfinance. Economies that grow more are, in principle, in a better position to undertake investments in telecommunications, roads and education, which are critical for MFI

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<sup>19</sup> CGAP (2002) points out that if an MFI stops issuing repeat loans, customers lose their primary incentive to repay, which is their confidence that they will have timely access to future loans when they need them.

<sup>20</sup> Successful borrowers generate credit histories (and may even generate collateral) providing information absent at the time they were given their first loans.

efficiency improvements (CGAP 2004). Better domestic economic conditions might then result in lower lending rates.<sup>21</sup>

Taking into account these considerations, the following two models are estimated:

$$lr_{it} = c + \gamma_i + \beta_1 \cdot br_{it} + \beta_2 \cdot sz_{it} + \beta_3 \cdot bs_{it} + \beta_4 \cdot os_{it} + \beta_5 \cdot ka_{it} + \beta_6 \cdot par_{it-1} + \beta_7 \cdot y_{it} + \beta_8 \cdot age_{it} + \varepsilon_{it}$$

(+            (-)            (-)            (+)            (?)            (+)            (-)            (-)

(1)

$$spr_{it} = c + \gamma_i + \beta_2 \cdot sz_{it} + \beta_3 \cdot bs_{it} + \beta_4 \cdot os_{it} + \beta_5 \cdot ka_{it} + \beta_6 \cdot par_{it-1} + \beta_7 \cdot y_{it} + \beta_8 \cdot age_{it} + \varepsilon_{it}$$
(2)

Expression (1) states that the lending rate at time  $t$  for the MFI  $i$  ( $lr_{it}$ ) depends on the borrowing rate ( $br_{it}$ ), the average loan size ( $sz_{it}$ ), the number of borrowers per staff ( $bs_{it}$ ), the operating cost per staff ( $os_{it}$ ), the capital-asset ratio ( $ka_{it}$ ), the portfolio at risk ( $par_{it-1}$ ), the real GDP growth ( $y_{it}$ ), and MFI age ( $age_{it}$ ). Expression (2) is identical to (1), but includes the absolute spread ( $spr_{it}$ ) as the left hand-side variable, and assumes that  $\beta_1 = 1$ . The results in all cases were obtained through the estimation of fixed effects regressions using OLS.<sup>22</sup> This means that both (1) and (2) include MFI-specific constants ( $\gamma_i$ ), in addition to a general constant ( $c$ ).

The expected signs for each of the coefficients are indicated below expression (1). High interest rates (spreads) are explained by large administrative costs, usually as a consequence of small loan sizes, which result in large administrative costs per unit of US\$ lent. Loan delinquency and borrowing costs directly affect lending rates. The lower the quality of the portfolio, the lower the probability of loan recovery, and thus, the larger lending rates (spreads) should be. The efficiency with which MFIs operate also influences on the rates charged: controlling for loan sizes, less efficient MFIs will have a larger cost per unit of lending, and thus, they would charge higher lending rates (spreads). The same argument applies for productivity: given an average loan size per borrower, MFIs with higher borrowers per staff member, will be in the position to charge lower lending rates (spreads). The impact of the funding structure on lending rates (spread) is uncertain, as higher capital-asset ratios may indicate the need for larger reserves, and thus be associated with larger lending rates (spreads); at the same time, better capitalized institutions could be perceived as

<sup>21</sup> See REDCAMIF (2009) for a classification of MFI indicators into categories of productivity, efficiency, and asset quality (among other). Evidently, lending rates are also dependent on market structure. Markets with a more concentrated supply structure should be, in principle, associated with higher lending rates. However, the way in which concentration indices should be computed is not obvious (as most MFIs operate in several local markets, each likely having different levels of concentration); and the data required to produce such indices is not readily available at the global level.

<sup>22</sup> The significance level of each coefficient was evaluated using White robust standard errors. Note that to avoid simultaneity with  $y_{it}$ ,  $PAR_{it-1}$  is considered with one period lag.

stronger, and thus, be able to attract longer-term, cheaper, funding. In addition, more mature MFIs are usually in the position of exploit economies of scale, and better honed lending technologies, and thus lending rates (spreads) for older MFIs should be lower. Finally, MFIs operating in a better domestic economic environment should also be able to charge lower rates (spreads).

Tables 6 and 7 show the results of the estimation of expressions (1) and (2), respectively, for a number of MFI groupings. A horizontal look at Tables 6 and 7 allows to see whether the coefficient of a specific explanatory variable has the expected sign (and whether the coefficient is statistically significant at usual confidence levels) across MFI groupings; looking at the table vertically allows to see whether lending rates (spread) for a specific MFI grouping are explained by the proposed explanatory variables in (1) and (2) (and whether the coefficients associated with those variables are significant at usual confidence levels). The estimated regressions for alternative groups of MFI would also allow to establish whether certain fundamentals influence lending rates (spreads) through a specific (or a number) of MFI characteristics, including location, institution type, legal status, purpose, and age.

*Borrowing Rate.* The coefficient for  $br_{it}$  is positive and highly statistically significant for all MFIs and most MFI groupings. However, higher borrowing rates appear to have a larger effect on lending rates in the CAC and SAC regions; for NGOs; and for regulated MFIs. In the regression for all MFIs, a Wald test indicates that the null hypothesis of the coefficient being equal to one cannot be rejected, suggesting that results for the lending rate and spread regressions should be about similar (what indeed is the case). The contribution of borrowing rates to lending rates appear about the same in the case of for-profit and non-profit institutions, and younger and more mature MFIs

*Average Loan size.* The coefficient for  $sz_{it}$  is negative and highly statistically significant for all MFIs and MFI groupings in the lending rate regressions (and also in the spread regressions, with the exception of NGOs, where the coefficient is negative but not statistically significant). The size of the coefficient is larger for MFIs in the AFR, ASP and SAC regions; for NBFIs; for regulated institutions; and for mature MFIs. Its size, however, appears to be about the same regardless of MFI purpose (the null of coefficient equality cannot be rejected). A couple of examples could help grasping the quantitative implications of these results. Looking at the lending rate (spread) regressions for all MFIs, a US\$100 increase in the average loan size would be associated with a decrease of lending rates (and spreads) of about 0.3 percentage points; depending on MFI purpose, legal status and age, the decrease would be in the range of 0.3 – 0.4 percentage points. It would explain, however, a decrease of about 1.6 percentage points for MFIs in AFR; of about 1.1 percent for MFIs in ASP and of about 0.6 percentage points for MFIs in SAC. In particular, in the ASP region, the difference in loan sizes in 2009 for MFIs in the sample at the 80<sup>th</sup> and the 20<sup>th</sup> percentile was about US\$ 500. This would explain a difference in lending rates of about 6 percentage points.

Table 6. Lending Rate Regressions (Selected Sample, 1998-2009)

	All	AFR	MCE	All (w/o AFR & MCE)					Banks	Credit Unions/Coops.	NBFIs	NGOs	Rural Banks	For Profit	Non Profit	Reg.	Non Reg.	Young	Mature
Borrowing Rate (percent)	1.14 *	0.70	0.75 *	1.20 *	0.83 *	1.78 *	0.22	1.29 *	1.06 *	0.98 **	0.98	1.41 *	1.22 *	1.08 ***	1.30 *	1.41 *	0.73	1.26 *	1.11 **
Loan size <sub>t</sub> (,000 US\$)	-3.11 *	-15.83 ***	-5.23 *	-1.87 *	-11.26 *	-1.15 *	-2.99 *	-5.91 *	-2.26 *	-2.17 *	-4.71 *	-2.70 ***	-9.24 *	-2.75 **	-2.73 *	-3.69 *	-2.34 *	-0.67 **	-4.21 *
Borrowers/staff ratio <sub>t</sub>	-0.02 ***	-0.06 **	0.00	-0.01 **	0.00	-0.07 *	-0.07 *	-0.04 *	-0.02 ***	-0.01	-0.03	-0.02	-0.02	-0.04 ***	-0.02	-0.02 ***	-0.04 ***	0.01	-0.03 **
Op. cost/staff <sub>t</sub> (,000 US\$)	0.34 *	1.20 *	0.71 *	0.18 *	0.05 *	0.45 *	0.41 *	0.32 *	0.09	0.34 *	0.83 *	0.24 **	0.14	0.41 ***	0.26 *	0.28 **	0.62	0.20	0.40 *
Capital/Asset ratio <sub>t</sub>	0.16	-0.23	0.30 *	0.24 *	0.08 **	0.48 *	0.09 *	0.33 *	0.33 *	-0.26 ***	0.31 *	0.00	0.15	0.36 *	0.04	0.24 *	0.02	0.32 *	0.13
Portfolio-at-Risk <sub>t-1</sub> (percent of Loans)	-0.03	-0.40	0.15	0.24 *	0.15 ***	0.19	0.37 *	0.16	0.34	0.13	-0.33	-0.04	-0.07	-0.27	0.04	-0.04	-0.02	0.10	-0.05
GDP growth <sub>t</sub> (percent)	-0.03	0.13	0.00	-0.10	0.01	0.26	-0.45 *	-0.05	-0.08	-0.16	-0.29	0.36 ***	0.31	-0.04	0.01	-0.06	-0.01	0.02	-0.08
Age	-3.74 *	-9.42	-0.98	-2.32 *	-2.39 **	-1.61	-1.41 ***	-1.67 ***	-5.58 *	-5.08 *	-3.38 ***	-3.64	-0.93	-4.04 ***	-3.57 **	-4.22 *	-0.82	-1.98	-3.87 **
Constant	34.61 *	71.98 **	15.12 **	25.69 *	33.12 *	20.83 *	31.43 *	26.88 *	36.12 *	38.35 *	26.14 **	42.18 *	31.46 *	32.45 *	37.19 *	30.78 *	39.00 ***	16.96 *	37.76 *
R <sup>2</sup>	0.577232	0.433559	0.704734	0.858638	0.889381	0.854812	0.760804	0.845865	0.880066	0.724004	0.48063	0.660112	0.910198	0.517948	0.689169	0.56321	0.598422	0.8601	0.546555
Cross Sections	350	66	49	235	81	39	49	66	39	32	124	136	18	140	210	216	134	61	289
Observations	2329	429	315	1585	516	277	298	494	282	219	807	923	95	908	1421	1417	912	387	1942
Period	1998 2009	1998 2009	1999 2009	1998 2009	1998 2009	1998 2009	1999 2009	1998 2009	1998 2009	1999 2009	1998 2009	1998 2009	2001 2009	1998 2009	1998 2009	1998 2009	1998 2009	1998 2009	1998 2009

Table 7. Spread Regressions (Selected sample, 1998-2009)

	All	AFR	MCE	All (w/o AFR & MCE)					Banks	Credit Unions/Coops.	NBFIs	NGOs	Rural Banks	For Profit	Non Profit	Reg.	Non Reg.	Young	Mature
Loan size <sub>t</sub> (,000 US\$)	-3.19 *	-15.08 ***	-5.10 *	-1.97 *	-11.10 *	-1.40 *	-2.54 *	-6.45 *	-2.28 *	-2.16 *	-4.70 *	-2.95	-9.93 *	-2.79 **	-2.93 *	-3.99 *	-2.22 *	-0.76 **	-4.29 *
Borrowers/staff ratio <sub>t</sub>	-0.02 ***	-0.06 **	0.00	-0.01 ***	0.00	-0.08 *	-0.06 *	-0.04 *	-0.02 **	-0.01	-0.03	-0.03	-0.02	-0.04 ***	-0.02	-0.02 ***	-0.04 ***	0.00	-0.03 **
Op. cost/staff <sub>t</sub> (,000 US\$)	0.35 *	1.17 *	0.69 *	0.19 *	0.05 *	0.52 *	0.39 *	0.35 *	0.09	0.33 *	0.83 *	0.29 **	0.17	0.41 ***	0.29 *	0.30 **	0.61	0.21 ***	0.40 *
Capital/Asset ratio <sub>t</sub>	0.15	-0.21	0.33 *	0.22 *	0.10 *	0.39 *	0.14 *	0.32 *	0.33 *	-0.26 ***	0.31 *	-0.02	0.09	0.35 *	0.02	0.20 *	0.04	0.30 *	0.12
Portfolio-at-Risk <sub>t-1</sub> (percent of Loans)	-0.03	-0.40	0.16	0.25 *	0.15 ***	0.21 ***	0.28 *	0.20	0.34	0.13	-0.33	-0.02	-0.07	-0.27	0.06	-0.03	-0.04	0.10	-0.05
GDP growth <sub>t</sub> (percent)	-0.05	0.13	0.02	-0.15	0.03	0.20	-0.34 *	-0.17	-0.09	-0.16	-0.28 **	0.32 ***	0.32	-0.06	-0.02	-0.12 ***	0.02	0.00	-0.10
Age	-3.73 *	-9.32	-1.16	-2.31 *	-2.38 **	-1.83	-2.80 *	-1.91 **	-5.67 *	-5.08 *	-3.39 ***	-3.59	-0.97	-4.08 ***	-3.44 **	-4.21 *	-0.83	-1.91	-3.87 **
Constant	36.04 *	69.41 ***	12.57 **	27.76 *	31.38 *	30.68 *	24.84 *	30.46 *	37.18 *	38.17 *	25.96 **	45.40 *	34.56 *	33.52 *	39.37 *	34.99 *	36.44 ***	19.69 *	38.88 *
R <sup>2</sup>	0.557967	0.395964	0.734357	0.848156	0.890133	0.844238	0.718195	0.826381	0.874988	0.737915	0.454211	0.642141	0.904753	0.498461	0.672061	0.539284	0.580643	0.843587	0.528943
Cross Sections	350	66	49	235	81	39	49	66	39	32	124	136	18	140	210	216	134	61	289
Observations	2329	429	315	1585	516	277	298	494	282	219	807	923	95	908	1421	1417	912	387	1942
Period	1998 2009	1998 2009	1999 2009	1998 2009	1998 2009	1998 2009	1999 2009	1998 2009	1998 2009	1999 2009	1998 2009	1998 2009	2001 2009	1998 2009	1998 2009	1998 2009	1998 2009	1998 2009	1998 2009

Notes

R<sup>2</sup>=R-squared value. Shaded cells represent coefficients with both the expected sign and that are statistically significant.

\* 99% level of confidence.

\*\* 95% level of confidence.

\*\*\* 90% level of confidence

*Borrowers per staff ratio.* The coefficient for  $bs_{it}$  is negative and highly statistically significant for all MFIs and most MFI groupings (though it is not significant for most institution types, with the exception of banks). The size of the coefficient is largest for the CAC and EUR regions; for non-regulated MFIs; and in the case of for-profit MFIs. An increase of 50 borrowers per staff would imply a decrease in lending rates (and spreads) of about 1 percentage points; depending on MFI purpose legal status and age, the decrease would be in range between 1 – 2 percentage points. For MFIs in the CAC and EUR regions, however, the decrease could be as high as 3.5 percentage points.

*Operational cost per staff member.* The coefficient for  $os_{it}$  is positive and highly statistically significant for all MFIs and most MFI groupings, (except for banks and non-regulated MFIs). An US\$1000 increase in operational expenditures per staff per year would cause an increase in lending rates (spreads) of about 0.3 percentage points; depending on MFI institution type, legal status, purpose and age, the increase would be between 0.3 – 0.8 percentage points. From a regional perspective, the coefficient is larger for MFIs in the AFR, MCE, and CAC, regions.

*Portfolio-at-Risk ratio.* The coefficient for  $PAR_{it-1}$  is positive and statistically significant across MFIs in most regions (either in the lending rate or the spread regressions), but not for other MFI groupings, suggesting that asset quality is a characteristic more linked with location rather than with other MFI characteristics. The size of the coefficient is larger for MFIs in EUR. An increase of 1 percentage point in the ratio would result in an increase in lending rates (spreads) of about 0.2 – 0.3 percentage points, depending on the MFI location.

*GDP growth.* The coefficient for  $y_{it}$  is negative and statistically significant (either in the lending rate or spread regressions) only for the EUR region; the NBFIs; and the regulated MFIs. In this regard, an increase of 1 percentage point in GDP growth would result in a decrease in spreads of about 0.1 – 0.3 percentage points depending on MFI characteristics. Of all lending rates (spread) fundamentals, this appears to be the one that appears least consistently across MFI groupings.

*Capital-Asset ratio.* The coefficient for  $ka_{it}$  is positive and statistically significant for most MFI groupings, though not statistically significant for the sample of all MFIs. This result seems to suggest that MFIs that maintain larger capital-asset ratios are those that need to do so, given expected decapitalization risks. Overall, results suggest that a 1 percentage point of additional capital-assets ratio would result in an increase of lending rates (spreads) of between 0.2 – 0.4 percent, depending on the particular MFI characteristics.

*Age.* The coefficient for this variable is negative and statistically significant for all MFIs and most MFI groupings. In particular, a MFI passing from “young” to “middle-aged”, would result in a decrease of lending rates (spreads) of about 4 percentage points, and going from “middle-aged” to “mature”, would result in another 4 percentage point decrease. The importance of age is most significant for banks, CUCs, for-profit MFIs and regulated institutions. Together with loan size, it appears to be the most important determinant of lending rates (spreads). For instance, the difference in lending rates (spreads) charged by

young MFI bank in comparison to those charged by a mature MFI bank would be of about 12 percentage points.

### *Robustness of Results*

The reported results are robust to changes in the sample period and to an increase in the cross-sections. However, results are somewhat stronger (in the sense of a larger number of coefficients with the right sign that are statistically significant), when the period considered is 2002-2009. This suggests that as MFI matured, their behavior seems to converge to a common model regardless of location, institution type, legal status or purpose. Results are somewhat weaker when a larger MFI cross-section is used, mostly due to the higher variability that the incorporation of smaller MFIs introduces into the sample.

## **VI. SUMMARY AND POLICY IMPLICATIONS**

Contrary to what was believed prior to the global financial crisis of 2007-2008, the links of the microfinance industry with both domestic economic conditions and changes in international capital markets have grown stronger. The large rates of growth observed during the most part of the last two decades in MFIs across the globe has resulted in an increase in the scale with which they operate, has forced the industry to diversify their funding structure (away from government subsidies, subsidized lending, and donor programs, and into commercial-type borrowings), has increased their client base to incorporate those operating in the domestic formal sector, and has resulted in the adoption of better management practices and information systems. A large number of MFIs that were created as non-profit NGOs have transformed themselves into regulated financial institutions that are partially funded with private capital. In addition, the large rates of growth have caused that microcredit has come to represent a significant share of both GDP and of credit to the private sector in a number of countries, making it relevant from a macroeconomic perspective. All these transformations have contributed to increase the systemic risk of the microfinance industry, as the links between MFIs and the general economic environment (both domestic and external) grew stronger.<sup>23</sup>

Although these links are consistently observed across a number of regions, institution types, legal status, MFI purpose and age, the systemic risk of some MFI groupings appears to be higher. From a regional perspective, the results suggest that systemic risk is higher for MFIs operating in the CAC and EUR regions, while it is lower for those in the ASP and SAC regions. From an institutional perspective, the systemic risk of banks and NBFIs appears to be higher, while there is evidence that for NGOs is lower. There is also some evidence that

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<sup>23</sup> It goes without saying that the fact that MFIs have grown more linked to domestic economic conditions and international capital markets does not mean that these institutions are now up to the standards of more mainstream financial institutions. On the contrary, a number of MFIs still suffer from an absence of a solid track record, poor reporting standards, heterogeneous products, and inadequate liquidity. This is also true for dedicated microfinance funds, which generally invest in privately placed, relatively illiquid assets and are therefore unable to report pricing on a daily basis (See Krauss and Walter 2009).



the systemic risk of for-profit institutions and younger MFIs is higher in comparison with that of non-profit MFIs and more mature institutions.

In addition to highlighting the links between the microfinance industry and general economic conditions, the global financial crisis brought into the fore the relatively high interest rates that MFIs charge to their usually low-income customers. The issue was a popular one in the press and among policy makers, as the high growth observed in the microfinance industry during the previous two decades has resulted in a deep and extended customer base. The risk however, was that uninformed policy-making and public debate could result in regulations that would threaten the industry's sustainability and scale.

In this connection, the empirical evidence suggests that more productive and efficient MFIs charge lower lending rates (spreads) across a number of MFI groupings. Moreover, MFIs with lower average loan sizes per customer charge higher lending rates (spreads), given the larger administrative costs associated with a larger number of accounts and with portfolios of very short-term durations. Loan size is important as a lending rate (spread) fundamental regardless of MFI location, institutional type, legal status, purpose or age. Interestingly, the evidence suggests that MFI's age is negatively associated with lending rates and spreads. This finding is consistent with previous research that highlighted that, as MFI mature, their lending technologies get tested and their staff becomes more knowledgeable, what allows MFIs to charge lower lending rates, other things equal.

From a regulatory perspective, the paper's findings reinforce, for the most part, a number of recommendations that can be found elsewhere (in particular in CGAP, 2000, 2002 and 2004). However, the fact that the microfinance industry has grown more linked to domestic economic conditions and international capital markets makes it more vulnerable to unwarranted changes in regulation. This is the case, as MFI funding is nowadays less dependent on "mission" and thus, more dependent on "sustainability" (what means a large probability of repayment).<sup>24</sup> Inappropriate regulation (like blanket loan restructurings at below market interest rates, or interest rate caps taking mainstream commercial banks' lending rates as benchmarks), would likely result in a withdrawal of funding, a reduction in MFI scale, an increase in MFI average loan sizes, and an increase in the effective interest rates that low-income customers pay (as disintermediation favors moneylenders and other informal credit suppliers that charge higher rates), with the associated losses in economic efficiency.

The results also suggest that if the policy objective is to reduce interest rates, regulation should, in principle, aim at creating an enabling environment (a market structure) in which MFIs can operate, test their lending technology, introduce innovations allowing increases in productivity and efficiency, and exert a competitive pressure on each other. More mature MFIs are able to spread their fixed costs over a larger number of loans; are likely to have learned how to better screen and select their clients, and where to cut costs and streamline

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<sup>24</sup> It should be said, however, that relative to other financial markets, there is still a relatively narrow base of institutions that invest in MFIs.

processes; and, are more likely to have the muscle to invest in technologies that reduce costs. As innovation occurs in those MFIs that “survive”, technology transfers to younger MFIs would be most likely if regulation, while protecting customers rights and ensuring MFI transparency and truth in lending, avoids outright inappropriate policies (as interest rate caps), and chooses appropriately between prudential and non-prudential principles depending on the industry’s local characteristics. Moreover, as regulation itself is costly (because of the additional requirements to which regulated institutions are subject and the supervision cost), over-regulation should be avoided. Strengthening the legal frameworks, including through the generalization of the use of credit bureaus, of better corporate governance principles, and of timely reporting on a standard basis would also contribute to avoid boom-bust dynamics, while limiting the lending rate spikes that occur as portfolios deteriorate sharply.

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## ANNEX

*Countries represented in each regional grouping*

The list below includes the countries –and number of MFIs located in each of them- that are represented in the sample considered in the paper.

*Sub-Saharan Africa* (Benin -5-, Burkina Faso -2-, Cameroon -3-, Congo (Democratic Republic) -1-, Republic of Congo -1-, Ethiopia -7-, Ghana -2-, Guinea -1-, Kenya -8-, Madagascar -5-, Mali -6-, Mozambique -1-, Malawi -2-, Niger -1-, Nigeria -2-, Rwanda -1-, Senegal -4-, Swaziland -1-, Chad -1-, Togo -2-, Tanzania -3-, Uganda -5-, South Africa -1-, Zimbabwe -2-).

*Asia-Pacific* (Bangladesh -18-, Indonesia -3-, India -14-, Cambodia -10-, Sri Lanka -1-, Mongolia -2-, Nepal -9-, Philippines -22-, Thailand -1-, Vietnam -2-).

*Central America and the Caribbean* (Costa Rica -2-, Dominican Republic -3-, Guatemala -4-, Honduras -5-, Haiti -4-, Mexico -3-, Nicaragua -13-).

*Eastern Europe* (Albania -5-, Bulgaria -4-, Bosnia & Herzegovina -13-, Kosovo -5-, Former Yugoslav Republic of Macedonia -4-, Poland -2-, Romania -5-, Russia -5-, Serbia -4-, Slovenia -5-, Ukraine -2-).

*Middle East and Central Asia* (Afghanistan -1-, Armenia -6-, Azerbaijan -5-, Egypt -6-, Georgia -5-, Jordan -4-, Kazakhstan -2-, Kyrgyz Republic -3-, Lebanon -1-, Morocco -7-, Pakistan -4-, West Bank & Gaza -3-, Tajikistan -2-, Tunisia -1-).

*South America* (Argentina -1-, Bolivia -9-, Brazil -5-, Chile -1-, Colombia -9-, Ecuador -19-, Peru -18-, Paraguay -3-, Venezuela -1-).

Table A1: Description of Data Set. Location

Sub Saharan Africa								
	No. of observations	No. of Institutions	Average No. of Observations	Median	Mean	5 perc. (%)	95 perc. (%)	SD
<b>1998-2006</b>								
Assets (% increase)	344	65	5.3	34.8	38.8	-12.4	105.2	37.4
Lending (% increase)	343	65	5.3	40.8	57.5	-19.9	142.5	152.1
Constant Lending (% increase)	342	64	5.3	32.1	50.8	-20.0	136.3	147.2
Borrowing (% increase)	126	47	2.7	40.9	98.0	-48.2	359.4	189.7
PAR	341	62	5.5	4.3	8.3	0.2	27.3	12.7
Write-Offs (% portfolio)	236	51	4.6	1.4	2.6	0.0	9.2	3.9
ROE	347	63	5.5	4.5	23.5	-53.6	36.5	469.4
<b>2007-2009</b>								
Assets (% increase)	200	67	3.0	22.2	27.2	-10.2	81.4	30.9
Lending (% increase)	200	67	3.0	24.1	31.8	-14.4	100.1	52.5
Constant Lending (% increase)	196	66	3.0	14.0	21.9	-23.1	75.3	47.7
Borrowing (% increase)	157	54	2.9	21.7	157.9	-38.5	434.3	1023.4
PAR	188	65	2.9	5.7	8.0	1.1	22.2	8.3
Write-Offs (% portfolio)	147	52	2.8	1.8	3.3	0.1	9.8	6.4
ROE	196	67	2.9	6.4	6.4	-68.9	39.0	114.0
<b>Asia Pacific</b>								
	No. of observations	No. of Institutions	Average No. of Observations	Median	Mean	5 perc. (%)	95 perc. (%)	SD
<b>1998-2006</b>								
Assets (% increase)	377	82	4.6	36.1	53.1	2.3	193.2	61.2
Lending (% increase)	378	82	4.6	38.4	59.2	-0.4	215.3	72.6
Constant Lending (% increase)	385	82	4.7	35.2	53.7	-8.1	195.6	72.0
Borrowing (% increase)	177	67	2.6	49.2	87.6	-40.6	347.5	144.3
PAR	376	79	4.8	3.6	5.7	0.1	18.8	6.4
Write-Offs (% portfolio)	226	51	4.4	0.9	1.9	0.0	6.9	2.8
ROE	389	82	4.7	11.8	18.5	-19.3	84.3	251.8
<b>2007-2009</b>								
Assets (% increase)	246	82	3.0	28.0	39.9	-7.1	127.4	46.4
Lending (% increase)	246	82	3.0	28.6	39.9	-8.0	113.3	46.3
Constant Lending (% increase)	240	81	3.0	21.0	29.9	-14.6	93.6	42.1
Borrowing (% increase)	231	78	3.0	34.9	65.9	-32.9	221.5	143.2
PAR	237	80	3.0	3.7	6.1	0.1	18.1	9.7
Write-Offs (% portfolio)	158	56	2.8	0.5	1.0	0.0	4.3	1.6
ROE	242	82	3.0	14.0	15.9	-10.0	55.6	32.5
<b>Central America, the Caribbean and Mexico</b>								
	No. of observations	No. of Institutions	Average No. of Observations	Median	Mean	5 perc. (%)	95 perc. (%)	SD
<b>1998-2006</b>								
Assets (% increase)	187	39	4.8	31.7	34.5	-6.5	94.3	31.9
Lending (% increase)	187	39	4.8	33.1	39.5	-10.9	108.7	42.1
Constant Lending (% increase)	184	39	4.7	30.3	34.5	-20.8	89.0	42.9
Borrowing (% increase)	101	34	3.0	51.0	97.4	-28.2	264.0	269.2
PAR	216	39	5.5	4.2	6.2	0.7	18.7	7.3
Write-Offs (% portfolio)	161	35	4.6	1.4	2.5	0.2	8.3	2.9
ROE	195	37	5.3	13.6	8.0	-23.3	48.1	50.9
<b>2007-2009</b>								
Assets (% increase)	117	39	3.0	10.2	15.7	-20.9	57.8	42.8
Lending (% increase)	117	39	3.0	9.7	16.2	-26.3	58.7	46.3
Constant Lending (% increase)	117	39	3.0	8.7	12.8	-25.2	58.6	41.8
Borrowing (% increase)	108	38	2.8	10.8	41.7	-38.5	155.4	168.0
PAR	116	39	3.0	6.7	9.6	2.0	28.6	8.8
Write-Offs (% portfolio)	105	36	2.9	2.3	3.6	0.4	11.5	3.8
ROE	116	39	3.0	7.3	-4.8	-87.1	33.8	61.1

**Table A1 (cont.): Description of Data Set. Location**  
**Eastern Europe**

	No. of observations	No. of Institutions	Average No. of Observations	Median	Mean	5 perc. (%)	95 perc. (%)	SD
<b>1998-2006</b>								
Assets (% increase)	232	49	4.7	43.9	56.7	-4.6	156.4	57.5
Lending (% increase)	232	49	4.7	49.0	63.6	-4.5	176.4	66.4
Constant Lending (% increase)	220	49	4.5	32.0	41.0	-13.9	128.9	49.9
Borrowing (% increase)	114	42	2.7	52.0	96.0	-20.8	329.6	185.1
PAR	222	49	4.5	1.2	3.0	0.1	14.3	4.9
Write-Offs (% portfolio)	180	40	4.5	0.6	1.2	0.0	3.5	1.9
ROE	230	49	4.7	9.1	9.4	-10.3	34.5	21.3
<b>2007-2009</b>								
Assets (% increase)	147	49	3.0	17.3	23.6	-25.3	93.6	40.2
Lending (% increase)	147	49	3.0	16.2	23.0	-29.6	97.3	41.4
Constant Lending (% increase)	147	49	3.0	11.3	14.7	-26.7	64.0	30.1
Borrowing (% increase)	143	48	3.0	18.4	72.8	-48.4	222.0	312.2
PAR	147	49	3.0	3.4	5.9	0.5	21.4	6.6
Write-Offs (% portfolio)	124	42	3.0	1.3	2.4	0.1	8.6	3.3
ROE	146	49	3.0	4.8	4.3	-35.7	35.9	42.8
<b>Middle East and Central Asia</b>								
	No. of observations	No. of Institutions	Average No. of Observations	Median	Mean	5 perc. (%)	95 perc. (%)	SD
<b>1998-2006</b>								
Assets (% increase)	257	49	5.2	36.8	56.6	-5.2	173.1	72.3
Lending (% increase)	258	50	5.2	52.1	77.3	-7.7	228.6	132.9
Constant Lending (% increase)	251	50	5.0	43.4	73.7	-3.3	223.0	137.5
Borrowing (% increase)	125	46	2.7	76.8	174.5	-23.0	745.0	316.6
PAR	258	47	5.5	1.7	4.9	0.2	18.4	9.7
Write-Offs (% portfolio)	182	38	4.8	0.6	1.8	0.0	7.2	3.3
ROE	254	49	5.2	6.0	-1.0	-24.1	26.1	77.6
<b>2007-2009</b>								
Assets (% increase)	150	50	3.0	19.7	34.6	-18.6	122.0	54.0
Lending (% increase)	150	50	3.0	25.4	36.2	-24.4	136.5	55.3
Constant Lending (% increase)	148	50	3.0	11.2	19.5	-26.3	88.5	43.4
Borrowing (% increase)	145	49	3.0	25.9	124.0	-25.8	254.2	777.4
PAR	142	48	3.0	2.2	5.1	0.2	24.9	8.8
Write-Offs (% portfolio)	126	46	2.7	0.7	2.1	0.0	8.8	3.9
ROE	149	50	3.0	12.5	2.4	-36.0	36.4	55.4
<b>South America</b>								
	No. of observations	No. of Institutions	Average No. of Observations	Median	Mean	5 perc. (%)	95 perc. (%)	SD
<b>1998-2006</b>								
Assets (% increase)	361	64	5.6	33.5	49.4	-8.1	116.7	119.9
Lending (% increase)	361	64	5.6	34.5	56.0	-11.6	163.1	159.5
Constant Lending (% increase)	362	64	5.7	29.4	48.8	-11.7	148.0	147.9
Borrowing (% increase)	175	58	3.0	43.6	387.9	-26.9	321.1	3536.1
PAR	384	62	6.2	4.1	5.1	0.4	13.6	4.6
Write-Offs (% portfolio)	270	53	5.1	1.2	2.3	0.1	7.9	4.1
ROE	369	64	5.8	12.0	12.6	-17.2	43.0	30.8
<b>2007-2009</b>								
Assets (% increase)	197	66	3.0	29.2	31.0	-9.0	81.3	28.8
Lending (% increase)	197	66	3.0	27.8	28.5	-11.4	74.9	28.2
Constant Lending (% increase)	197	66	3.0	17.4	19.8	-17.9	69.9	28.5
Borrowing (% increase)	190	64	3.0	22.6	50.8	-27.4	175.9	132.2
PAR	190	65	2.9	3.5	4.3	0.7	10.1	3.5
Write-Offs (% portfolio)	174	60	2.9	1.2	2.4	0.2	7.1	3.9
ROE	197	66	3.0	11.7	12.6	-7.8	37.3	21.0

Source: Author's calculations and Microfinance Information Exchange (MIX).

Table A2 (cont.): Description of Data Set. Type of Institution

Non-Government Organizations								
	No. of observations	No. of Institutions	Average No. of Observations	Median	Mean	5 perc. (%)	95 perc. (%)	SD
<b>1998-2006</b>								
Lending Rate (percent)	689	134	5.1	38.5	45.4	21.7	85.3	27.6
Spread (percent)	645	131	4.9	33.6	40.6	18.9	80.4	25.2
Loan Size (US\$)	808	138	5.9	179.0	465.0	53.0	2274.1	882.1
Borrowers/staff ratio	809	138	5.9	130.0	154.5	41.0	305.6	132.3
Operational/staff (,000 US\$)	691	135	5.1	962.0	1019.4	137.8	2338.8	698.4
Capital/Asset ratio	817	138	5.9	50.4	50.3	9.6	95.4	27.5
<b>2007-2009</b>								
Lending Rate (percent)	410	135	3.0	36.1	42.4	22.4	79.8	24.9
Spread (percent)	399	132	3.0	31.1	37.4	17.5	76.4	25.0
Loan Size (US\$)	413	138	3.0	283.0	567.9	79.0	1504.6	1245.6
Borrowers/staff ratio	411	138	3.0	137.0	158.9	60.5	298.5	121.0
Operational/staff (,000 US\$)	407	135	3.0	1266.5	1290.3	189.2	2828.7	864.8
Capital/Asset ratio	414	138	3.0	32.7	36.2	3.5	82.1	24.6
<b>Rural Banks</b>								
	No. of observations	No. of Institutions	Average No. of Observations	Median	Mean	5 perc. (%)	95 perc. (%)	SD
<b>1998-2006</b>								
Lending Rate (percent)	63	18	3.5	39.2	38.8	21.2	55.4	10.2
Spread (percent)	63	18	3.5	33.4	33.6	17.3	50.7	9.9
Loan Size (US\$)	78	18	4.3	296.5	401.2	121.3	1040.4	352.9
Borrowers/staff ratio	78	18	4.3	123.0	123.9	47.7	212.0	51.8
Operational/staff (,000 US\$)	63	18	3.5	775.0	727.0	202.3	1230.0	335.8
Capital/Asset ratio	79	18	4.4	14.6	16.0	8.8	24.1	6.7
<b>2007-2009</b>								
Lending Rate (percent)	54	18	3.0	33.7	34.6	18.6	51.0	10.4
Spread (percent)	54	18	3.0	29.3	29.8	14.1	45.7	10.5
Loan Size (US\$)	53	18	2.9	445.0	582.2	131.6	1437.6	451.5
Borrowers/staff ratio	53	18	2.9	126.0	142.8	45.2	221.8	137.5
Operational/staff (,000 US\$)	54	18	3.0	898.1	1232.3	350.6	1755.9	1978.1
Capital/Asset ratio	54	18	3.0	14.3	15.4	8.6	26.1	5.5

Source: Author's calculations and Microfinance Information Exchange (MIX).

	observations	Institutions	Average No. of Observations	Median	Mean	5 perc. (%)	95 perc. (%)	SD
<b>1998-2006</b>								
Lending Rate (percent)	641	120	5.3	35.5	41.1	16.9	79.7	31.8
Spread (percent)	594	119	5.0	31.2	36.6	14.3	74.5	31.6
Loan Size (US\$)	748	123	6.1	500.0	926.8	58.0	3380.0	1290.9
Borrowers/staff ratio	748	123	6.1	104.0	129.6	27.0	315.5	93.1
Operational/staff (,000 US\$)	639	120	5.3	1406.7	1509.5	215.0	3315.5	1048.5
Capital/Asset ratio	755	123	6.1	36.4	43.2	6.0	96.7	31.1
<b>2007-2009</b>								
Lending Rate (percent)	364	121	3.0	31.4	36.5	17.1	65.1	29.4
Spread (percent)	354	119	3.0	25.1	30.2	13.9	59.5	28.4
Loan Size (US\$)	371	123	3.0	963.0	1532.9	119.5	5812.5	1969.8
Borrowers/staff ratio	364	123	3.0	113.5	141.6	38.2	333.3	114.9
Operational/staff (,000 US\$)	361	121	3.0	1853.1	1974.0	325.5	4075.7	1280.3
Capital/Asset ratio	372	124	3.0	21.7	28.0	8.7	76.2	19.2



Table A3: Description of Data Set. Legal Status

Non-Regulated Institutions								
	No. of observations	No. of Institutions	Average No. of Observations	Median	Mean	5 perc. (%)	95 perc. (%)	SD
<b>1998-2006</b>								
Lending Rate (percent)	666	131	5.1	38.1	45.6	21.5	86.7	28.0
Spread (percent)	628	128	4.9	33.0	40.1	17.8	81.4	25.6
Loan Size (US\$)	786	136	5.8	205.0	572.5	54.0	2698.0	1067.5
Borrowers/staff ratio	787	136	5.8	127.0	145.7	36.3	290.7	126.7
Operational/staff (,000 US\$)	666	132	5.0	999.3	1068.9	138.4	2462.6	752.8
Capital/Asset ratio	794	136	5.8	46.0	47.9	8.6	94.8	28.6
<b>2007-2009</b>								
Lending Rate (percent)	404	136	3.0	36.1	43.3	21.1	80.4	33.2
Spread (percent)	397	134	3.0	30.9	38.0	16.4	76.5	33.3
Loan Size (US\$)	408	136	3.0	337.5	791.1	79.0	2163.1	1792.8
Borrowers/staff ratio	406	136	3.0	132.5	150.0	49.0	282.0	109.0
Operational/staff (,000 US\$)	402	136	3.0	1330.5	1382.6	192.6	3044.0	972.7
Capital/Asset ratio	408	136	3.0	32.5	36.0	5.9	80.9	23.7
Regulated Institutions								
	No. of observations	No. of Institutions	Average No. of Observations	Median	Mean	5 perc. (%)	95 perc. (%)	SD
<b>1998-2006</b>								
Lending Rate (percent)	1120	211	5.3	34.7	38.4	17.0	78.4	61.2
Spread (percent)	1063	210	5.1	29.8	33.8	13.7	73.1	62.0
Loan Size (US\$)	1299	215	6.0	515.0	1001.7	60.0	4089.7	1381.9
Borrowers/staff ratio	1298	215	6.0	107.5	132.9	25.0	335.2	104.6
Operational/staff (,000 US\$)	1120	211	5.3	1297.6	1498.2	211.4	3436.2	1069.4
Capital/Asset ratio	1312	216	6.1	27.3	37.5	5.0	95.0	29.1
<b>2007-2009</b>								
Lending Rate (percent)	642	217	3.0	30.7	33.6	16.6	60.5	16.1
Spread (percent)	627	211	3.0	24.5	28.1	12.7	54.5	14.7
Loan Size (US\$)	648	217	3.0	978.0	1668.6	124.4	6047.9	2088.3
Borrowers/staff ratio	640	217	2.9	109.0	134.9	35.0	317.1	114.3
Operational/staff (,000 US\$)	637	217	2.9	1830.8	1976.2	338.1	4037.7	1353.4
Capital/Asset ratio	651	217	3.0	18.9	24.4	6.9	68.9	18.9

Source: Author's calculations and Microfinance Information Exchange (MIX).