Banking Crises and the Performance of Microfinance Institutions

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Abstract

We evaluate to what extent Microfinance Institutions' (MFIs) outreach and sustainability are affected when a banking crisis disrupts a country's financial system. Our study period includes 2008, so we pay special attention to the effects of banking crises before and after 2008, when a much broader financial crisis affected the financial systems of developed and developing countries alike. We analyze a dataset of over 2,000 annual observations for MFIs from over 118 countries for the period of 2001-2011. Our results indicate that MFIs operating in countries with a banking crisis had better financial sustainability measured by the return-on-assets, possibly due to MFIs acquiring higher quality borrowers who were rationed by commercial banks. Moreover, we find evidence that the global financial crisis, together with a banking crisis, might have forced MFIs to cut outreach to the poor to maintain sustainability, consistent with previous evidence of a tradeoff between outreach and sustainability. Banking crises seem to affect MFIs differentially by their organizational form with microfinance banks and microfinance NGOs more affected relative to Credit Unions or Non-Bank Financial Institutions. The main results are consistent with the view that financial disruptions cause commercial banks to curtail lending to smaller businesses, some of whom might have found credit through microfinance institutions, especially through microfinance banks. Thus, a banking crisis combined with additional financial market distress is associated with outreach to fewer and less poor borrowers even if MFIs financial sustainability is preserved.

Key words: microfinance institutions, banking crisis, financial crisis, financial system, outreach, sustainability

JEL codes: G10, G21

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1. Introduction

Microfinance Institutions (MFIs) serve over 200 million clients that lack access to traditional financial services (Microcredit Summit Campaign, 2015). More than half of these clients are poor borrowers receiving their very first loan. Similar to banks and other financial institutions, MFIs are vulnerable to system-wide financial stresses including banking crises, which typically result in credit crunch and limited access to external financing. Even in the absence of a financial stress, MFIs almost exclusively serve poor borrowers excluded from the formal financial system and banks. Therefore, it is important to understand what happens to these institutions in the times of systematic financial distress. When a banking crisis hits a country and commercial banks curtail their lending, do microfinance institutions also reduce their lending and are their clients less likely to to get a loan? In this paper, we evaluate how MFIs' outreach and sustainability are affected when a banking crisis disrupts the banking system of a country. Since the study period includes another major financial and credit market event, we pay special attention to the effects of banking crises before and after 2008, when a much broader financial crisis affected the financial systems of developed and developing countries alike.

The existing literature shows that banking crises affect not only banks but also have negative effects on the rest of the economy (Teimouri and Dutta 2016; Ongena, Smith and Michalsen 2003). Banking crises lead to bank distress, decrease in lending and investment, and subsequent decline in employment and output (Dell'Ariccia, Detragiache and Rajan 2008; Furceri and Zdzienicka, 2012; and Boyd, Kwak and Smith 2005; Ivashina and Scharfstein, 2010; Chodorow-Reich, 2014; Hoggarth, Reis and Saporta, 2002). As liquidity decreases , investments decline (Teimouri and Dutta 2016), and bank-dependent borrowers, often smaller firms, suffer

(Chava and Purnanandam 2011). Relatively richer countries with higher levels of financial deepening and larger current account imbalances seem to suffer more than developing countries. For example, evaluating dynamic adjustments following banking crises for 79 developed and emerging countries from 1973 to 2010, Teimouri and Dutta (2016) find that the banking credit declined significantly and remained stagnant in the medium run. More importantly, they find that the investment and bank credit ratios declined more in advanced countries after the banking crisis. Even in developing countries, where most MFIs operate, a banking crisis is associated with contraction in deposit and thus less credit (Chipalkatti, Ramesha, and Rishi, 2007). Furthermore, banking crises are in general associated with higher unemployment, lower labor force participation, trade, foreign direct investments, and domestic investment (Chodorow-Reich 2014), and even with more terrorist activity (Gries and Meierrieks 2013).

Small and micro firms are especially vulnerable to the availability of bank credit and, as liquidity is sucked out of the financial system, small firms are more likely to experience credit rationing. Evidence supports the "credit crunch effect" whereby a financial/banking crisis results in increased lender risk aversion and reduced or tightened credit supply to small and medium enterprises (Deyoung et al. 2015; Bonaccorsi di Patti and Sette, 2016), as well as in decrease in small firms' access to credit (Popov and Udell, 2012).

The global financial crisis of 2008 led toloss of the profits of both banks and firms (Sufian and Habibullah, 2010; Hippler and Hassan, 2015). It also decreased cross border lending (De Haas and Van Horen, 2013) and credit lines (Berrospide, Meisenzahl, and Sullivan, 2012; Cotugno and Sampagnaro2013) and led to contraction in deposits, especially in retail and savings banks (Chipalkatti, Ramesha and Rishi, 2007; Puri, Rocholl, and Steffen, 2011). Some researchers argue, however, that the banking crisis could have had little to no effect on some

firms' welfare even if it affected banks (Ongena et al., 2003). This view is similar to research suggesting that, since bank crises strengthen some banks' capital positions, a crisis may improve small banks' probability of survival and of capturing market share, which improves the performance of some banks, particularly those with high quality capital (Berger and Bouwman, 2013; (De Haas & Van Horen, 2013).

In the microfinance literature, the impact of banking crises is unknown and only impact of the financial crisis of 2008 has been explored. Specifically, Wagner and Winkler (2013) find that MFIs were vulnerable to the 2008-2009 global financial crisis and that their credit growth dropped sharply after 2008. Silva and Chávez (2015) found that, contrary to banks, MFIs in countries with better institutional quality (more advanced financial systems) were more resilient to the global financial crisis and suggested that, by creating an enabling environment for MFIs, governments played a crucial role in supporting their outreach and sustainability. Quayes (2015) highlights the potential trade-offs between the two dimensions of MFI performance – outreach and financial sustainability – especially in the environment of financial distress. Wijesiri (2016) finds differences in the reaction of MFIs' productivity to the shock of the 2008 financial crisis related to MFI ownership type and organizational structure, with non-government organizations (NGOs) and cooperatives least affected, and with microfinance banks and microfinance non-bank financial institutions suffering the most during the crisis.

While the separate impacts of banking crisis and the 2008 financial crisis on firms' and banks' performance have been studied before, there is a lack of knowledge of how banking crisis combined with the global financial crisis affect non-traditional financial firms, such as MFIs. An important finding by Wagner (2012) is that MFIs were more resilient to financial distress (crisis) compared to the traditional banks. On the other hand, in time of distress, the smallest firms are

the most vulnerable if unable to fund their operating and financing needs. Therefore, there is a need to evaluate how MFIs react to systematic financial distress and banking crises in particular. .

Our paper differs from previous work in several aspects. First, we study the impacts of bank crises and distinguish between the impacts before and after the global financial crisis of 2008. In addition, unlike previous work, we account for the dual aspect of the MFI's goals – namely the fact that their objectives are to reach more borrowers while maintaining financial sustainability. This is important because the literature provides ample evidence of a trade-off between the outreach and the sustainability dimensions of MFIs' performance. It suggests that financial success may come at the expense of serving fewer and less poor clients which results in - "mission drift" if MFIs focus on maintaining their financial results at the expense of their outreach to the poor (Cull et al., 2007 & 2009; Augsburg and Fouillet, 2010; Armendariz and Szafarz, 2011; Hartarska et al., 2013; Quayes, 2015; Hermes et al. 2011). At the same time, Gonzalez and Rosenberg, (2006) and Schicks (2007) argue that financial sustainability and social outreach complement and reinforce each other. Since there is evidence that a banking crisis may differential impacts depending on MFIs ownership type, we specifically distinguish these impacts between the four different types of MFIs.

While a few papers have tried to explain various aspects of the post-2008 financial environment for MFIs and their adjustment, our contribution to the literature is that we are the first to study the impacts of banking crises itself on MFIs and whether if these have been more devastating after the 2008 global financial crisis. We use the global Mixmarket dataset of 621 MFIs from over 118 countries for the period of 2001-2011 complemented with data from 3 rounds of the World Bank survey of Central Banks. Since the global financial crisis and the

banking crises are similar to a natural experiment and these events can be considered exogenous, we use simple exogenous dummies within a quasi-Difference-in-Difference (DiD) framework. The main objective is to evaluate how the dual aspect of the MFI's goals - *Outreach* (with *Breadth* and *Depth* dimensions) and *Financial Sustainability* (measured by *ROA*) were affected by banking crises before and after the 2008 global financial crisis. .Thus we investigate whether the consequences of banking crises could be ameliorated or strengthened by the 2008 global financial distress. Based on these estimates, we can evaluate whether MFIs are impacted similarly to banks and whether they have become more integrated into the financial sectors. More specially, during a banking or financial distress, banks become more risk averse in order to preserve equity capital (Deyoung et al., 2015). In MFIs, such behavior could lead to lower outreach. Moreover, the empirical evidence would support either a "mission drift" or "complementarity" hypothesis regarding MFI's dual objectives.

Our results indicate that MFIs operating in countries with a banking crisis had better financial sustainability measured by the return-on-assets, possibly due to MFIs acquiring higher quality borrowers who were rationed by commercial banks. Moreover, we find evidence that the global financial crisis, together with a banking crisis, might have forced MFIs to cut outreach to the poor to maintain sustainability, consistent with previous evidence of a tradeoff between outreach and sustainability. Banking crises seem to affect MFIs differentially by their organizational form with microfinance banks and microfinance NGOs more affected relative to Credit Unions or Non-Bank Financial Institutions. The main results are consistent with the view that financial disruptions cause commercial banks to curtail lending to smaller businesses, some of whom might have found credit through microfinance institutions, especially through microfinance banks.

This paper is organized as follows. Section 2 describes the data and data sources. Section 3 specifies the empirical model. Section 4 discusses the results, and section 5 presents robustness checks. We conclude with a brief summary.

2. Data

We use several sources to assemble our dataset. The individual MFI data come from the MIX MARKET information platform (www.mixmarket.org).

The *banking crisis* variable comes from Laeven and Valencia (2013) and contain information for a period from 2004 and up to and including 2011. The literature defined banking crisis in two ways. In the first approach, a banking crises is defined through a narrative (Bordo et al., 2001; Caprio and Klingebiel, 2003; Demirgüç-Kunt and Detragiache, 2005; Reinhart and Rogoff, 2009; Schularick and Taylor, 2012; and Laeven and Valencia, 2013). In the second approach, it is identified using real-time measures of banking distress. The latter approach is assumed to overcome potential biases from the backward-looking accounts in the first definition (Romer and Romer, 2017). These authors state that "bank equity returns provide the best real-time signal of narrative banking crisis identified by existing historians relative to a host of other variables, including non-financial equity returns, credit spreads, and macroeconomic conditions". Laeven and Valencia (2013) define a banking crisis as a situation characterized by bank runs, significant losses in the banking system, and/ or bank liquidations. Analysis of our data reveals that all of the banking crises recorded during the study period were in Eastern Europe and Central Asia, with Russia and Kazakhstan having a banking crisis after 2008. Out of the total of 66 annual observations, only Russia had a banking crisis before the global financial crisis with. That is to say, there are only two countries with fully-fledged banking crises – Russia in both pre- and the post-global financial crisis periods and Kazakhstan after the global financial crisis.

Unlike previous financial crises, the 2008 US financial crisis and the banking crisis affected mostly advanced, middle-income economies.

The rest of the data come from several rounds of the World Bank-sponsored survey of central banks (see Barth, Caprio, and Levine, 2013). It includes the measure of the *return-to-assets* for the banking system to measure opportunity costs to microfinance activities as well as an index of the independence of the supervisory body to measure the stringency of banking regulations within a country. Additional variables are collected from the World Bank World Development Indicators, such as the *Depth* of financial sector, defined as the ratio of the M2 monetary aggregate, including currency and deposits to the country's GDP and measures the level of banking sector. Country characteristics include *inflation, economy size,* and *control of corruption*. The financial system characteristics include *average ROA in banking, money and quasi money as percent of GDP, and the number of bank branched per 100,000 adults.* Specifically, the number of branches per 100,000 people reflects the "density" of banking services in the country (Malikov & Hartarska, 2018). Table 1 presents the definitions of the dependent and independent variables and their sources.

The resulting dataset is for the period of 2004-2011 and contains information for 621 MFIs from 118 countries, which results in about 2,272 individual annual MFI observations.[1] MFI-specific variables such as, MFIs' size, age, business type, availability of savings, risk exposure (the portfolio at risk 30 days or longer), whether MFIs are regulated a government regulatory agency, and legal status.

Summary statistics by groups of MFIs operating in countries with and without banking crises are presented in Table 2. While the results show statistically significant differences in

[1] Only observations with at least three stars for quality of reporting are used.

means between pre- and post- global financial crisis in terms of the *Breadth* and *Depth* of outreach (log of the number of active borrowers (*NAB*), and the average loan balance per borrower / GNI per capita, respectively), there is no statistically significant difference in the financial performance – return on assets (*ROA*).

3. Empirical Specification

We estimate whether financial markets' distress such as a banking crisis affects the *outreach* and *sustainability* of MFIs. Of special interest is the combined effect of a banking crisis and of the post 2008 global financial crisis environment on MFIs' outreach and sustainability. We focus on this aspect because the post 2008 environment has likely affected the supply of funds available to MFIs to on-lend to their clients. The general economic slowdown has likely affected low-income clients' ability to generate income and repay loans and thus affected MFIs profits and sustainability. With the financial markets in turmoil, borrowers seeking the smallest loans are likely to be affected the most because lenders avoid smaller and thus costlier or riskier borrowers. Therefore, MFIs outreach is likely also affected.

While various empirical approaches are useful in evaluating whether a treatment (or an event such as a banking crisis) affects an outcome of interest, we employ a dummy variable interaction approach or a Difference-in-Differences -like framework. A banking crisis is similar to a natural experiment as it occurs randomly from the perspective of an small MFI operating in one country and not in another. Thus, MFIs find themselves randomly in a "treated" (with a banking crisis) or "non-treated" (without a banking crisis) country. From the perspective of an MFI, a banking crisis can be considered an exogenous "treatment" event. Similarly, the pre- or post- 2008 global financial crisis economic environments are exogenous events from the perspective of an

MFI. Thus, dummy variables can capture the effects of the two events affecting credit markets for micro-loans in a model that is similar to the Difference-in-Differences technique. Specifically, it is able to distinguish whether the impacts of banking crises on MFI performance are enhanced or weakened by the global financial crisis.

Since MFIs have the dual objective of reaching poor borrowers while covering costs, we study the effect of the financial distress in credit markets on these two aspects of performance, *outreach* and *sustainability,* by using three outcome measures. Outreach itself has two dimensions and we measure the *breadth* of outreach to poor borrowers by the number of active borrowers and the *Depth* of outreach, which is the clients' poverty level by the average loan size scaled by the country GNI per person. Finally, we capture the impact on financial sustainability by the returns on assets ratio.

The empirical analysis of MFIs' performance follows the microfinance literature and specifies the MFIs' performance measures as a function of MFI-specific, macroeconomic, and institutional factors and regulatory framework (Hartarska and Nadolnyak, 2007 & 2008; Hartarska, 2005; Wagner & Winkler, 2013). Since a banking crisis might have different effects before and after the financial market distress (financial distress might have differential effect with and without a banking crisis), we include the interaction term of banking crisis and the global financial distress to estimate whether there is a different effect of a banking crisis combined with the post 2008 global financial crisis.

Specifically, we estimate:

$$\begin{aligned} Outreach_{ijt} = {} & \beta_0 + \beta_1 Banking\_Crisis_{jt} + \beta_2 Financial\_Crisis_t \\ & + \beta_3 Banking\_Crisis * Financial\_Crisis_t + (\beta_4 time\ since\ 2008) \\ & + \alpha' MFI_{ijt} + \beta' C_{jt} + \gamma' FS_{jt} + \varepsilon_j + \varepsilon_t + u_{ijt} \end{aligned} \quad \text{(a1)}$$

$$Sustainability_{ijt} = \beta_0 + \beta_1 Banking\_Crisis_{jt} + \beta_2 Financial\_Crisis_t + \beta_3 Banking\_Crisis * Financial\_Crisis_t + (\beta_4 time\ since\ 2008) + \alpha' MFI_{ijt} + \beta' C_{jt} + \gamma' FS_{jt} + \varepsilon_j + \varepsilon_t + u_{ijt} \quad \text{(a2)}$$

Here $Outreach_{ijt}$ is measured by two variables - the *breadth of outreach* (log of the number of active borrowers (NAB), and the Depth of outreach (average loan balance per borrower / GNI per capita). We use *i* denote MFI, *j* stands for the country, and *t* for time period. $\text{Sustainability}_{ijt}$ is measured by the Return-on-Assets (*ROA*). $Financial\_Crisis_t$ is equal to 0 during the 2004-2007 period (pre-crisis) and 1 during 2008-2011.[2] $Banking\_Crisis_{jt}$[3] takes the value of one if a country *j* had a banking crisis in year *t*. Following Silva and Chavez (2015), the time since 2008 variable is defined as current year minus 2008 and 0 if negative, and is included to capture the diminishing effect of the global financial crisis on the performance of MFIs. MFI_{ijt} is a vector of MFIs' specific characteristics that include MFI *age*, *ratio of capital to total assets,* log of *total assets,* ratio of savings to total assets, ratio of loans outstanding to total assets, portfolio-at-risk > 30 days, the *legal status* of MFIs and whether they are *Regulated* by a government regulatory agency. C_{jt} includes macroeconomic country-specific variables (characteristics), such as *inflation*, the *size* of the economy, and *control of corruption*. FS_{jt} are the characteristics of the financial system, such as return on banking assets, *financial statement transparency*, and *bank branches* per 100K adults. Here ε_j and ε_t are country and year "fixed effects" used to control for unobservable

[2] Our definition is closest to Wijesiri (2016) who defined the period 2005–2007 as before, and the period 2008-2011 as after the global financial crisis. Similarly, De Young (2015) defines the financial crisis as lasting 2007:Q4 through 2010:Q4. Since our banking crisis data end in 2011, more narrow band is unlikely to be much more useful.

[3] A banking crisis is defined as systemic if two conditions are met: 1) Significant signs of financial distress in the banking system (as indicated by significant bank runs, losses in the banking system, and/or bank liquidations); 2) Significant banking policy intervention measures in response to significant losses in the banking system (Laeven and Valenci, 2012). The financial crisis that originated in Unites Sates subprime mortgage market in 2008, quickly spread to Europe (Brunnermeier, 2009).

persistent country- and year-specific effects, u_{ijt} is the normally distributed random error term. In all cases, the standard errors (SEs) are clustered at MFI level.

The MFI-specific variables are used to control for factors affecting MFIs' performance from the supply side. By contrast, macroeconomic and financial country-specific variables could influence the MFIs' performance from demand side (Wagner & Winkler, 2013). The MFI's *leverage* is defined by the ratio of capital to total assets. MFI *size* is measured by the logarithm of total assets, and *age* is measured by a categorical variable defined by three categories – Mature, New, and Young – according to difference between the inception and the year of data submitted by MFIs (Mix market, 2017). We also include the measures of *lending*, *saving*, and *risk exposure* using the ratio of gross loan portfolio to total assets, *ratio of deposits to total assets*, and *ratio of capital to total assets*, respectively (Hartarska and Nadolnyak, 2008). *Regulation* controls for regulatory status (whether MFI is regulated by a government regulatory agency or not) and is included because performance may be affected by entry restrictions and /or supervision (Hartarska and Nadolnyak, 2008). MFI type is defined by 5 dummies: *CU* for credit union, *NBFI* for Non-bank Financial Institution, *NGO* for non-governmental organization, as well as *Rural Bank* and *Other*. The category *Bank* serves as the reference group. The regional dummies are Eastern Europe and Central Asia (*EECA*) where all banking crises occurred, with non-EECA as the reference group.

The variables for country characteristics' are *inflation* - average consumer price index (*CPI*) (Wagner & Winkler, 2013; Hartarska and Nadolnyak, 2008), *size* of the economy (log of GDP) and *Control of Corruption* (Hartarska and Nadolnyak, 2008). Financial system characteristics' are *ROA of banking*, *financial statement transparency*, *M2* (money and quasi

money as percent of GDP) and *bank branches* per 100,000 adults to reflect the level of regulation of MFIs and its competitors because these are likely to affect clients.

We cluster standard errors at microfinance institutional level to solve the potential heteroscedasticity issues (Wagner & Winkler, 2013; Hartarska and Nadolnyak, 2007). The variable *banking crisis* is not varying over time by in our sample and thus we can only use the random effect model. Further, the Haussmann test shows that, for a model without the banking and financial crises dummies, random effects remain preferable.

The first hypothesis that we want to test is whether a *banking crisis* forces MFIs to curtail lending and thus serve fewer or less poor borrowers. On the one hand, we expect that if MFIs operate like banks, this will be the case (Brière & Szafarz, 2015). On the other hand, if banks cut off access to loans for many borrowers, some of these borrowers may end up as clients of microfinance institutions, especially microfinance banks thus increasing the breadth of outreach but possibly reducing the depth of outreach (MFIs having more but less poor clients). The results are determined by the estimates of $\widehat{\beta_1}$, $\widehat{\beta_2}$, and $\widehat{\beta_3}$[4].

The second hypothesis to be tested is whether MFI *sustainability* is affected by a *banking crisis*. Again, if MFIs are more like banks, some drop in the *ROA* is expected. If MFIs clients are dependent on the unique access to loans through MFIs, then these clients are unlikely to change repayment patterns and MFIs' financial sustainability will be unaffected. Moreover, if some less poor borrowers lose access to bank loans and shift to microfinance loans, the profitability of

[4] $\widehat{\beta_1} = E[\bar{Y}_0^T] - E[\bar{Y}_0^C]$, average banking crisis effect on MFIs' performance in the pre-2008 period;
$\widehat{\beta_2} = E[\bar{Y}_1^C] - E[\bar{Y}_0^C]$, denotes average global financial crisis effect on MFIs' performance in the country without banking crisis;
$\widehat{\beta_3} = E[\bar{Y}_1^T] - E[\bar{Y}_0^T] - (E[\bar{Y}_1^C] - E[\bar{Y}_0^C])$, the post 2008 change in the average effect of banking crisis on the MFI performance;
$\widehat{\beta_1} + \widehat{\beta_3} = E[\bar{Y}_1^T] - E[\bar{Y}_1^C]$ banking crisis effect post 2008 on MFIs' performance;
$\widehat{\beta_2} + \widehat{\beta_3} = E[\bar{Y}_1^T] - E[\bar{Y}_0^T]$ the post 2008 change in average MFI performance in countries with banking crises

MFIs may improve. Indeed, anecdotal evidence for the period prior to the current study in late 1990s shows that, while lending quantity in Russia deteriorated as a result of the 1998 default and banking crisis, the portfolio of banks that was devoted to microloans actually improved (Chava and Purnanandam, 2011). Based on the tests of the first two hypotheses, we can also test whether there exists a trade-off between MFIs' *outreach* and *financial sustainability*.

Finally, the average impact of the banking crisis is captured by $\widehat{\beta_1} + \widehat{\beta_3}$ during the period after 2008. The average effect of Post 2008 is $\widehat{\beta_2} + \widehat{\beta_3}$ in countries with a banking crisis and to β_2 in the absence of a banking crisis. Thus, the Chow test (a joint F-test) was used to test for $\widehat{\beta_1} + \widehat{\beta_3}$ and $\widehat{\beta_2} + \widehat{\beta_3}$, implying whether banking crises have significant effect on MFIs' performance post-2008, and whether the global financial distress has the significant effect with banking crisis, compared to without banking crisis. $\widehat{\beta_3}$ measures the post-2008 change in the average impact of banking crises on the MFI performance. The inclusion of the dummy interaction allows differentiation between the impacts of banking crises and the 2008 financial crisis on MFI performance.

3.2 Robustness check: different legal status and regions

For robustness checks we estimate the same models for the EECA region and by different legal status (Table 4). MFIs vary by their legal status which affects their outreach and sustainability (Wijesiri, 2016). That is why we also estimate the models for subsamples of MFIs operating in the only region with banking crises – ECA, as well as models by MFI type - bank, NBFI, CU, and NGO (Table 5).

4. Empirical Results

Table 3 presents the estimation of the impacts of banking crises and the global financial crisis on the Breadth and Depth of outreach (Models 1 and 2) and Sustainability (Model 3). Our main variables of interest are $\widehat{\beta_1}$, $\widehat{\beta_2}$, $\widehat{\beta_3}$, as well as $\widehat{\beta_1} + \widehat{\beta_3}$, and $\widehat{\beta_2} + \widehat{\beta_3}$,measuring the effect of the banking crisis and -the global financial distress, and the global financial crisis impacts on MFI performance with and without banking crisis, holding *ceteris paribus*.

The results in Column 1 in Table 3 show that banking crises before 2008 did not affect MFIs' *breadth* or *Depth* of outreach, *ceteris paribus*. Columns 4-6 in Table 4 present the estimates from the Eastern Europe and Central Asia regions that contain all the countries that had a banking crisis. Results for the full sample, combined with F test results in Table 6, show that the outreach of MFIs (log of number of active borrowers *NAB*) is affected by the banking crises in either period. The financial distress post 2008 has a positive effect on *NAB* for MFIs in countries without banking crisis, while it has no effect on *NAB* for MFIs in countries with banking crisis. The interaction term of banking crisis and global financial distress shows a significant and negative effect and indicates that, after 2008, the average effect of banking crisis was on average about 1.409 percent fewer borrowers being reached, in relation to the pre-2008 period. Thus, this result suggests that the global financial crisis is strengthening the negative impact of the banking crises on the Breadth of outreach performance of MFIs.

In terms of *Depth* of MIFs' outreach, Column 2 shows the estimates of the variables of interest, namely, it shows that the relevant dummies are not statistically significant. This indicates that neither banking crisis nor financial distress are associated with the size of borrowers' loan balance in countries with and without banking crises. It implies that, unlike banks, MFIs neither shrank their outreach nor provided smaller loan to avoid risks (Deyoung et

al., 2015). During the banking crisis and after 2008 recession, the decline in the *average loan balance per borrower /GNI per capita* could have been driven by increased risk overhang effects (Deyoung et al. 2015). Credit can become less available (Deyoung et al., 2015) and increased risk aversion of banks can result in reaching clients with relatively smaller loan balance. While for the overall sample *Depth* is not significantly impacted by the banking crises or the financial crisis, different types of MFIs (by legal status) are impacted differentially and the details are discussed in the section on Robustness Checks.

In terms of *financial sustainability* (*ROA*) in Column 3, the coefficient on the banking crises is positive and statistically significant suggesting that MFIs in countries with a banking crisis had effects on average *ROA* in the period of before 2008. From F-test results in Table 6, *ROA* is significant and positively affected by banking crises after 2008, its average impact (0.072) is slightly smaller than pre-the global financial distress impact (0.081). Taken together, these results seem to suggest that better clients switched to MFIs from banks which made the MFIs more profitable. This is consistent with findings by Chava and Purnanandam (2011), Deyoung et al. (2015), Puri, Rocholl and Steffen (2011), and Montoriol-Garriga and Wang (2011) that small firms are rationed as the liquidity is sucked out of the banking system and high quality borrowers are excluded from the banking credit market. Such borrowers could have found their way in microfinance institutions.

The average effect of banking crises on MFIs' NAB after the global financial crisis is lower relative to the pre-2008 period. A banking crisis itself does not seem to induce MFIs to cut back the number of active borrowers, nor does it affect the Depth of outreach. The financial crisis of 2008 alone is associated with slight increase in the number of active borrowers in MFIs. However, a banking crisis's effect combined with the post-2008 financial stress has a large and

negative impact of about -1.9 percent impact on outreach. Thus, we find that a banking crisis improves financial sustainability (positive effect on ROA) both pre and post 2008. Yet it has a negative effect on breadth of outreach (*NAB)* post-2008, compared to pre-2008 global financial distress. Taken together, these results confirm a trade-off between outreach and financial sustainability found in previous work even in case of financial distress (Cull et al. 2007; Navajas et al. 2000; Schreiner 2002; Conning 1999; Hulme and Mosley, 1996; Lapenu and Zeller, 2 002; and Paxton and Cuevas, 2002). Specifically, as MFIs cut back the number of clients, and to cope with the consequences from banking crisis and the 2008 global financial crisis, they could have served fewer poor borrowers but possibly lower risk (higher quality). These borrowers might have been higher-quality for MFIs but lower-quality for banks (Chava and Purnanandam 2011, Deyoung et al. 2015, Puri, Rocholl & Steffen 2011, and Montoriol-Garriga & Wang 2011). The switching to MFIs could have helped MFIs to avoid losses (lower ROA). Clearly, these results are consistent with evidence that a banking crisis results in bank distress, and a possible decline in banking credit (Dell'Ariccia, Detragiache, and Rajan, 2008). As Wagner (2012) and Deyoung et al. (2015) observed, MFIs are intergraded into the international financial system and exposed to same risks as banks. It is not surprising that MIFs' outreach is affected by banking crises and the financial crisis, MFis may have advantage of serving some of the borrowers rationed by banks. Our results are consistent with the view that, for some financial institutions especially small banks like MFIs, a crisis may improve the probability of survival and their competitive strength, which in the case of MFIs (Berger and Bouwman, 2013; De Haas & Van Horen, 2013).[5]

[5] In addition, the result that MFIs in a country with a banking crisis are associated with fewer active borrowers and better financial sustainability is consistent with Andersson (2016) who observes that major banking crises enhance the market orientation of economic institutions and the stability and accountability of political institutions.

Turning to specific MFI characteristics, we first observe that, relative to mature MFIs, MFIs classified as newly established have lower *outreach* and worse *sustainability*. This is consistent with previous work by Vanroose and D'Espallier et al. (2013), and Hartarska and Nadolnyak (2007). *Sustainability* is unaffected by MFI size, but size has a significant and positive effect on both *Breadth* and *Depth* of outreach, which is consistent with Silva and Chavez's (2015). The measure of the level of leverage (*cap_asset*), shows that more leveraged MFIs have lower breadth of outreach (-2.892) and better financial sustainability (0.051). The ratio of savings to assets is negative in the breadth of outreach model, suggesting that savings collecting MFIs serve fewer borrowers, but it does not affect *sustainability* or the *Depth* of outreach. The ratio of gross portfolio to total assets measuring MFIs' commitment to lending is positively associated with *outreach* and *ROA*. Risk, measured by the portfolio at risk 30 days or longer, is associated with lower level of *breadth* of outreach but, as expected, MFIs with risker portfolios offer smaller-size loans (Depth is lower). Unsurprisingly, regulated MFIs tend to serve less poor borrowers as indicated by the positive and significant coefficient of 0.088. The legal status of MFI matters, because relative to MFIs organized as banks (our comparison group), all other types of MFIs reach fewer but poorer borrowers, and *ROA* is smaller for CU and NGO.

Regarding the impact of macroeconomic factors, we find that MFIs in larger economies reach more borrowers as indicated by the positive and insignificant coefficient of 0.057. However, this variable does not affect Depth of outreach or financial sustainability. Inflation does not affect MFIs' *outreach* and *sustainability*. Interestingly, MFIs in countries with higher level of corruption index seem to reach poorer clients and have higher level of financial sustainability.

In terms of financial system characteristics, MFIs in countries with more profitable banking sector (higher returns to assets in the banking sector) serve fewer poor borrowers and have better sustainability. The transparency of the financial system in a country is unrelated to MFIs' *financial sustainability*, but MFIs operating within more transparent financial systems reach more and poorer borrowers. The Depth of the financial system (measured by the ratio of M2 to GDP) has no effect on MIFs' *depth of outreach* or *financial sustainability*, but higher levels of M2 are associated with better outreach by MFIs. Consistent with our results that borrowers may be switching to MFIs in a crisis, we find that MFIs in countries with more commercial bank branches per 100,000 adults have fewer clients and lower level of *financial sustainability*.

5. Robustness Checks

Across the world and within countries, MFIs operate under different legal statuses and have different outreach and sustainability (Wijesiri, 2016). That is why, to check the robustness of our results, we estimate our models using the sample of MFIs from the region with banking crises – *EECA*, as well as using sub-samples of MFIs classified by type - *Bank*, *NBFI*, *CU*, and *NGO*. Tables 4 and 6 show the estimates of MFI outreach and financial sustainability in the EECA. Tables 5 and 6 present the estimates of MFI by the samples of MFI type (Bank, CU, NBFI, and NGO) for *Breadth of outreach* (log of number of active borrowers), *Depth of outreach* (average loan size scaled by the GNI per capita), and *Sustainability* (*ROA*).

Table 4 shows that the 2008 global financial crisis had a direct negative effect on *financial sustainability* (*ROA*) in all countries (with and without a banking crisis) in the EECA region. This is consistent with other findings such as Wagner (2012) and Di Bella and Gabriel (2011) who demonstrate that MFIs in the EECA recorded the strongest credit growth before the

global financial crisis and were most affected by the 2008 global financial crisis compared with other regions. Indeed, the negative and significant coefficient on the interactive dummy (financial crisis times banking crisis) in the *ROA* equation confirms this interpretation. Moreover, the global financial crisis has a direct negative effect on *sustainability* of MFIs (-0.065). The interaction term of banking crisis and financial crisis results in 0.095% lower level of sustainability, which is greater than that for MFI from all over the world. In all cases, the joint effect of a banking crisis is amplified by that of the 2008 financial distress. In this region, we find that neither the financial nor a banking crisis affected outreach.

The coefficients on the control variables are largely consistent with the previous estimation. Our previous results show that MFIs in countries with more commercial bank branches per 100,000 adults are associated with fewer clients and lower financial sustainability, while in the EECA region it is associated with lower *sustainability and poorer* clients. Also, MFIs in countries with higher level of corruption index seem to reach more borrowers and have better ROA in this region.

Since MFIs with different legal status using different technologies or governance mechanisms result in different efficiency levels (Wijesiri 2016; Sevin et al. 2012; Estape-Dubreuil and Torreguitart-Mirada 2015), a banking crisis may affect the NGOs, NBFIs, and Credit Unions differently. Similarly, the financial systems of countries of various regions and level of economic development were affected differentially by the global financial troubles and banking crisis following 2008. Thus, we split the sample data by the MFI legal status and report the impacts of banking crises and the global financial crisis on MFIs' outreach and financial sustainability across Bank, CU, NBFI, and NGO in Table 5.

The results show that a banking and financial crises have differential impact on MFI outreach and sustainability by legal status. For example, the breadth of outreach is unaffected by either a banking or a financial distress for Banks and CUs. Only for NBFIs is the financial crisis associated with better outreach, while jointly a banking crisis and the financial crisis had large negative impact on outreach. We find that a banking crisis is associated with credit unions (CUs) lending to poorer borrowers (negative sign on Depth of outreach, indicating smaller loan size scaled by a country's GNI), while NGOs had less poor borrowers. However, NGOs in countries with a banking crisis after 2008 were also lending to poorer borrowers (negative coefficient of -0.118 on the interactive dummy). This is confirmed by the pooled estimates in Table 3. Estape-Dubreuil and Torreguitart-Mirada (2015) argue that microfinance NGOs serve more clients and reach poorer clients, and thus perform better from the perspective of social welfare.

In terms of sustainability, we find that banking crises after 2008 are associated with improved ROA in MFIs organized as banks (joint impact of 0.2) and NGOs (0.10). These results again are consistent with the interpretation that relatively high quality borrowers rationed out by regular commercial banks during a banking crisis after 2008 switch to MFIs or NGOs.

6. Conclusion

In this manuscript, we evaluate how MFIs meet their outreach and sustainability when a banking crisis disrupts the banking system of a country. Since our study period includes the 2008 global financial crisis, a much broader financial crisis affected the financial systems of developed and developing countries alike, we pay special attention to the impacts of banking crises before and after 2008. We analyze a dataset of over 2,000 annual observations of MFIs from over 118 countries for the period of 2004-2011, with a random effects panel clustered at the MFI level and with time and country dummies. Our results indicate that, *ceteris paribus*, MFIs in countries with

a banking crisis served fewer borrowers and had better financial sustainability before 2008. Moreover, we find that in the post 2008 environment the banking crisis led MFIs to cut their outreach without much impact on financial sustainability. Specifically, MFIs in countries with a banking crisis reached 1.4 percent fewer borrowers after the 2008 global financial distress. These results support previous findings of a tradeoff between outreach and sustainability and that the financial crisis was associated with improved financial sustainability of MFIs. Last but not least, the global financial crisis amplifies the effects on outreach, but not on MFIs' financial sustainability. This suggests that MFIs may have intergraded into the international financial system but they might be affected by crises in a different way from banking.

We find that Microfinance banks and NGOs were the most affected by the financial crisis compared to other business types, which is consistent with Wijesiri's (2016). The results overall are consistent with the view that commercial banks might have curtailed lending to smaller businesses some of whom might have found credit through microfinance institutions, especially microfinance banks. Thus, while not all banking crisis impacts are the same, a banking crisis combined with additional financial markets distress is clearly associated with fewer borrowers being served by the microfinance industry, even if not at the expense of these institutions financial sustainabilit

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Table 1. Variable Definitions

Dependent variables	
ROA	Return on assets; measures how well the MFI uses its total assets to generate returns
LN_borrowrers	Logarithm of the number of current borrowers, that is the number of individuals that currently have an outstanding loan balance with the MFI or are responsible for repaying any portion of the gross loan Portfolio.
Depth	Average loan balance per borrower / GNI per capita
Independent variables	
MIF characteristics variables	
Banking_Crisis*Financial_Crisis	A dummy that equals one if MFI suffers from the global financial crisis
Banking_Crisis	A dummy that equals one if the country suffers banking crisis
Financial_Crisis	A dummy that equals one if year>2007
Time since 2008	A non-negative number equals current year-2008, 0 if negative
Capital_to_Asset	Ratio of capital to total assets
Age	categorized by the number of years since inception:
New	A dummy that equals one if MIF is New
Young	A dummy that equals one if MIF is Young
Size	The total assets of the MFI ($ 100 million). Total assets include all assets net of contra asset accounts such as the loan loss reserve and accumulated depreciation
Depposit_to_Assets	Ratio of saving/savings to total assets
GLP_to_Assets	Ratio of Gross loan Portfolio (loans outstanding) to total assets
PAR_30	Portfolio-at-risk > 30 days
English	Legal origin_English
Regulated	A dummy that equals one if MIF is Regulated by a government regulatory agency
CU	A dummy that equals one if MIF is CU
NBFI	A dummy that equals one if MIF is NBFI
NGO	A dummy that equals one if MIF is NGO
Other	A dummy that equals one if MIF Other
Rural_Bank	A dummy that equals one if MIF is Rural Bank
EEECA	A dummy that equals one if MIF is from Eastern Europe and Central Asia
Country characteristics variables	
CPI	Average annualized consumer price index
GDP	Logarithm of the total GDP ($100 billion)
Control_of_Corruption	Control_of_Corruption
Financial system characteristics variables	
Bank_ROA	Return on assets of bank
Financial_Transparency	Financial Statement Transparency
M2_GDP	M2/GDP
Bank_Branches	Bank Branches per 100K adults

Table 2. Statistics summary

VARIABLES	N	mean	N	mean	N
	Total	Total	No global fin. crisi		
LN_borrowrers (10 million)	2,192	1.97	2,147	2	45
		(5.84)		(5.90)	
ROA (%)	2,269	1.096	2,206	1.09	63
		(11.256)		(11.350)	
Depth	2,442	0.362	2,379	0.356	63
		(0.519)		(0.503)	
Banking_Crisis	2,192	0.0506	2,147	0.0307	45
		(0.219)		(0.173)	
Capital_to_Asset	2,192	0.305	2,147	0.306	45
		(0.255)		(0.255)	
Age					45
New	2,192	0.101	2,147	0.102	45
		(0.302)		(0.303)	
Young	2,192	0.198	2,147	0.194	45
		(0.399)		(0.396)	
Size	2,192	0.506	2,147	0.513	45
		(1.524)		(1.539)	
Deposit_to_Assets	2,192	0.164	2,147	0.162	45
		(0.259)		(0.257)	
GLP_to_Asset	2,192	0.775	2,147	0.776	45
		(0.162)		(0.162)	
PAR_30	2,192	6.689	2,147	6.661	45
		(13.252)		(13.183)	
English	2,192	0.3	2,147	0.306	45
		(0.458)		(0.461)	
Regulated	2,192	56.2%	2,147	55.5%	45
		(0.496)		(0.497)	
Legal status					
CU	2,192	9.4%	2,147	8.8%	45
		(0.292)		(0.283)	
NBFI	2,192	44.6%	2,148	44.5%	45
		(0.497)		(0.497)	
NGO	2,192	36.8%	2,149	37.4%	45
		(0.482)		(0.484)	
Other	2,192	0.3%	2,150	0.3%	-
		(0.056)		(0.057)	
Rural_Bank	2,192	3.9%	2,151	4%	-
		(0.193)		(0.195)	

EECA	2,192	15.3%	2,147	13.6%	45
		(0.36)		(0.342)	
CPI	2,192	122.7	2,147	121.9	45
		(22.05)		(21.49)	
GDP	2,192	5.373	2,147	5.265	45
		(6.594)		(6.516)	
Control_of_Corruption	2,192	-0.415	2,147	-0.403	45
		(0.285)		(0.274)	
Bank_ROA	2,192	1.386	2,147	1.664	45
		(3.897)		(0.991)	
Financial_Transparency	2,192	4.879	2,147	4.885	45
		(1.057)		(1.06)	
M2_GDP	2,053	53.91	736	52.36	1,317
		(23.10)		(25.37)	
Bank_Branches	2,053	19.99	736	17.21	1,317
		(16.81)		(17.46)	

Note: Std. Dev. in parentheses

Table 3. Estimates of MFI outreach and financial sustainability using random effect models

VARIABLES	(1) ln(NAB)	(2) Depth	(3) ROA
	All	All	All
Banking_crisis	-0.735	-0.064	0.081**
	(0.620)	(0.344)	(0.033)
Financial_crisis	0.248**	-0.051	-0.001
	(0.111)	(0.040)	(0.011)
Banking_crisis*1.Financial_crisis	-1.409***	-0.105	-0.009
	(0.285)	(0.196)	(0.018)
t_since_2008	-0.001	0.028	-0.005
	(0.055)	(0.018)	(0.005)
Cap_asset	-2.892***	0.078	0.051*
	(0.486)	(0.067)	(0.027)
Size	0.187***	0.024***	0.000
	(0.041)	(0.008)	(0.001)
age (New)	-0.812***	0.069	-0.046***
	(0.126)	(0.044)	(0.016)
age (Young)	-0.113	0.007	0.004
	(0.083)	(0.019)	(0.006)
Dep_totasset	-2.841***	0.051	0.001
	(0.296)	(0.102)	(0.016)
Glp_totasset	0.752***	0.091*	0.137***
	(0.244)	(0.053)	(0.024)
english	-3.358***	0.595***	0.092
	(0.628)	(0.230)	(0.080)
Port_risk30	-0.391**	-0.025*	-0.026
	(0.164)	(0.015)	(0.018)
Regulated	0.263	0.088*	-0.010
	(0.177)	(0.047)	(0.009)
CU	-3.144***	-0.493***	-0.040*
	(0.402)	(0.184)	(0.023)
NBFI	-1.979***	-0.373**	-0.040
	(0.324)	(0.158)	(0.025)
NGO	-3.397***	-0.530***	-0.069**
	(0.371)	(0.164)	(0.028)
Other	-3.394***	-0.345*	-0.042
	(0.584)	(0.180)	(0.035)
Rural_Bank	-2.703***	-0.372**	-0.014
	(0.457)	(0.182)	(0.028)
1.EECA	0.262	1.164***	0.020
	(0.566)	(0.280)	(0.035)
CPI	-0.001	-0.001	0.000
	(0.004)	(0.001)	(0.000)
GDP	0.057***	-0.000	-0.000
	(0.018)	(0.005)	(0.002)
Control_of_Corruption	-0.077	-0.094*	0.047*
	(0.277)	(0.057)	(0.027)
Banking_ROA	0.005	0.004**	0.001**
	(0.006)	(0.002)	(0.001)

Financial_Transparency	0.117**	-0.026*	0.005
	(0.045)	(0.015)	(0.003)
M2_GDP	0.012**	-0.003	-0.001
	(0.006)	(0.002)	(0.001)
Bank_Branches	-0.009*	0.001	-0.001**
	(0.005)	(0.002)	(0.000)
Constant	16.810***	0.156	-0.087
	(0.671)	(0.181)	(0.070)
Observations	2,053	2,272	2,131
Number of id	617	684	652
country fixed effect	Yes	Yes	Yes
year fixed effect	Yes	Yes	
R^2_between	0.480	0.336	0.311

Note: Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1, mature as the reference for age, bank as the reference group for legal status.

Table 4. Estimates of MFI outreach and financial sustainability for Eastern Europe and Central Asia Region, random effects

VARIABLES	(4) ln(NAB)	(5) Depth	(6) ROA
	EECA	EECA	EECA
Banking_crisis	3.294	0.613	-0.232
	(2.690)	(1.095)	(0.220)
Financial_crisis	0.223	-0.123	-0.065**
	(0.256)	(0.204)	(0.027)
Banking_crisis*1.Financial_crisis	-1.356***	-0.126	-0.095**
	(0.491)	(0.438)	(0.045)
t_since_2008	-0.261**	-0.025	-0.021
	(0.120)	(0.062)	(0.016)
Cap_asset	-3.393***	0.503	0.018
	(0.290)	(0.378)	(0.020)
Size	0.132**	0.049*	0.002
	(0.061)	(0.027)	(0.002)
age (New)	-0.631***	0.424	-0.027*
	(0.225)	(0.280)	(0.015)
age (Young)	-0.180	0.029	0.004
	(0.128)	(0.069)	(0.008)
Dep_totasset	-2.510***	-0.482	-0.020
	(0.309)	(0.393)	(0.015)
Glp_totasset	-0.107	0.314	0.025
	(0.674)	(0.334)	(0.029)
english			
Port_risk30	-0.254	-0.681	-0.145**
	(0.886)	(0.619)	(0.065)
Regulated	0.699**	0.149	0.000
	(0.281)	(0.163)	(0.018)
CU	-4.362***	-0.844*	0.036**
	(0.543)	(0.495)	(0.017)
NBFI	-2.563***	-0.835*	0.006
	(0.467)	(0.430)	(0.016)
NGO	-2.623***	-1.257***	0.035
	(0.562)	(0.464)	(0.033)
Other			
Rural_Bank			
1.EECA			
CPI	0.011	0.006	0.004***
	(0.015)	(0.010)	(0.001)
GDP	0.034	0.010	-0.003
	(0.071)	(0.020)	(0.003)
Control_of_Corruption	2.208***	0.582	0.152*
	(0.632)	(0.564)	(0.090)

Banking_ROA	-0.001	0.005	-0.000
	(0.007)	(0.004)	(0.001)
Financial_Transparency	0.296***	-0.006	0.014*
	(0.111)	(0.048)	(0.008)
M2_GDP	0.025	-0.017	0.002
	(0.049)	(0.033)	(0.002)
Bank_Branches	0.012	0.037*	-0.009**
	(0.038)	(0.022)	(0.004)
Constant	13.462***		0.091
	(3.898)		(0.261)
Observations	321	388	373
Number of id	117	138	133
country fixed effect	Yes	Yes	Yes
year fixed effect	Yes	Yes	Yes
R^2_between	0.718	0.239	0.186

Note: Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1, mature as the reference for age, bank as the reference group for legal status.

Table 5: Robustness test: Estimates of MFI outreach and financial sustainability across different legal status using the random effect model

VARIABLES	(1) Bank	(2) CU	(3) NBFI	(4) NGO	(5) Bank	(6) CU	(7) NBFI	(8) NGO	(9) Bank	(10) CU	(11) NBFI	(12) NGO
	Log (NAB)				Depth of Outreach				ROA			
Banking_crisis	1.085	-1.582	-1.042	-0.518	0.729	-2.971***	0.216	0.745**	0.049	0.006	0.045	0.041
	(1.174)	(2.048)	(0.817)	(0.720)	(0.822)	(0.290)	(0.778)	(0.336)	(0.094)	(0.075)	(0.063)	(0.051)
Financial_crisis	-0.170	0.022	0.474***	0.078	0.387	-0.130	-0.089	-0.047**	-0.051	0.051	0.018	-0.011
	(0.535)	(0.635)	(0.153)	(0.164)	(0.344)	(0.083)	(0.075)	(0.023)	(0.040)	(0.031)	(0.019)	(0.020)
Banking_crisis*Financial_crisis	0.076	-0.669	-0.892**	-0.058	0.184	0.104	-0.537	-0.118*	0.154***	0.020	0.011	0.061**
	(0.771)	(0.567)	(0.382)	(0.807)	(0.550)	(0.104)	(0.872)	(0.062)	(0.049)	(0.037)	(0.031)	(0.025)
t_since_2008	0.183	0.186	-0.157*	0.003	0.178	-0.044*	0.031	0.010	0.003	-0.008	-0.023***	0.013
	(0.219)	(0.231)	(0.081)	(0.087)	(0.162)	(0.025)	(0.041)	(0.010)	(0.015)	(0.016)	(0.008)	(0.010)
cap_asset	-4.492***	-3.113***	-3.586***	-1.911***	-1.273**	0.016	0.217*	0.030	0.263**	-0.020	0.081	0.061**
	(1.543)	(0.601)	(0.534)	(0.723)	(0.590)	(0.162)	(0.117)	(0.028)	(0.108)	(0.036)	(0.050)	(0.029)
Size	0.254***	0.566***	0.299***	0.602***	0.101***	0.067***	0.009	0.042***	0.006***	-0.010	0.004	-0.003
	(0.033)	(0.159)	(0.045)	(0.213)	(0.022)	(0.022)	(0.006)	(0.008)	(0.002)	(0.007)	(0.003)	(0.007)
age (New)	-0.807***	-0.868*	-0.992***	-0.642***	1.747***	0.077	0.091	-0.015	-0.085***	0.010	-0.043**	-0.082*
	(0.312)	(0.457)	(0.152)	(0.247)	(0.442)	(0.091)	(0.067)	(0.017)	(0.019)	(0.019)	(0.018)	(0.049)
age (Young)	-0.405	-0.130	-0.373***	0.147	1.213***	0.037	-0.013	-0.009	0.027	-0.006	0.010	-0.008
	(0.775)	(0.351)	(0.091)	(0.146)	(0.438)	(0.061)	(0.043)	(0.015)	(0.024)	(0.011)	(0.007)	(0.012)
Dep_totasset	-4.535***	-2.900***	-2.785***	-2.054***	0.373	0.001	0.412***	0.013	-0.011	0.002	0.016	-0.085
	(0.770)	(0.436)	(0.653)	(0.765)	(0.526)	(0.089)	(0.157)	(0.072)	(0.070)	(0.018)	(0.030)	(0.062)
Glp_totasset	0.941	0.389	1.068***	0.352	2.441***	0.151	0.051	0.031	0.217***	0.017	0.168***	0.140***
	(0.730)	(0.778)	(0.392)	(0.331)	(0.678)	(0.147)	(0.084)	(0.038)	(0.070)	(0.030)	(0.048)	(0.029)
English	-4.006*	17.348***	11.521***	1.316	-0.017	-0.478*	-0.404*	-0.178	-0.325**	-0.086	0.133**	0.041
	(2.109)	(3.071)	(1.125)	(0.885)	(0.432)	(0.263)	(0.207)	(0.172)	(0.151)	(0.056)	(0.055)	(0.035)
Port_risk30	4.950***	-0.651	-0.346**	-0.573*	1.766	0.040	-0.043	0.001	0.209*	-0.055**	-0.067	-0.102***
	(1.893)	(0.447)	(0.172)	(0.321)	(1.394)	(0.148)	(0.037)	(0.044)	(0.126)	(0.027)	(0.052)	(0.028)
EECA	-0.393	17.420***	14.692***	1.259	0.733	2.580***	-0.129	0.052	-0.103	-0.110	0.289***	-0.292**
	(0.784)	(2.814)	(0.957)	(1.028)	(0.743)	(0.301)	(0.596)	(0.135)	(0.063)	(0.124)	(0.111)	(0.117)
CPI	-0.010	-0.018	0.002	-0.000	-0.014*	0.005	-0.002	0.000	0.000	-0.001	0.001**	-0.001
	(0.011)	(0.027)	(0.006)	(0.007)	(0.007)	(0.004)	(0.003)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)
Gdp	-0.057	-0.015	0.138***	0.020	-0.008	0.008	0.027**	-0.004	-0.004	0.006	-0.004	0.004
	(0.060)	(0.083)	(0.027)	(0.029)	(0.056)	(0.012)	(0.013)	(0.002)	(0.003)	(0.004)	(0.003)	(0.003)
Control_of_Corruption	1.104	-1.669	0.563	-0.110	0.189	0.300	-0.097	-0.077**	0.116	0.077	0.066	0.019
	(0.788)	(1.309)	(0.489)	(0.367)	(0.756)	(0.251)	(0.186)	(0.033)	(0.074)	(0.115)	(0.054)	(0.036)
Banking_ROA	-0.241*	-0.000	0.004	0.008	-0.093	0.078**	0.004*	0.001	-0.017	0.013	0.001	0.004

	(0.142)	(0.161)	(0.008)	(0.006)	(0.085)	(0.037)	(0.002)	(0.001)	(0.011)	(0.015)	(0.001)	(0.005)
Financial_Transparency	0.329*	0.121	0.006	0.088	-0.265**	-0.048***	-0.051	-0.008	-0.011	0.008	-0.005	0.023***
	(0.181)	(0.148)	(0.062)	(0.079)	(0.111)	(0.018)	(0.037)	(0.008)	(0.014)	(0.005)	(0.005)	(0.007)
M2_GDP	0.014	-0.015	0.007	0.017	-0.038**	-0.002	-0.008	0.001	0.001	-0.003	0.002**	-0.003**
	(0.046)	(0.026)	(0.008)	(0.011)	(0.016)	(0.005)	(0.005)	(0.001)	(0.003)	(0.003)	(0.001)	(0.001)
Bank_Branches	-0.077***	-0.004	-0.007	0.005	-0.041***	0.008***	0.003	0.001	-0.001	-0.000	-0.000	-0.002**
	(0.018)	(0.019)	(0.006)	(0.008)	(0.013)	(0.002)	(0.003)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)
Regulated		0.148	0.823***	-0.380	3.241**	0.173	0.148	0.032*		0.011	-0.012	-0.008
		(0.367)	(0.314)	(0.282)	(1.603)	(0.123)	(0.122)	(0.017)		(0.018)	(0.014)	(0.014)
Constant	21.840***			13.413***			1.549*		-0.025		-0.587***	0.420*
	(2.633)			(2.156)			(0.815)		(0.125)		(0.177)	(0.249)
Observations	96	196	926	749	101	266	971	815	99	242	924	773
Number of id	28	84	253	210	29	108	271	221	27	98	260	218
country fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2_between	0.969	0.601	0.557	0.309	0.953	0.204	0.416	0.460	0.962	0.172	0.219	0.595

Standard errors in parentheses mature as the reference for age, bank as the reference group for legal status. Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 6 Banking crisis effect post 2008 and financial crisis effect in countries with banking crisis according to F test.

All	NAB	Depth	ROA
$\beta_1 + \beta_3 = 0$	1.161	-0.169	0.072*
$\beta_2 + \beta_3 = 0$	-0.094	-0.156	-0.010
EECA			
$\beta_1 + \beta_3 = 0$	1.938	0.487	-0.328
$\beta_2 + \beta_3 = 0$	-1.133**	-0.249	0-.160***
Bank			
$\beta_1 + \beta_3 = 0$	1.161	0.913	0.204*
$\beta_2 + \beta_3 = 0$	-0.094	0.571	0.103**
CU			
$\beta_1 + \beta_3 = 0$	-0.839	0.356	0.025
$\beta_2 + \beta_3 = 0$	-0.647	-0.025	0.070
NBFI			
$\beta_1 + \beta_3 = 0$	-1.934**	-0.321	0.056
$\beta_2 + \beta_3 = 0$	-0.418	-0.626	0.029
NGO			
$\beta_1 + \beta_3 = 0$	-0.773*	0.527*	0.102**
$\beta_2 + \beta_3 = 0$	0.020	-0.165**	0.050

Note: $\widehat{\beta_1} + \widehat{\beta_3} = E[\bar{Y}_1^T] - E[\bar{Y}_1^C]$ banking crisis effect post 2008 on MFIs' performance;
$\widehat{\beta_2} + \widehat{\beta_3} = E[\bar{Y}_1^T] - E[\bar{Y}_0^T]$ the post 2008 change in average MFI performance in countries with banking crises