The vulnerability of microfinance to financial turmoil – evidence from the global financial crisis

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Abstract

Has microfinance "normalised" and also become crisis-prone like other sources of finance, and if so, why? This paper provides empirical evidence suggesting that the long-held view that microfinancing is a more stable source of finance than bank financing need to be revisited in light of the strong negative impact that the global financial crisis of 2007/09 had on new loans granted by microfinance institutions. This impact is most pronounced for microfinance institutions with higher credit growth prior to the crisis and institutions operating in Eastern Europe and Central Asia. These results are in line with evidence on credit boom and busts in the traditional banking sector and on the determinants of bank credit developments in emerging markets during the global financial crisis. Moreover, there is some evidence suggesting that the crisis impact was stronger for microfinance institutions operating as banks compared to institutions with other legal status. Microfinance has therefore become also vulnerable to financial turmoil, because it has adopted the cyclical behaviour of the traditional banking sector.

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JEL classification: E44, G21, O11, F30

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1.   Introduction

Over the last decade microfinance has gained reputation as an effective tool to alleviate poverty and foster growth and employment in developing countries and emerging market economies by providing loans and other financial services to poor households and microentrepreneurs neglected by traditional banks (Allen et al. 2011, World Bank 2008, Rajan 2006). Moreover, microfinance has been seen as an exception to the inherent instability of finance. Conservative credit technologies, the alleged flexibility of microenterprises and the low level of integration of microfinance in the domestic and international financial system seemed to isolate microfinance from turmoil in traditional financial sectors (Patten et al. 2001, Krauss and Walter 2009, Gonzalez 2007, Galema et al. 2011).[1] As a result, until recently (Basel Committee on Banking Supervision 2010, Dittus and Klein 2011) financial stability aspects of microfinance and financial inclusion have received little attention (IMF 2005).

The global financial crisis has changed this. Already at an early stage anecdotal evidence from practitioners (Centre for the Study of Financial Innovation 2008, Littlefield and Kneiding 2009) indicated that previous results on the crisis resilience of microfinance are no longer valid, as

1. microfinance institutions are no longer isolated from mainstream finance because MFIs have increasingly turned to domestic and international capital markets, commercial banks and microinvestment vehicles, for raising funds to foster credit growth (Gaul 2010, El-Zoghbi et al. 2011).

2. the recession following the global financial crisis was so deep and all-embracing that even flexible microenterpreneurs were hit hard.

3. in the pre-crisis period microfinance institutions applied their conservative credit technologies in a less rigorous way (Chen et al. 2010). There were several reasons for this. First, a rise in competition (Assefa et al. 2010) made it more difficult to successfully apply dynamic incentives microfinance credit technologies rely upon (Armendáriz and Morduch 2010). Second, MFIs engaged in substantial hiring efforts to manage the rise in lending activities (see e.g. Zeitinger 2010). Thus, staffing became a major risk the industry was exposed to (Centre for the Study of Financial Innovation 2008), as a large pool of inexperienced loan officers issued loans in an environment

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[1] Wagner (2012) provides an overview about the early literature on microfinance and financial crises.

characterized by optimism and the expectation of strong growth.[2] When clients' financial and macroeconomic conditions deteriorated, substantial problems of over-indebtedness emerged (Kappel et al. 2011).

Anecdotal evidence has been increasingly supported by an emerging literature suggesting that microfinance has become more crisis-prone. Di Bella (2011) shows that by including the crisis years 2008 and 2009 in the analysis MFI performance is found to be significantly correlated with domestic and international financial and economic conditions, contradicting earlier evidence. Wagner and Winkler (2011) find that the pattern of pre-crisis MFI credit growth is influenced by similar factors that are highlighted in the literature on credit booms in the traditional banking sector (Mendoza and Terrones 2008). Finally, Gonzalez (2011) presents evidence suggesting that the rise in MFI vulnerability largely reflects the experience of those MFIs that have diverted from the original target group of (informal) microbusinesses by increasingly turning to (consumer) lending to salaried workers.

We contribute to this literature by providing econometric evidence on the question whether microfinance has adopted the boom-bust pattern in credit growth characterizing traditional finance. Our analysis is based on 2000 – 2009 credit growth data from 655 microfinance institutions (MFIs) operating in 80 emerging market countries. We find evidence that microfinance has become vulnerable to financial turmoil by following the boom-bust pattern characterizing the traditional financial sector (Tornell and Westermann 2002, Aisen and Franken 2010, IMF 2010): MFIs with higher credit growth in the pre-crisis period recorded a stronger credit contraction during the crisis. Moreover, like in the traditional banking sector (IMF 2011), the boom-bust pattern was more pronounced in Eastern Europe and Central Asia and less developed in South Asia. Overall, our results provide justification for the increasing attention policymakers, central bankers and regulators pay to financial stability challenges in microfinance.

The paper is structured as follows. After this introduction we present the data and the methodology of our analysis (section 2). Section 3 contains our main results and is followed by some robustness checks (section 4). The paper ends with a summary and conclusions.

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[2] Empirical evidence (Behr, Entzian and Güttler 2011) suggests that experienced MFI loan officers are less likely to approve loan applications, i.e. are more risk averse in accepting clients than newly hired staff. .

2.   Data and methodology

2.1 Data description

Our analysis is based on MFI data retrieved from Mix Market.[3] We exclude those institutions where microfinance accounts for less than 80% of total activities. We also do not take into account countries where the fiscal year ends between April and September as the respective MFI data does not correspond to the annual data on macroeconomic and structural variables.[4] Finally, we disregard institutions providing less than three consecutive years of data and MFIs from Afghanistan, Kosovo, Palestine, Montenegro, Uzbekistan, Guinea, Iraq, East Timor, Serbia, Lebanon and Syria as country data is available to a limited extent only.

In our panel estimates we take annual data for 655 MFIs in 80 countries over the period 2000-2009.[5] As the number of MFIs reporting to Mix Market increases from 2000 onwards, we have an unbalanced panel, e.g. in 2000 our sample contains data of 97 MFIs while we have 655 MFIs in 2008, serving more than 53 million borrowers with a total outstanding portfolio of about USD 24 billion. In the cross-section analysis we take annual data for 461 MFIs in 51 countries over the period 2004-2007.[6] In terms of regions our sample consists of 124 MFIs (74) from Sub-Saharan Africa (SSA), 67 (53) from East-Asia and the Pacific (EAP), 164 (90) from Eastern Europe and Central Asia (ECA), 231 (192) from Latin America (LAC), and 69 (52) from South Asia (SA).[7]

For each MFI we have information on its current legal status. We have 43 (33) banks, 129 (61) credit unions, 257 (191) NBFIs and 226 (176) NGOs in our sample.[8] While micro-banks

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[3] Mix Market is a platform that focuses on providing consistent data on MFIs balance sheets and performance. Reporting is voluntarily and data entry reviewed and cross-checked by Mix Market analysts. The majority of MFIs provide data supported by audited financial statements or rating reports. Hence, the sample represents a random sample of better and best managed MFIs worldwide (Krauss and Walter 2009) but not a random sample of all MFIs operating worldwide.

[4] This mainly affects MFIs from Asia, in particular from Bangladesh and Nepal.

[5] Appendices 1 – 3 provide detailed information on the variables used, descriptive statistics and information on pairwise correlations of variables.

[6] In our cross-section analysis we exclude all countries with less than 3 MFIs reporting to Mix Market.

[7] The first number refers to the panel sample, the number in brackets to the cross-section sample. Due to the limited number of MFIs reporting, our sample does not include MFIs from the Middle East and North Africa (MENA).

[8] We exclude the Mix Market category „Rural bank" as there are only few institutions with this legal form almost exclusively operating in South Asia.

are profit orientated, regulated by a supervisory agency or the central bank and are able to provide a range of financial services including deposit taking, NGOs follow a non-profit approach, are not regulated and hence not authorized to take deposits. Credit Unions are regulated member based financial intermediaries providing specific financial services including deposit taking to their members. NBFIs are regulated institutions that offer financial services similar to those of banks but do not participate in the national payment systems as they are usually not allowed to offer current accounts. Banks and most NBFIs are for-profit institutions, while NGOs and many credit unions are non-profit institutions. Thus, our sample consists of 235 (174) profit- and 420 (288) non-profit institutions.

In terms of size, micro banks are by far the largest type of institution in our sample. In the panel sample the median size of banks is around USD 43.6 million. NGOs are considerably smaller with a median size of USD 2.1 million. A similar pattern emerges for the median number of borrowers, which is close to 48,000 for banks and about 9,100 for NGOs.

[Insert Table 1a and 1b here]

2.2 Methodology

Panel analysis

We run panel regressions for the period 2000-2009 testing whether

1) the global financial crisis has a significant impact on real credit growth of MFIs and whether

2) the impact of the global financial crisis differs across MFIs' legal status and the region they are operating in.

To this end we estimate the following basic panel regression:[9]

$$y_{ijt} = \beta_1 + \beta_2 Crisis2008_t + \beta_3 Crisis2009_t + \beta_4 X_{it} + \beta_5 Co_{jt} + \alpha_i + \varepsilon_{ijt}$$

We use a MFI-specific fixed effects estimator to control for all unobservable persistent MFI specific effects.[10] Throughout the paper we cluster standard errors at the institutional level to address potential heteroscedasticity.

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[9] In doing so we follow the approach of De Haas et al. (2011).

[10] The Hausman test favors the fixed effects model (p-value below 1%) versus the random effects method.

Our dependent variable, y_{ijt}, is real credit growth of MFI i located in country j in year t.[11] We take data on MFI gross loan portfolio provided by Mix Market (2011) in current USD, convert values into local currency, deflate it by using the consumer price index series (IFS line 64)[12] and calculate the log change.[13]

Our main variables of interest are *Crisis 2008$_t$* and *Crisis 2009$_t$* which are time dummy variables that are 1 in 2008 and 2009, respectively. They allow us to account for the effect of the global crisis on real credit growth in the microfinance sector. We separate between 2008 and 2009 as in general emerging markets were seriously affected by the crisis only after the default of *Lehman Brothers,* i.e. after September 2008.[14] Thus, the impact of the crisis on MFI credit growth might be substantially different for both years, namely smaller in 2008 than in 2009.

X_{it} is a set of variables on MFI level and CO_{jt} is a set of macroeconomical and structural variables on country level and α_i is treated as MFI-specific fixed effects.

Other explanatory variables on MFI level are real *Funding growth* and *Total risk*. We calculate *Funding growth* by including all liabilities by MFIs which are neither deposits nor equity. Hence, *Funding growth* captures capital inflows into the microfinance sector from domestic and international financial markets. Again we convert USD values into local currency, deflate them by using the consumer price index series (IFS line 64) and calculate the annual log change for the period 2000 – 2009. We follow Guo and Stepanyan (2009) and weight *Funding growth* by the ratio of funding to the gross loan portfolio to account for the importance of funding for each individual MFI. We calculate the variable *Total risk* by taking the sum of portfolio at risk over 30 days (PAR30) and the write-off ratio (Gonzalez 2010). Moreover, to minimize endogeneity concerns, we lag *Funding growth* and *Total risk* by one

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[11] We include MFIs that do not provide audited financial statements to Mix Market in order to get a more representative MFI sample, also including smaller MFIs. However, we run a robustness check for a sample excluding MFIs that are not audited.

[12] Equivalent to real loan portfolio, we convert funding growth also into local currency and deflate it by using their corresponding consumer price index.

[13] When confronted with negative values, we follow Papaioannou (2009) and Herrmann and Mihaljek (2010) and take the natural logarithm of the absolute value and assign it a negative sign. Moreover, in all regressions we correct for outliers by excluding MFIs with observations for the respective institutional variables (i.e. credit growth, funding growth, total risk) that are below/above the 1st/99th percentile.

[14] Until summer 2008 there was a discussion whether economic developments in emerging markets would decouple from those in mature economies (IMF 2008, p 22 ff.).

year. Additionally, we include the institutional variable *Size*, i.e. the size of MFIs' gross loan portfolios weighted by the GDP of the respective country.[15]

An important issue in modeling changes in credit growth is to separate between credit demand and supply effects. Concretely, given the decline in economic activity after the crisis, MFI credit growth is expected to fall as loan demand by MFI clients drops. Lower *GDP growth,* higher *Inflation,* a more positive *Current account balance* – as a measure of net capital inflows into country *j* – and a drop in *Remittances* (as a percentage of GDP) are expected to have a negative impact on the demand for microcredit and hence on real credit growth (Ahlin et al. 2011). Moreover, with few exceptions (Di Bella 2011) most microfinance sectors are small in volume terms. Thus, we are reasonably confident that endogeneity concerns are mitigated as it is unlikely that microfinance credit growth drives GDP growth or other macroeconomic variables. Finally, we control for some structural variables, like *Restrictions* as an index of trade and capital account openness (Dreher et al. 2008) and the *Herfindahl-Hirschmann Index* (HHI) as a measure of competition among MFIs in a given market.[16] There is some evidence that microfinance flourishes in difficult markets, where traditional credit technologies employed by banks are at a clear disadvantage to microfinance technologies (Galema 2011). Hence, we expect a positive coefficient. The same applies for the HHI as Assefa et al. (2010) found that MFIs tend to have lower outreach when facing a more competitive environment.

We run regressions for the sample as a whole as well as for subsamples that distinguish between MFIs with different legal status as well as between regions MFIs are operating in.[17] In a further step we interact the crisis dummies with our four main institutional and macroeconomic variables, namely *Funding growth*, *Total risk*, *GDP growth* and *Inflation*. Thereby we want to test whether the relationship between real credit growth and those variables in the crisis years 2008 and 2009 is significantly different from the one observed in the non-crisis period.

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[15] Given the small volume of MFI portfolios we multiply them by 100 to get reasonable coefficients.
[16] Due to multicollinearity concerns we include the current account, remittances, restrictions and the Herfindahl-Hirschmann Index one by one.
[17] As time-invariant variables drop out in a fixed effects specification, we cannot include legal status or regional dummy variables in our main regression.

Cross-section analysis

We further want to test whether the fall in MFI credit growth in the crisis years is related to the magnitude of credit growth in the pre-crisis period. Thus, we analyze whether the microfinance sector follows the same boom-bust pattern of credit growth that characterizes the traditional banking sector (Caprio and Klingebiel 1996a and 1996b, IMF 2004). To this end we follow the approach by Vogel and Winkler (2010) and create the variable *Credit Fall 0907*. It measures the difference between the log change of real credit growth in 2009 to the one observed in 2007. The smaller *Credit Fall 0907* the deeper the contraction of credit in the crisis period.[18] We regress this variable on average credit growth over 2004-2007 in order to test for a significant boom-bust effect.

Figure 1 illustrates the idea taking an example from Bosnia and Herzegovina. The dashed line represents the largest MFI in Bosnia and Herzegovina in 2007 in terms of real loan portfolio. From 2004 to 2007 its average credit growth is 58 percent p.a.. Credit growth peaks in 2007 at a value of 69 percent. In 2009, real credit growth displays a sharp decline and records -6 percent. Accordingly, *Credit Fall 0907* for this particular MFI amounts to -75 percent.

[Insert Figure 1]

We estimate the following cross-section OLS model:

$$CreditFall0907_i = \beta_1 + \beta_2 \, PreCrisisCreditGrowth_i + \beta_3 X_i + \beta_4 CO_k + \beta_5 INST_i + \beta_6 REGION_i + \varepsilon_i$$

Credit Fall 0907$_i$ is the above described variable measuring the decline in credit growth between 2007 and 2009 of MFI$_i$, i.e. the depth of the bust. *Pre-Crisis Credit Growth$_i$* captures real credit growth from 2004-2007 of MFI$_i$, i.e. the size of the boom. X_i is a matrix of the institutional variables and CO_k is a matrix of the macroeconomic and structural country

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[18] There is no commonly accepted definition of a credit bust or credit contraction compared to a gradual decline in growth, i.e. a „soft landing" (see e.g. Braun and Hausmann 2002, Tornell and Westermann 2002). This is also because historically negative credit growth rates have been observed only rarely in financial crisis episodes (Schularick and Taylor forthcoming), Moreover, given the lack of long data series in microfinance it is not possible to apply econometric techniques in determining boom and bust periods. Against this background, the abrupt and steep fall of credit growth in the crisis period in our view justifies the use of the term „bust" when describing microfinance credit growth patterns in the late 2000s, even though on average microfinance credit growth remained positive in the crisis years.

variables. All institutional, macroeconomic and structural variables represent average values for 2004 – 2007.[19]

Again we want to test whether the boom-bust pattern is significantly different across legal form and region. Tables 2a and 2b show that there are substantial differences in *Credit Fall 0907* related to both variables: NBFIs and MFIs operating in Eastern Europe and Central Asia record a substantially deeper decline in credit growth compared to credit unions and MFIs operating in South Asia. Thus we include $INST_i$ and $REGION_i$[20] as a matrix of dummy variables in our regression to control for legal status and region of MFI_i.

[Insert Table 2a and 2b here]

3.   Results
Panel analysis

There is strong evidence that the global financial crisis had a significant impact on real credit growth of microfinance institutions (Table 3). Both crisis year dummies are highly significant with a negative sign. Moreover, as expected, the crisis impact is substantially stronger in 2009 than in 2008. While in 2008 credit growth declines by about 12 percentage points, in 2009 the drop amounts to about 20 percentage points. This of substantial economic significance given an average credit growth of 29% recorded during the observation period. Moreover, the result is robust when including other macroeconomic and structural variables to our baseline regression.

[Insert Table 3 here]

We also find that *Funding growth$_{t-1}$* (positive) and *Total risk$_{t-1}$* (negative) are significant in explaining MFI real credit growth in the observation period. Thus, MFI credit growth rises with the ability of MFIs to raise funding in the previous year, while a deteriorating portfolio quality makes MFIs more cautious in expanding credit in the year to follow. However, the

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[19] We take the geometrical mean for all growth rates.
[20] Including regional dummies and country dummies in the same regression is subject to substantial problems of multicolinearity (Variance inflation factor > 10). Since we want to analyze whether the boom-bust pattern is different across regions, following the one observed in the traditional banking sector, we settle for regional dummies in our baseline analysis. As a robustness check, we exchange country for regional dummies.

economic significance is rather small: funding growth rates have to be in the range of 100% in order to be associated with a rise of credit growth by about 5 percentage points. Moreover, like in the traditional banking sector (Mendoza and Terrones 2008), higher GDP growth and larger current account deficits (lower surpluses) are associated with stronger credit growth. Finally, credit advances more rapidly in countries with a stronger inflow of remittances and a higher concentration in the microfinance sector.

There is also evidence that the crisis years see substantial changes in sign and significance of the main explanatory variables of real MFI credit growth (Table 4). Most importantly we find that during the crisis MFIs securing more funding in the previous year show significantly lower credit growth. Moreover, the effect is substantially stronger than the positive impact of funding growth for the observation period as a whole. Thus, for 2009, the overall effect of lagged real funding growth on real credit growth was negative (0.0812-0.233*1=-0.152).

[Insert Table 4 here]

There is also some evidence, albeit limited to 2008 that in the crisis MFIs with a lower portfolio quality show higher credit growth. This may indicate moral hazard behaviour of weak MFIs that runs counter to the general result according to which a rise in risk triggers a decline in credit growth. Overall however, *Total risk$_{t-1}$* has still a negative impact on real credit growth in 2008 (-0.557+0.491*1=-0.066). Finally, in the crisis years there is a significant and negative impact of higher inflation on credit growth. This can be explained by the rise in food and energy prices in this period, which had a substantially stronger impact on inflation in emerging markets than in mature economies (Wehinger 2008). In addition, it is in line with evidence according to which the poor, i.e. MFI clients, are more vulnerable to price hikes in food prices (CGAP 2008, Ivanic and Martin 2008).

Results from panel regressions based on a sample split by legal status (Table 5a) suggest that credit growth of microfinance banks reacted with a delay but then more forcefully to the global financial crisis. While in 2008 the crisis dummy is not significant, for 2009 credit growth plunges by 30 percentage points, which is substantially stronger than in the sample as a whole and for MFIs operating as NGOs and NBFIs. By contrast, the crisis impact on lending growth by credit unions is significantly weaker than for other MFIs, with a reduction of 10 percentage points in 2008 and 2009. Distinguishing more broadly between profit and

non-profit our results reveal that during the crisis years the decline in credit growth is less pronounced for non-profit institutions suggesting that commercialization of microfinance has had a negative impact on the stability of microcredit .

[Insert Tables 5a and 5b here]

Turning to a regional split of the sample (Table 5b), the evidence suggests that the impact of the crisis on MFI credit growth differs substantially across regions. Eastern Europe and Central Asia is hit hardest in 2009, when MFI real credit growth drops by 40 percentage points. This is by far the highest coefficient for a crisis dummy variable in our estimates. Moreover, the 2009 impact in ECA is substantially stronger than in 2008. Credit growth in Latin America and South Asia is affected as well. However, the 2009 impact is at about the same size as in 2008. By contrast, in Sub-Saharan Africa and East Asia Pacific there is no significant impact of the crisis on MFI credit growth in 2008 and 2009 respectively, controlling for other factors included in the baseline regression. This regional pattern mimics the one recorded in the traditional banking sector (IMF 2011, p. 5)

Cross-section analysis

Results of the cross section analysis provide strong evidence for a boom-bust pattern of credit growth in microfinance. In all specifications (Tables 6 – 8) a one percentage point higher credit growth in the pre-crisis period is associated with a deeper fall of credit growth in the crisis period compared to 2007 in the range between 0.5 and 0.6 percentage points. In most specifications, the credit bust is also found to be significantly larger for countries with higher inflation in the pre-crisis period and in Eastern Europe and Central Asia (Table 6). By contrast, the decline in credit growth is more subdued in (1) countries with higher GDP growth in the pre-crisis period, (2) in countries with a better performance in the current account and (3) in South Asia. Again, our results are in line with those found for the traditional banking sector (Aisen and Franken 2010, Vogel and Winkler 2010).

[Insert Table 6 here]

Finally, there is evidence that the fall in credit growth was less severe for MFIs operating as credit unions, compared to NGOs acting as the control group (Table 6). However, microfinance commercialization is not associated with a significantly more pronounced

boom-bust pattern compared to NGOs as the respective institutional variables, *Bank* and *NBFI*, are found to be insignificant. This contradicts the results of the panel analysis, where microfinance banks show a substantially stronger reduction in credit growth than their peers.

Against this background, we test whether the relationship between boom and bust varies across institutional forms (Table 7). Interacting legal status dummies with pre-crisis credit growth reveals that there is no specific bank and non-bank financial institutions relationship between pre-crisis credit growth and the decline in credit growth in the crisis. Thus, the boom-bust pattern of those MFIs is not significantly different from the one observed for NGOs. However, credit unions are again identified as an outlier. While in general credit unions show a less pronounced bust in credit growth, the negative relationship between pre-crisis credit growth and the subsequent bust is significantly more pronounced for credit unions compared to the control group (i.e. NGOs).

[Insert Table 7 here]

We perform the same analysis with regard to regions (Table 7) and find that in Latin America and the Caribbean higher pre-crisis credit growth is associated with an even stronger bust than in other regions. However, Latin American MFIs in general are found to deliver a more stable flow of credit compared to the control region (i.e. Africa).

Finally, we test whether within each region the fall in credit is significantly related to the institutional form of MFIs operating in the respective region (Table 8). Results suggest that MFIs operating as banks or non-bank financial institutions significantly aggravate the fall in credit growth in Eastern Europe and Central Asia. In the other regions there is no evidence that banks and NBFIs are significantly associated with a more pronounced decline in credit growth. Distinguishing between profit and non-profit MFIs leads to the conclusion that within the respective regions there is no significant relation between the profit motive of an MFI and the depth of the slump.

[Insert Table 8 here]

4.   Robustness checks

We conduct a series of sensitivity tests to check for the robustness of our results (Tables 9 –
12). With regard to both analyses - panel and cross-section - we test whether the results are
robust when limiting the sample to MFIs that are older than 9 years in 2009 and to MFIs with
a high quality of reporting. The latter is rated by Mix Market in the form of "diamonds". Our
robustness check is based on a sample of MFIs with at least four diamonds, indicating that the
respective MFIs have been audited by a third-party accounting firm. Moreover, we test
whether our results hold when limiting the sample to MFIs with a loan portfolio of at least
USD 2 million and to a sample without the smallest (5th percentile) and the largest (95th
percentile) MFIS (in terms of loan portfolio). Thus, we check whether our results are robust
when excluding a) very young MFIs, b) MFIs characterized by a low reporting standard, c)
very small MFIs and d) outliers more broadly defined.

[Insert Table 9 here]

We receive robust results for our panel analysis, testing for the vulnerability of MFIs during
the financial crisis years (Table 9). The crisis dummies are robustly significant and show the
familiar pattern of a lower impact of the crisis on real credit growth in 2008 compared to
2009.

[Insert Table 10 here]

With regard to our cross-section analysis, we receive robust results for our main explanatory
variable *Pre-crisis credit growth* (Table 10). Interestingly, for the sample of MFIs older than
9 years, the coefficient is substantially higher than in the baseline regressions and the other
robustness checks. This indicates that the boom-bust pattern is more pronounced for mature
MFIs: a one percentage point higher credit growth in the pre-crisis period is associated with a
fall of credit growth in the crisis period compared to 2007 by 0.95 percentage points.
Moreover, the regional dummies are robustly indicating that Eastern Europe and Central Asia
is the region with the most severe credit crunch in 2009 while in South Asia the fall in credit
growth is less severe compared to the control group (i.e. Sub-Saharan Africa).

The robustness checks also confirm that there are no significant differences between microfinance NGOs, microfinance banks and non-bank financial institutions in terms of the decline in credit growth in the crisis. Moreover, the credit union dummy remains positively significant with one exception, namely when limiting our sample to MFIs with a loan portfolio of at least USD 2 million. Thus, for larger institutions there is no significant difference across legal status with regard to the fall in credit growth after the crisis compared to pre-crisis growth.

[Insert Table 11 here]

Additionally, we check for the robustness of our results by varying the time period for which we calculate averages of our main explanatory variables in the cross-section analysis (Table 11). Instead of taking the average over 2004-2007, we choose a longer (2003 to 2007) and a shorter period (2005-2007). Again, our main variables of interest, pre-crisis credit growth, institutional and regional dummies, remain significant with the same sign and similar coefficient estimates.

[Insert Table 12 here]

Finally, we run a cross-section employing country fixed effects instead of regional dummies. We again find robust results for our explanatory variable *Pre-Crisis credit growth* (column 1). We then replace the average pre-crisis GDP growth with the decline in GDP growth from 2007 to 2009 (columns 2 – 6). This is because the fall in MFI credit growth might be largely driven by a decline in credit demand that reflects the decline in economic activity in the respective countries. Thus, we include a variable called *GDP fall 0907* which is calculated in the same way as the *Credit Fall 0907* variable. Results show a positive and highly significant coefficient of *GDP fall 0907* across different sample specifications. This indicates that overall economic conditions play an important role in explaining the depth of the microfinance credit contraction in the crisis. However, *Pre-Crisis Credit Growth* remains robustly significant, indicating that the decline in credit growth is still a function of the magnitude of the boom. Moreover, all legal status dummies become insignificant indicating that when controlling for country fixed effects the legal status of an MFI has no explanatory power when it comes to the contraction of credit growth in the crisis compared to pre-crisis levels.

5. Conclusion

This paper provides evidence on the vulnerability of microfinance to financial turmoil by analyzing the pattern of credit growth of 655 microfinance institutions in 80 countries over the period 2000 – 2009. The analysis reveals that the crisis had a strong negative impact on credit growth of microfinance institutions. Moreover, there is robust evidence that this impact is most pronounced for microfinance institutions with higher credit growth in the pre-crisis period and microfinance institutions operating in Eastern Europe and Central Asia. These results are in line with evidence on credit boom and bust patterns in the traditional banking sector and with evidence on the determinants of credit growth in the traditional banking sector during the crisis. Finally, there is some evidence that the crisis impact was stronger for microfinance institutions operating as banks compared to institutions with a different legal status. However, the boom-bust pattern of microfinance banks has not been significantly different from the pattern observed for microfinance NGOs and NBFIs. Thus, the overall evidence as to the importance of commercialization on the vulnerability of microfinance to financial turmoil is mixed.

Overall, we find that microfinance has become vulnerable to financial turmoil, also because microfinance itself has adopted the cyclical characteristics of the traditional banking sector. This does not imply that microfinance has lost the characteristics which distinguish it from traditional banking in terms of target group orientation, credit technologies applied and social mission. However, our results provide justification for the increasing attention policymakers, central bankers and regulators pay to financial stability challenges in microfinance.

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Table 1a: Panel sample distribution – Number of observations

	SSA	EAP	ECA	LAC	SA	Total
Bank	76	26	48	148	13	311
Credit Union	283	26	235	172	20	736
NBFI	273	115	576	418	196	1578
NGO	292	249	43	711	184	1479
Total	924	416	902	1449	413	4104

Table 1b: Cross-section distribution – Number of observations

	SSA	EAP	ECA	LAC	SA	Total
Bank	6	4	6	15	2	33
Credit Union	17	2	16	24	2	61
NBFI	25	14	64	62	26	191
NGO	26	33	4	91	22	176
Total	74	53	90	192	52	461

Figure 1: Real credit growth 2000-2009:

Construction of the variable *Credit fall 0907*

Pre-crisis credit growth 0407
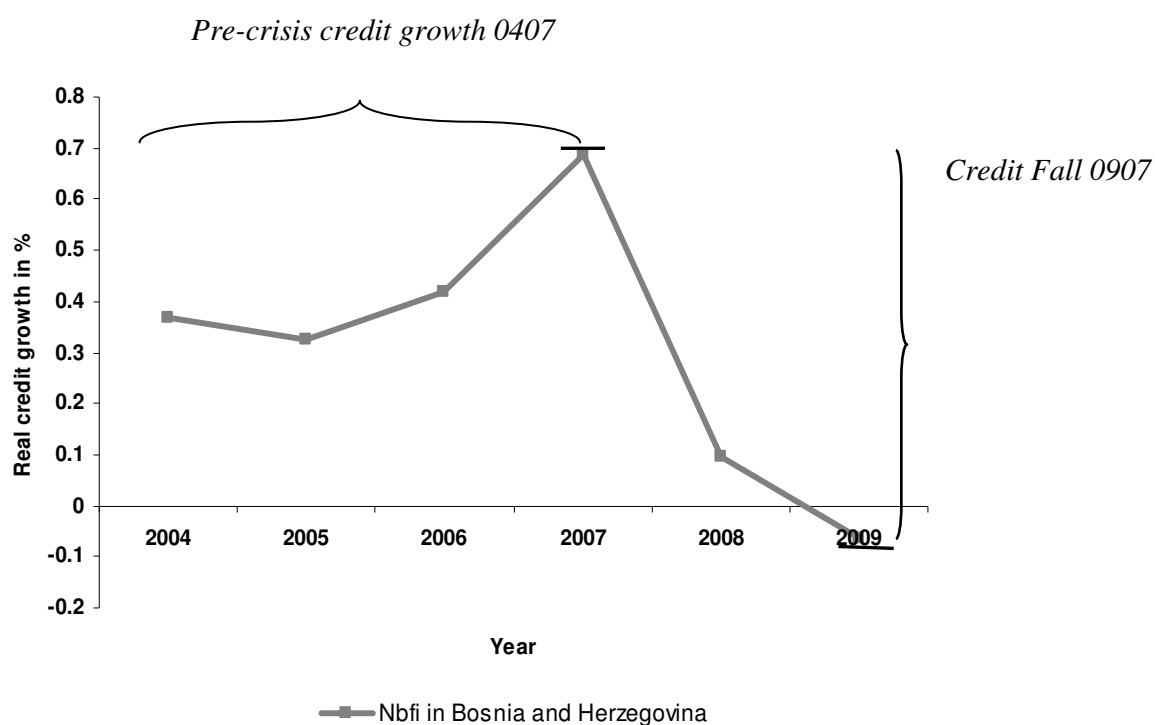
Table 2a: Pre- and post crisis credit growth across legal statuses

Current legal status	No. of MFIs	Pre-crisis credit growth in 04-07	Crisis credit growth in 2009	Credit fall 0907
Bank	33	0.33	0.1	-0.23
Credit Union/Cooperatives	61	0.23	0.08	-0.15
NBFI	191	0.38	0.05	-0.33
NGO	176	0.29	0.06	-0.23
Total	461	0.32	0.06	-0.26

Source: Mix Market, own calculations

Table 2b: Pre- and post crisis credit growth across regions

Region	No. of MFIs	Pre-crisis credit growth in 04-07	Crisis credit growth in 2009	Credit fall 0907
SSA	74	0.26	0.08	-0.24
EAP	53	0.26	0.14	-0.18
ECA	90	0.34	-0.07	-0.46
LAC	192	0.27	0.04	-0.23
SA	52	0.63	0.26	-0.1

Source: Mix Market, own calculations

Table 3: Panel analysis - Baseline results

	Dependent variable: *Real credit growth*				
	(1)	(2)	(3)	(4)	(5)
Funding growth$_{t-1}$	**0.0564*****	**0.0592*****	**0.0588*****	**0.0556*****	**0.0527*****
	(0.0190)	**(0.0188)**	**(0.0188)**	**(0.0195)**	**(0.0191)**
Total risk$_{t-1}$	**-0.450*****	**-0.534*****	**-0.493*****	**-0.427*****	**-0.451*****
	(0.149)	**(0.146)**	**(0.136)**	**(0.152)**	**(0.149)**
Size	0.0000142	0.0000187	0.00000226	-0.0000139	0.0000315
	(0.0000378)	(0.0000370)	(0.0000381)	(0.0000565)	(0.0000291)
GDP per capita growth	**0.808*****	**0.699*****	**0.791*****	**0.838*****	**0.859*****
	(0.188)	**(0.198)**	**(0.196)**	**(0.189)**	**(0.187)**
Inflation	-0.00346	-0.00271	-0.00363	-0.00443	-0.00389
	(0.00256)	(0.00250)	(0.00261)	(0.00298)	(0.00241)
Crisis 2008	**-0.122*****	**-0.134*****	**-0.123*****	**-0.120*****	**-0.117*****
	(0.0208)	**(0.0207)**	**(0.0210)**	**(0.0224)**	**(0.0201)**
Crisis 2009	**-0.206*****	**-0.215*****	**-0.204*****	**-0.199*****	**-0.202*****
	(0.0191)	**(0.0206)**	**(0.0193)**	**(0.0196)**	**(0.0193)**
Current account balance		**-0.00122*****			
		(0.000458)			
Remittances			**0.00692****		
			(0.00341)		
Restrictions				0.000476	
				(0.00131)	
Herfindahl Index					**0.187****
					(0.0880)
Constant	**0.321*****	**0.316*****	**0.284*****	**0.298*****	**0.262*****
	(0.0227)	**(0.0226)**	**(0.0284)**	**(0.0773)**	**(0.0384)**
Observations	2866	2784	2836	2722	2827
R-squared (within)	0.17	0.18	0.175	0.17	0.17

Omitted dummy category is the non-crisis period 2000-2007. Standard errors in parentheses. Standard errors allow for clustering at the institutional level.*, **, and *** represent
statistical significance at the 10%, 5%, and 1% level respectively.

Table 4: Panel analysis – Baseline regression with interaction terms

	Dependent variable: *Real credit growth*			
	(1)	(2)	(4)	(5)
Funding growth$_{t-1}$	**0.0812*****	**0.0566*****	**0.0574*****	**0.0529*****
	(0.0208)	**(0.0190)**	**(0.0191)**	**(0.0190)**
Total risk$_{t-1}$	**-0.463*****	**-0.557*****	**-0.440*****	**-0.450*****
	(0.150)	**(0.176)**	**(0.149)**	**(0.151)**
Size	0.0000159	0.0000184	0.0000179	0.00000952
	(0.0000356)	(0.0000371)	(0.0000372)	(0.0000373)
GDP growth	**0.743*****	**0.789*****	**0.616*****	**0.862*****
	(0.188)	**(0.190)**	**(0.212)**	**(0.188)**
Inflation	-0.00344	-0.00336	-0.00370	-0.000507
	(0.00251)	(0.00254)	(0.00262)	(0.00315)
Crisis 2008	**-0.103*****	**-0.154*****	**-0.136*****	**-0.0771*****
	(0.0227)	**(0.0250)**	**(0.0266)**	**(0.0250)**
Crisis 2009	**-0.172*****	**-0.221*****	**-0.216*****	**-0.151*****
	(0.0197)	**(0.0248)**	**(0.0183)**	**(0.0279)**
Funding$_{t-1}$*Crisis 2008	**-0.0814***			
	(0.0451)			
Funding$_{t-1}$*Crisis 2009	**-0.233*****			
	(0.0550)			
Total risk$_{t-1}$*Crisis 2008		**0.491****		
		(0.208)		
Total risk$_{t-1}$*Crisis 2009		0.189		
		(0.206)		
GDP growth*Crisis 2008			0.311	

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				(0.389)	
GDP growth*Crisis 2009				0.497	
				(0.408)	
Inflation*Crisis 2008					**-0.00499***
					(0.00292)
Inflation*Crisis 2009					**-0.00931****
					(0.00431)
Constant	**0.318****	**0.329****	**0.331****	**0.301****	
	(0.0226)	**(0.0236)**	**(0.0234)**	**(0.0256)**	
Observations	2866	2866	2866	2866	
R-squared	0.18	0.167	0.17	0.173	

Omitted dummy category is the non-crisis period 2000-2007. Standard errors in parentheses. Standard errors allow for clustering at the institutional level.*, **, and *** represent statistical significance at the 10%, 5%, and 1% level respectively.

Table 5a: Panel analysis: Crisis impact across legal status

Dependent variable: *Real credit growth*

	(1) Profit	(2) Non-Profit	(3) Bank	(4) Credit Union	(5) NBFI	(6) NGO
Crisis 2008	**-0.105****	**-0.133****	-0.0993	**-0.103***	**-0.102****	**-0.153****
	(0.0270)	**(0.0264)**	(0.0599)	**(0.0469)**	**(0.0270)**	**(0.0323)**
Crisis 2009	**-0.223****	**-0.192****	**-0.308****	**-0.0977****	**-0.236****	**-0.210****
	(0.0333)	**(0.0227)**	**(0.0706)**	**(0.0351)**	**(0.0355)**	**(0.0304)**
Constant	**0.408****	**0.254****	**0.394****	**0.223****	**0.388****	**0.282****
	(0.0298)	**(0.0313)**	**(0.0591)**	**(0.0589)**	**(0.0323)**	**(0.0366)**
Observations	1112	1819	242	441	1084	1099
R-squared (within)	0.20	0.15	0.293	0.127	0.202	0.155

Omitted dummy category is the non-crisis period 2000-2007. Standard errors in parentheses. Standard errors allow for clustering at the institutional level.*, **, and *** represent statistical significance at the 10%, 5%, and 1% level respectively. All regressions are run including the variables Funding growth$_{t-1}$, Total risk$_{t-1}$, Size, GDP growth and Inflation. However they are not reported to save space.

Table 5b: Panel analysis: Crisis impact across regions

Dependent variable: *Real credit growth*

	(1) SSA	(2) EAP	(3) ECA	(4) LAC	(5) SA
Crisis 2008	-0.0145	**-0.180****	**-0.167****	**-0.150****	**-0.180***
	(0.0429)	**(0.0466)**	**(0.0457)**	**(0.0205)**	**(0.102)**
Crisis 2009	**-0.213****	-0.0903	**-0.404****	**-0.128****	**-0.206***
	(0.0353)	(0.0608)	**(0.0664)**	**(0.0249)**	**(0.0979)**
Constant	**0.417****	**0.205****	**0.428****	**0.210****	**0.544****
	(0.0391)	**(0.0436)**	**(0.0632)**	**(0.0243)**	**(0.127)**
Observations	608	360	529	1136	298
R-squared (within)	0.185	0.166	0.248	0.223	0.126

Omitted dummy category is the non-crisis period 2000-2007. Standard errors in parentheses. Standard errors allow for clustering at the institutional level.*, **, and *** represent statistical significance at the 10%, 5%, and 1% level respectively. All regressions are run including the variables Funding growth$_{t-1}$, Total risk$_{t-1}$, Size, GDP growth and Inflation. However they are not reported to save space.

Table 6: Cross-section analysis: Baseline results

	Dependent variable: *Credit Fall 0907*				
	(1)	(2)	(3)	(4)	(5)
Pre-Crisis Credit Growth	**-0.608*****	**-0.614*****	**-0.612*****	**-0.584*****	**-0.598*****
	(0.0647)	**(0.0652)**	**(0.0652)**	**(0.0663)**	**(0.0653)**
Total risk 0407	-0.165	-0.198	-0.177	-0.105	-0.142
	(0.259)	(0.270)	(0.262)	(0.269)	(0.255)
Size 0407	0.0000548	0.0000636	0.0000655	0.0000809	0.0000687
	(0.0000579)	(0.0000550)	(0.0000577)	(0.0000666)	(0.0000635)
Age	**-0.0544***	**-0.0578***	**-0.0559***	-0.0355	**-0.0544***
	(0.0296)	**(0.0297)**	**(0.0299)**	(0.0296)	**(0.0300)**
GDP growth 0407	**0.0119***	0.00997	0.00736	**0.0130***	**0.0125***
	(0.00652)	(0.00662)	(0.00723)	**(0.00717)**	**(0.00657)**
Inflation 0407	**-0.00914***	-0.00763	-0.00781	**-0.00945****	**-0.0128****
	(0.00475)	(0.00498)	(0.00476)	**(0.00474)**	**(0.00487)**
Bank	0.0263	0.0155	0.0192	0.0313	0.00684
	(0.0590)	(0.0604)	(0.0576)	(0.0602)	(0.0560)
Credit Union	**0.115****	**0.110****	**0.105****	**0.116****	**0.0911***
	(0.0479)	**(0.0481)**	**(0.0479)**	**(0.0528)**	**(0.0467)**
NBFI	0.00697	0.0143	0.00941	0.0169	0.00560
	(0.0342)	(0.0340)	(0.0343)	(0.0357)	(0.0341)
EAP	0.0297	-0.000143	0.0676	0.0643	-0.0115
	(0.0535)	(0.0555)	(0.0575)	(0.0615)	(0.0567)
ECA	**-0.221****	**-0.229****	**-0.161****	**-0.213****	**-0.264****
	(0.0629)	**(0.0623)**	**(0.0759)**	**(0.0899)**	**(0.0644)**
LAC	0.0236	0.00227	0.0479	0.0381	0.0220
	(0.0406)	(0.0416)	(0.0431)	(0.0525)	(0.0403)
SA	**0.310****	**0.312****	**0.332****	**0.299****	**0.333****
	(0.0702)	**(0.0698)**	**(0.0709)**	**(0.0705)**	**(0.0695)**
Current account balance 0407		**0.00165***			
		(0.000904)			
Remittances 0407			-0.00502		
			(0.00307)		
Restrictions 0407				-0.00118	
				(0.00228)	
HHI 0407					**0.245****
					(0.0750)
Constant	0.0485	0.0829	0.0751	0.0352	0.00894
	(0.112)	(0.114)	(0.115)	(0.153)	(0.113)
Observations	444	444	444	420	444
R-squared	0.317	0.323	0.323	0.307	0.301
Country fixed effects?	No	No	No	No	No

Omitted dummy categories are the legal status NGO and the region SSA. Standard errors in parentheses. Standard errors allow for clustering at the institutional level.*, **, and *** represent statistical significance at the 10%, 5%, and 1% level respectively.

Table 7: Cross-section analysis:
Interactions between pre-crisis credit growth and legal status / region

	Dependent variable: *Credit Fall 0907*	
	(1)	(2)
Pre-Crisis Credit Growth 0407	**-0.536*****	**-0.568*****
	(0.0691)	**(0.153)**
Total risk 0407	-0.196	-0.253
	(0.245)	(0.272)
Size 0407	0.0000447	0.0000458
	(0.0000580)	(0.0000571)
Age	**-0.0632****	**-0.0698****
	(0.0291)	**(0.0306)**
GDP growth 0407	**0.0125***	**0.0109***
	(0.00645)	**(0.00639)**
Inflation 0407	**-0.00807***	**-0.00993****
	(0.00475)	**(0.00492)**
EAP	0.0512	0.0298
	(0.0545)	(0.0799)
ECA	**-0.223*****	**-0.204****
	(0.0616)	**(0.0878)**
LAC	0.0428	**0.125****
	(0.0413)	**(0.0613)**
SA	**0.310*****	**0.217****
	(0.0687)	**(0.0922)**
Bank	0.0847	0.0456
	(0.0852)	(0.0579)
Credit Union	**0.251*****	**0.126*****
	(0.0595)	**(0.0482)**
NBFI	0.0298	0.0262
	(0.0488)	(0.0339)
*Pre-Crisis Credit Growth*Bank*	-0.162	
	(0.216)	
*Pre-Crisis Credit Growth*Credit Union*	**-0.548****	
	(0.241)	
*Pre-Crisis Credit Growth*NBFI*	-0.0699	
	(0.118)	
*Pre-Crisis Credit Growth*EAP*		-0.00805
		(0.183)
*Pre-Crisis Credit Growth*ECA*		-0.0944
		(0.233)
*Pre-Crisis Credit Growth*LAC*		**-0.380****
		(0.169)
*Pre-Crisis Credit Growth*SA*		0.108
		(0.169)
Constant	0.0292	0.0863
	(0.111)	(0.126)
Observations	444	444
R-squared	0.332	0.343
Country fixed effects?	No	No

Omitted dummy categories are the legal status NGO and the region SSA. Standard errors allow for clustering at the institutional level. *, **, and *** represent statistical significance at the 10%, 5%, and 1% level respectively.

Table 8: Cross-section analysis: Interactions between legal status and region

	Dependent variable: *Credit Fall 0907*	
	(1)	(2)
Pre-crisis credit growth	**-0.598***	**-0.615***
	(0.0665)	**(0.0676)**
Total risk	-0.125	-0.117
	(0.254)	(0.279)
Size	**-0.0565***	**-0.0507***
	(0.0292)	**(0.0299)**
Age	**0.0000908***	0.0000615
	(0.0000490)	(0.0000471)
GDP growth	**0.0132***	**0.0118***
	(0.00705)	**(0.00657)**
Inflation	**-0.0127***	**-0.0121****
	(0.00473)	**(0.00478)**
SSA	0.0634	0.0618
	(0.111)	(0.113)
EAP	0.132	0.120
	(0.110)	(0.111)
ECA	0.124	-0.126
	(0.123)	(0.118)
LAC	0.0986	0.0981
	(0.103)	(0.105)
SA	**0.311****	**0.320****
	(0.145)	**(0.141)**
*Bank&NBFI*SSA*	0.0858	
	(0.0649)	
*Bank&NBFI *EAP*	-0.112	
	(0.0841)	
*Bank&NBFI *ECA*	**-0.333***	
	(0.0812)	
*Bank&NBFI *LAC*	0.00824	
	(0.0375)	
*Bank&NBFI *SA*	0.123	
	(0.114)	
*Profit*SSA*		0.0926
		(0.0599)
*Profit*EAP*		-0.0874
		(0.0853)
*Profit*ECA*		-0.00845
		(0.0889)
*Profit*LAC*		-0.00715
		(0.0407)
*Profit*SA*		0.118
		(0.113)
Observations	444	444
R-squared	0.572	0.553
Country fixed effects?	No	No

Constant is omitted. Standard errors allow for clustering at the institutional level. *, **, and *** represent statistical significance at the 10%, 5%, and 1% level, respectively.

Table 9: Robustness check: Panel analysis

	Dependent variable: *Real credit growth*			
	(1) Age > 9 years	(2) Diamonds > 3	(3) Size > USD 2 Mio.	(4) Sample without 5th and 95th percentile
Funding growth$_{t-1}$	0.0544***	0.0615***	0.0873***	0.0547***
	(0.0206)	(0.0201)	(0.0226)	(0.0194)
Total risk$_{t-1}$	-0.430**	-0.586***	-0.616***	-0.492***
	(0.173)	(0.155)	(0.124)	(0.144)
Size	0.00000485	0.00000921	0.0000545	-0.0000487
	(0.0000390)	(0.0000379)	(0.000101)	(0.0000696)
GDP growth	0.913***	0.972***	1.191***	0.924***
	(0.197)	(0.191)	(0.201)	(0.193)
Inflation	-0.00241	-0.00271	-0.000766	-0.00333
	(0.00302)	(0.00262)	(0.00274)	(0.00265)
Crisis 2008	-0.106***	-0.123***	-0.143***	-0.124***
	(0.0229)	(0.0221)	(0.0210)	(0.0215)
Crisis 2009	-0.184***	-0.202***	-0.205***	-0.203***
	(0.0196)	(0.0198)	(0.0227)	(0.0202)
Constant	0.274***	0.318***	0.285***	0.317***
	(0.0246)	(0.0232)	(0.0236)	(0.0233)
Observations	2165	2367	1834	2597
R-squared (within)	0.165	0.194	0.255	0.182

Omitted dummy category is the non-crisis period 2000-2007. Standard errors allow for clustering at the institutional level. *, **, and *** represent statistical significance at the 10%, 5%, and 1% level respectively.

Table 10: Robustness check: Cross-section analysis

	Dependent variable: *Credit Fall 0907*			
	(1) Age > 9 years	(2) Diamonds > 3	(3) Size > USD 2 Mio.	(5) Sample without 5th and 95th percentile
Pre-Crisis Credit Growth	**-0.952*****	**-0.569*****	**-0.527*****	**-0.630*****
	(0.129)	**(0.0833)**	**(0.0713)**	**(0.0704)**
Total risk 0407	**-0.600****	-0.358	0.305	-0.284
	(0.303)	(0.279)	(0.424)	(0.244)
Size 0407	**0.0187****	0.00772	0.00784	**0.0143****
	(0.00857)	(0.00724)	(0.00916)	**(0.00660)**
Age	**-0.0139****	-0.00427	**-0.00953***	-0.00773
	(0.00547)	(0.00481)	**(0.00563)**	(0.00493)
GDP growth 0407	0.0594	-0.0280	0.00560	-0.0397
	(0.0491)	(0.0310)	(0.0335)	(0.0302)
Inflation 0407	0.0000690	0.0000546	0.0000685	0.000126
	(0.0000611)	(0.0000641)	(0.0000535)	(0.0000773)
Bank	0.0269	0.0396	0.0307	0.0154
	(0.0704)	(0.0609)	(0.0583)	(0.0695)
Credit Union	**0.150***	**0.149***	0.0991	**0.112****
	(0.0548)	**(0.0508)**	(0.0702)	**(0.0501)**
NBFI	0.00628	0.0105	0.00884	-0.0162
	(0.0421)	(0.0370)	(0.0407)	(0.0349)
EAP	-0.0354	0.0327	-0.0578	0.0142
	(0.0680)	(0.0622)	(0.0695)	(0.0545)
ECA	**-0.261***	**-0.226***	**-0.265***	**-0.265***
	(0.0768)	**(0.0700)**	**(0.0715)**	**(0.0611)**
LAC	0.0232	0.0303	0.0169	0.0117
	(0.0487)	(0.0408)	(0.0465)	(0.0406)
SA	**0.340***	**0.337***	**0.287***	**0.291***
	(0.0818)	**(0.0731)**	**(0.0833)**	**(0.0751)**
Constant	-0.174	-0.0428	-0.128	0.0156
	(0.167)	(0.118)	(0.122)	(0.113)
Observations	260	374	289	400
R-squared	0.256	0.296	0.281	0.352
Country fixed effects?	No	No	No	No

Omitted dummy categories are the legal status NGO and the region SSA. Standard errors allow for clustering at the institutional level. *, **, and *** represent statistical significance at the 10%, 5%, and 1% level respectively.

Table 11: Robustness check cross-section analysis: Variation of our explanatory variables

	Dependent variable: *Credit Fall 0907*	
	(1) Mean 03-07	(2) Mean 05-07
Pre-crisis credit growth	**-0.549*****	-0.614***
	(0.0734)	**(0.0785)**
Total risk	-0.0732	-0.0584
	(0.278)	(0.282)
Size	0.0000449	0.0000520
	(0.0000691)	(0.0000567)
Age	**-0.0562***	**-0.0716****
	(0.0307)	**(0.0312)**
GDP growth	-0.00350	**1.004***
	(0.00563)	**(0.605)**
Inflation	**-0.0104****	**-0.0101****
	(0.00514)	**(0.00500)**
Bank	0.0573	0.0242
	(0.0647)	(0.0615)
Credit Union	**0.125****	**0.108****
	(0.0517)	**(0.0528)**
NBFI	0.0325	0.0111
	(0.0339)	(0.0349)
EAP	0.0323	0.0152
	(0.0590)	(0.0567)
ECA	**-0.180****	**-0.221*****
	(0.0703)	**(0.0655)**
LAC	0.00889	0.00935
	(0.0435)	(0.0461)
SA	**0.347*****	**0.326*****
	(0.0782)	**(0.0785)**
Constant	0.110	0.118
	(0.109)	(0.115)
Observations	415	404
R-squared	0.282	0.312
Country fixed effects?	No	No

Omitted dummy categories are the legal status NGO and the region SSA. Standard errors allow for clustering at the institutional level. *, **, and *** represent statistical significance at the 10%, 5%, and 1% level respectively.

Table 12: Robustness check: Controlling for country fixed effects

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable: *Credit Fall 0907*					
Pre-Crisis Credit Growth	**-0.592*** **(0.0750)**	**-0.592*** **(0.0750)**	**-0.592*** **(0.0750)**	**-0.592*** **(0.0750)**	**-0.563*** **(0.0755)**	**-0.592*** **(0.0750)**
Total risk 0407	-0.222 (0.268)	-0.222 (0.268)	-0.222 (0.268)	-0.222 (0.268)	-0.183 (0.271)	-0.222 (0.268)
Size	0.0000662 (0.0000684)	0.0000662 (0.0000684)	0.0000662 (0.0000684)	0.0000662 (0.0000684)	0.0000825 (0.0000794)	0.0000662 (0.0000684)
Age	**-0.0720**** **(0.0351)**	**-0.0720**** **(0.0351)**	**-0.0720**** **(0.0351)**	**-0.0720**** **(0.0351)**	-0.0534 (0.0349)	**-0.0720**** **(0.0351)**
GDP growth 0407	0.00132 (0.00926)					
GDP Fall 0907		**0.0126**** **(0.00553)**	**0.0128**** **(0.00553)**	**0.0161***** **(0.00603)**	**0.00222** **(0.00810)**	**0.0127**** **(0.00556)**
Inflation 0407	**-0.0285*** **(0.0148)**	-0.00160 (0.00866)	-0.00449 (0.00868)	-0.00983 (0.00820)	-0.0129 (0.00848)	0.0000379 (0.0101)
Bank	-0.0199 (0.0667)	-0.0199 (0.0667)	-0.0199 (0.0667)	-0.0199 (0.0667)	-0.0116 (0.0682)	-0.0199 (0.0667)
Credit Union	0.0766 (0.0743)	0.0766 (0.0743)	0.0766 (0.0743)	0.0766 (0.0743)	0.0755 (0.0738)	0.0766 (0.0743)
NBFI	0.0468 (0.0431)	0.0468 (0.0431)	0.0468 (0.0431)	0.0468 (0.0431)	0.0500 (0.0437)	0.0468 (0.0431)
Current account balance 0407				0.00441 (0.00346)		
Remittances 0407				**-0.0225***** **(0.00841)**		
Restrictions 0407					-0.0145 (0.00976)	
HHI 0407						-0.0986 (0.196)
Constant	**0.272**** **(0.123)**	**0.244**** **(0.111)**	**0.341***** **(0.125)**	**0.608***** **(0.185)**	**1.036*** **(0.593)**	**0.282*** **(0.146)**
Observations	444	444	444	444	420	444
R-squared	0.434	0.434	0.434	0.434	0.428	0.434
Country fixed effects?	Yes	Yes	Yes	Yes	Yes	Yes

Omitted dummy category is the legal status NGO. Standard errors allow for clustering at the institutional level. *, **, and *** represent statistical significance at the 10%, 5%, and 1% level, respectively. Country dummy variables are not shown.

Appendices

Appendix 1a: List of variables - Panel sample

Name	Periodicity	Description	Source
Dependent variables			
Real credit growth	2000-2009	The log difference of the real outstanding loan portfolio (loan portfolio in domestic currency deflated by the consumer price index) in two consecutive years.	Mix Market : Gross loan portfolio, IFS line 64
Explanatory variables			
Institutional level			
Real funding growth$_{t-1}$	2000-2009	The one year lagged log difference of real total funding liabilities (funding liabilities in domestic currency deflated by the consumer price index) in two consecutive years, weighted by the one year lagged share of funding liabilities to the outstanding loan portfolio. Total funding liabilities are defined as the difference between total assets and the sum of equity and deposits.	Mix Market: Total assets, total equity, total deposits
Total risk$_{t-1}$	2000-2009	The one year lagged sum of portfolio at risk over 30 days (PAR30) and the write-off ratio (WOR)	Mix Market: PAR30 and WOR
Size (% of GDP)	2000-2009	Loan portfolio (in USD) of the respective MFI to GDP of the respective country (in USD).	Mix Market and WDI
Institutional form	2009	Dummies of the following variables: Bank, Credit Union/Cooperative; NGO, NBFI, Rural banks and others.*	Mix Market: Profile information
Marcoeconomic and structural variables			
GDP per capita growth (annual %)	2000-2009	Annual percentage growth rate of GDP per capita based on constant local currency.	WDI
Inflation, consumer prices (annual %)	2000-2009	Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified interval.	WDI
Current account balance (log)	2000-2009	Current account balance is the sum of net exports of goods, services, net income, and net current transfers. Data are in current U.S. dollars.	WDI
Workers' remittances and compensation of employees, received (% of GDP)	2000-2009	Workers' remittances and compensation of employees comprise current transfers by migrant workers and wages and salaries earned by nonresident workers.	WDI
Restrictions	2000-2009	Index of data on restrictions consists of hidden import barriers, mean tariff rate, taxes on international trade (percent of current revenue) and capital account restrictions.	Dreher et al. (2008)
Herfindahl-Hirschmann Index	2000-2009	The sum of the squares of the market shares of each MFI in the respective country. Increases in the Herfindahl index generally indicate a decrease in competition and an increase of market power and vice versa	Mix Market: Gross loan portfolio
Crisis dummy variables			
Crisis 2008 (2009)	2008 (2009)	Crisis dummies are 1 in 2008 or in 2009, respectively	-

Appendix 1b: List of variables - Cross-section sample

Name	Periodicity	Description	Source
Dependent variables			
Credit Fall 0907	2009 and 2007	The log difference between real outstanding loan portfolio in 2009 and 2007 (loan portfolio in domestic currency deflated by the consumer price index)	Mix Market: Gross loan portfolio
Explanatory variables			
Institutional level			
Pre-crisis credit growth	2004-2007	The average real credit growth	Mix Market: Gross loan portfolio
Total risk 0407	2004-2007	The average of the sum of Portfolio at Risk over 30 days (PAR30) and Write-off Ratio (WOR)	Mix Market: PAR30 and WOR
Size (% of GDP)	2004-2007	Loan portfolio (in USD) of the respective MFI to GDP of the respective country (in USD)	Mix Market: Gross loan portfolio and WDI
Age	2004-2007	Age of the respective MFI	Mix Market: Profile information
Legal status	2009	Dummies of the following variables: Bank, Credit Union/Cooperative; NGO and NBFI	Mix Market: Profile information
Region	-	Sub-Saharan Africa (SSA), East Asia and Pacific (EAP), Eastern Europe and Central Asia (ECA), Latin America and Caribbean (LAC), South Asia (SA	Mix Market: Profile information
Macroeconomic and structural variables			
GDP per capita growth (annual %)	2004-2007	Average annual percentage growth rate of GDP per capita based on constant local currency.	WDI
Inflation, consumer prices (annual %)	2004-2007	Average inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified interval.	WDI
Current account balance (log)	2004-2007	Average current account balance is the sum of net exports of goods, services, net income, and net current transfers. Data are in current U.S. dollars.	WDI
Workers' remittances and compensation of employees, received (% of GDP)	2004-2007	Average workers' remittances and compensation of employees comprise current transfers by migrant workers and wages and salaries earned by nonresident workers.	WDI
Restrictions	2004-2007	Average of index of data on restrictions consists of hidden import barriers, mean tariff rate, taxes on international trade (percent of current revenue) and capital account restrictions.	Dreher et al. (2008)
Herfindahl-Hirschmann Index	2004-2007	Average of the sum of the squares of the market shares of each MFI in the respective country. Increases in the Herfindahl Index generally indicate a decrease in competition and an increase of market power and vice versa	Mix Market: Gross loan portfolio

Appendix 2a: Descriptive statistics – Panel sample

Variable	Obs	Mean	Std. Dev.	Min	Max

Dependent variable					
Real credit growth (%)	4104	0.29	0.36	-0.67	2.03
Institutional variable					
Real funding growth$_{t-1}$ (%)	3176	0.28	0.48	-0.58	3.39
Total risk$_{t-1}$ (%)	3520	0.07	0.09	0.00	0.96
Size (% to GDP)	4099	0.001	0.003	0.00	0.052
Macroeconomic and structural variables					
GDP growth (%)	3981	0.04	0.04	-0.15	0.33
Inflation (%)	3979	7.66	6.38	-0.09	0.96
Current account to GDP (in %)	3998	3,380	29,400	-42,000	412,000
Remittances (in % to GDP)	4055	6.17	7.41	0.00	0.50
Restrictions (Index 0-100)**	3848	54.31	13.18	19.06	89.26
Herfindahl Index (Index 0-1)***	4002	0.32	0.24	0.04	0.99

*for log-transformed variables the statisitcs are calculated by using the origin values
**a higher Index level represents a lower level of restrictions
***a lower index represents a higher level of competition

Appendix 2b: Descriptive statistics – Cross-section sample

Variable	Obs	Mean	Std. Dev.	Min	Max
Dependent variable					
Credit Fall 0907 (percentage points)	461	-0.26	0.36	-1.44	1.03
Institutional variable					
Pre-Crisis Credit Growth (%)	461	0.32	0.33	-0.29	3.15
Total risk 0407 (%)	459	0.06	0.07	0.00	0.57
Size 0407 (% to GDP)	461	0.0009	0.003	0.00	0.022
Age (year)*	461	12.07	7.73	1	45
Macroeconomic and structural variables					
GDP growth 0407 (%)	461	0.06	0.04	-0.01	0.22
Inflation 0407 (%)	456	0.07	0.03	0.02	0.17
Current account balance 0407 (in million USD)*	461	-2.56	5.88	-16.45	21.92
Remittances 0407 (in % to GDP)	461	0.07	0.07	0.00	0.29
Restrictions 0407 (Index 0-100)**	430	56.10	10.40	34.25	75.36
Herfindahl Index 0407 (Index 0-1)***	456	0.29	0.21	0.05	0.98

*for log-transformed variables the statisitcs are calculated by using the origin values
**a higher Index level represents a lower level of restrictions
***a lower index represents a higher level of competition

Appendix 3a: Pairwise correlations – Panel sample

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]
[1]	*Real credit growth*	1											
[2]	*Funding growth$_{t-1}$*	0.32	1										
		0.00											
[3]	*Total risk$_{t-1}$*	-0.18	-0.13	1									
		0.00	0.00										
[4]	*Size*	-0.05	-0.06	-0.05	1								
		0.00	0.00	0.00									
[5]	*GDP growth*	0.20	0.11	-0.13	-0.07	1							
		0.00	0.00	0.00	0.00								
[6]	*Inflation*	-0.03	0.02	0.02	-0.01	0.02	1						
		0.03	0.21	0.24	0.54	0.27							
[7]	*Crisis 2008*	-0.11	-0.02	-0.03	0.01	0.03	0.25	1					
		0.00	0.19	0.06	0.54	0.02	0.00						
[8]	*Crisis 2009*	-0.20	-0.11	0.01	0.04	-0.39	-0.10	-0.18	1				
		0.00	0.00	0.73	0.00	0.00	0.00	0.00					
[9]	*Current account balance ÄNDERN*	-0.01	-0.07	0.04	-0.03	0.11	-0.01	0.01	-0.03	1			
		0.53	0.00	0.01	0.02	0.00	0.65	0.59	0.04				
[10]	*Remittances*	-0.05	-0.01	-0.06	0.08	-0.07	0.09	0.03	0.00	-0.12	1		
		0.00	0.58	0.00	0.00	0.00	0.00	0.03	0.94	0.00			
[11]	*Restrictions*	-0.12	-0.08	0.00	0.04	0.03	-0.13	0.03	0.06	-0.05	0.23	1	
		0.00	0.00	0.97	0.01	0.08	0.00	0.10	0.00	0.00	0.00		
[12]	*Herfindahl Index*	-0.04	-0.01	0.00	0.00	-0.01	0.15	0.04	-0.03	-0.06	-0.16	-0.02	1
		0.02	0.64	0.79	0.80	0.67	0.00	0.00	0.09	0.00	0.00	0.18	

p-values reported below correlation coefficient.

Appendix 3b: Pairwise correlations – Cross-section sample

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]	[16]	[17]	[18]	[19]	[20]
[1]	*Credit Fall 0907*	1																			
[2]	*Pre-Crisis Credit Growth*	-0.43	1																		
		0.00																			
[3]	*Total risk 0407*	0.16	-0.31	1																	
		0.00	0.00																		
[4]	*Size 0407*	0.03	-0.08	-0.05	1																
		0.50	0.10	0.24																	
[5]	*Age*	0.19	-0.37	0.16	0.16	1															
		0.00	0.00	0.00	0.00																
[6]	*GDP growth 0407*	-0.05	0.18	-0.30	-0.10	-0.23	1														
		0.27	0.00	0.00	0.03	0.00															
[7]	*Inflation 0407*	-0.11	-0.02	0.06	0.01	-0.12	0.12	1													
		0.03	0.71	0.19	0.80	0.01	0.01														
[8]	*Bank*	0.00	-0.01	-0.04	0.56	0.08	-0.02	0.10	1												
		0.94	0.83	0.35	0.00	0.08	0.72	0.03													
[9]	*Credit Union*	0.13	-0.12	0.08	-0.05	0.10	-0.08	-0.13	-0.11	1											
		0.01	0.01	0.09	0.26	0.03	0.10	0.00	0.02												
[10]	*NBFI*	-0.12	0.16	-0.14	-0.07	-0.26	0.31	0.03	-0.23	-0.33	1										
		0.01	0.00	0.00	0.12	0.00	0.00	0.59	0.00	0.00											
[11]	*NGO*	0.03	-0.07	0.11	-0.19	0.15	-0.26	0.01	-0.22	-0.31	-0.66	1									
		0.55	0.14	0.02	0.00	0.00	0.00	0.79	0.00	0.00	0.00										
[12]	*SSA*	0.03	-0.10	0.23	0.03	0.00	-0.23	0.25	0.02	0.13	-0.07	-0.03	1								
		0.53	0.03	0.00	0.52	0.94	0.00	0.00	0.73	0.01	0.15	0.56									
[13]	*EAP*	0.03	-0.01	-0.04	0.01	-0.04	0.09	-0.04	0.01	-0.10	-0.11	0.18	-0.16	1							
		0.52	0.76	0.41	0.86	0.37	0.04	0.38	0.91	0.03	0.02	0.00	0.00								
[14]	ECA	-0.21	0.03	-0.21	0.01	-0.27	0.49	0.15	-0.01	0.07	0.30	-0.34	-0.22	-0.18	1						
		0.00	0.58	0.00	0.77	0.00	0.00	0.00	0.84	0.16	0.00	0.00	0.00	0.00							

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]	[16]	[17]	[18]	[19]	[20]
[15]	LAC	0.07	-0.15	0.07	0.02	0.30	-0.38	-0.26	0.02	-0.02	-0.16	0.16	-0.37	-0.30	-0.42	1					
		0.16	0.00	0.13	0.64	0.00	0.00	0.00	0.65	0.70	0.00	0.00	0.00	0.00	0.00						
[16]	SA	0.10	0.33	-0.07	-0.09	-0.08	0.14	-0.04	-0.05	-0.10	0.06	0.03	-0.16	-0.13	-0.18	-0.30	1				
		0.04	0.00	0.12	0.04	0.09	0.00	0.44	0.33	0.03	0.18	0.52	0.00	0.01	0.00	0.00					
[17]	*Current account balance 0407 ÄNDERN*	0.10	-0.02	0.02	-0.03	0.11	0.09	-0.23	0.06	0.06	-0.15	0.08	-0.24	0.23	-0.08	0.20	-0.15	1			
		0.04	0.60	0.72	0.50	0.01	0.07	0.00	0.17	0.20	0.00	0.09	0.00	0.00	0.07	0.00	0.00				
[18]	*Remittances 0407*	-0.15	-0.08	-0.05	0.11	-0.05	-0.16	0.09	0.01	-0.11	0.06	0.01	-0.27	0.06	0.28	0.03	-0.15	-0.22	1		
		0.00	0.09	0.24	0.02	0.25	0.00	0.05	0.76	0.01	0.19	0.83	0.00	0.16	0.00	0.46	0.00	0.00			
[19]	*Restrictions 0407*	-0.09	-0.17	0.06	-0.01	0.15	-0.08	-0.12	-0.06	-0.15	0.10	0.03	-0.44	-0.01	0.23	0.42	-0.40	0.04	0.34	1	
		0.08	0.00	0.23	0.85	0.00	0.09	0.01	0.24	0.00	0.04	0.47	0.00	0.87	0.00	0.00	0.00	0.47	0.00		
[20]	*HHI 0407*	0.05	-0.12	-0.06	0.01	-0.06	0.13	0.25	0.05	0.14	-0.01	-0.11	0.00	0.17	0.33	-0.19	-0.28	-0.25	-0.12	0.10	1
		0.32	0.01	0.23	0.79	0.18	0.01	0.00	0.25	0.00	0.76	0.02	0.93	0.00	0.00	0.00	0.00	0.00	0.01	0.05	

p-values reported below correlation coefficient