Crisis in microfinance institutions: identifying problems

Abstract

This article empirically analyses the reasons for crises in microfinance institutions (MFIs), using a sample of 832 MFIs from 74 countries for the period 2003-2011. The methodology used is logit analysis with panel data. The main results show that both internal and external factors influence the probability of a crisis. We find different factors that reduce the likelihood of a crisis (company's performance, country's economic growth, political stability and existence of a private credit bureau). On the other hand, excessive liquidity, a higher proportion of deposits over loans and more loans per employee all increase the probability of a crisis.

Keywords: Microfinance, crisis, panel data.

JEL Classification: G21, O12.

1. Introduction

Microfinance institutions (MFIs) are a fundamental part of many countries' financial systems. This activity, which began giving loans to people on low incomes based on little more than a joint guarantee, has evolved into a major industry offering a wide range of financial products and services such as loans, transfers, deposits and microinsurance.

Because of the importance that this activity has gained[1], many studies have analysed the achievements of the most successful microfinance institutions (Ahlin et al., 2006; Kaboski, 2005; Khandker, 2005; Patten et al., 2001). These studies seek to identify models to be replicated and activities that microfinance institutions should follow, since not all have followed the same successful path. Some have become big and provided services to a large number of clients, such as Grameen Bank, while others are operating on a smaller scale or have even disappeared.

In the study of MFIs' performance, we can distinguish between two different approaches: the financial sustainability on one hand and the social impact (such as poverty reduction or female empowerment) on the other (Armendáriz and Morduch, 2010). However, although studying the successful experiences is extremely important, an analysis of failed institutions[2] is essential, especially when large MFIs have failed and disappeared even after following the best practices and recommendations gleaned from the most satisfactory experiences. The past examples of the institutions that have disappeared, as well as those that have managed to survive after encountering difficulties, are of enormous help in avoiding making the same mistakes again today. Studying failure is even more relevant today because the crisis has changed microfinance institutions' structures and business model. Despite the importance of this, there have been few studies that have analysed the failure of microfinance institutions. The few that exist focus on

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[1] According to data from the Microcredit Summit Campaign, on 31 December 2011, the 3,703 microfinance institutions that reported data had reached 195 million customers worldwide.

[2] In the study of MFIs' failure, we have also two different approaches: the lack of financial sustainability on one hand and the absence of social impact on the other.

a descriptive study of specific cases. Although these provide very relevant information, they cannot be easily generalized. Stegee (1998) discusses the failure of the Colombian Corposol institution and how its inadequate growth and structure led it to an unsustainable situation. Marulanda et al. (2010) analysed 10 microfinance institutions in Latin America that failed. Out of all of the lessons he gleans, he stresses that the way the institution's management team addresses the issues is critical in these situations. Rozas (2011) extends the previous work done by Marulanda, making an in-depth analysis of the failure of 10 other microfinance institutions located in different parts of the world. The main recommendations he puts forward are to face the problems with determination, avoid panic and seek external advice.

In this context, the main contribution from our work is to carry out, for the first time, a study to identify the factors leading to the failure of microfinance institutions, by using an econometric analysis of the probability of MFI crisis. This probability of crisis is defined as the possibility that an institution may have financial problems. The second contribution from this work is that the analysis is carried out on a large number of MFIs, and not only for specific cases. That allows comparing healthy MFIs with those that are in crisis. Unlike previous studies, this study also analyses the effect that the macroeconomic and institutional situation of the countries in which the MFIs operate has on the probability of a crisis, thereby giving us the third contribution from this work. The econometric analysis and the large sample size enable the results obtained to be generalized easily, which did not occur in previous works that addressed only specific cases. The innovation proposed in the paper is to suggest early warning systems which microfinance organisations and regulatory authorities can use to minimise the likelihood of a crisis occurring, by analogy with the early warning systems proposed for banks and national governments (e.g. special issue of 'Journal of Economic Perspectives', April 1998; special issue of 'Journal of International Development' (vol 25 no 8), December 2013).

The empirical analysis is carried out on a sample of 832 MFIs from 74 countries during the period 2003-2011. By choosing this large sample size, it is possible to analyse both the specific characteristics of the microfinance institutions themselves and the macroeconomic variables and institutional characteristics of the country in which they are located. To carry out the empirical analysis, a panel data logit regression is applied. The main results of the study show that the institutions with greater profitability are less likely to have difficulties. Moreover, institutions with greater liquidity, higher proportion of deposits over loans and more loans per employee are more likely to have a crisis. Additionally, the economic growth of the country in which the MFI operates, political stability and the existence of a private credit bureau reduce the probability of a crisis.

The rest of the work is organized as follows. In section 2, the factors influencing the failure of MFIs are explained. In section 3, the sample is defined, the methodology used in the study is explained, and the results obtained are presented. The study ends with the conclusions and bibliographical references.

2. The difficulties of microfinance institutions

When we analyse the success of an MFI, we should consider the ultimate goals of a MFI: the first one is to serve as many poor people as possible and the second one is its own financial sustainability. The debate between the two approaches has not been concluded yet, although the most recent microfinance paradigm seems to favour the financial approach (Hermes and Lensink, 2007). In addition, it is difficult to establish a definition of failure that appears as a result of a failure to achieve financial and social results at the same time. For this reason, the existing studies focused, as we are doing in this one, on the achievement of financial results (Marulanda et al. 2010; Rozas, 2011). In this regard, the financial failure of these institutions may be caused by internal and external factors (Navajas and Villacorta, 2012).

2.1- *Internal factors*

Internal factors refers to the very characteristics of MFIs, such as their organizational design, staffing structure, products sold, and so on. These factors are often the most decisive in determining an MFI's financial position, but they are also relevant because they are controlled by the institutions themselves. Below, we review the main factors that reflect the status and structure of an MFI and which may influence their probability of crisis.

- **Size of loan:** The average size of loans granted by an institution is indicative of its customers' average income. The smaller the loan, the lower its customers' income level will be. The relationship between this variable and the probability of crisis in an MFI can be either positive or negative. On the one hand, a lower average loan size is expected to lead to higher risk. In other words, granting microloans for very small amounts can attract customers with greater difficulties in repaying the loans (Roslan and Karim, 2009). On the other hand, a bigger average loan size is also expected to lead to a higher risk. This is because borrowers who bear higher repayment instalments are more likely to default (Guttman, 2008, Eze and Ibekwe, 2007). In this regard, Sharma and Zeller (1997) explain that if a project fails, the borrower bearing higher repayment instalments will have more difficulty in meeting their repayment obligations.

- **Excess liquidity:** Greater liquidity provides greater security, but too much can lead to higher risk loans. An MFI with high liquidity may be tempted to encourage rapid growth, especially in terms of the number of borrowers per branch (González, 2010). A rapid rise in microloans, driven by excess liquidity, may relax restrictions on granting these loans. This easing of restrictions will cause an increase in the default rate (Cermeño et al., 2011). Therefore, it is expected that excess liquidity will be positively related to the probability of crisis in a MFI.

–   **Deposit-loan ratio:** Lenders will increase disbursements of credit and/or relax credit constraints if they perceive an increase in deposits over total loans, which could increase the probability of a crisis (Cermeño et al., 2011).

–   **Interest rate applied by the institution:** The relationship between this variable and the probability of crisis in an MFI can be either positive or negative. On the one hand, at a higher interest rate, customers will have more difficulties in repaying their loans, and this will result in higher default rates (Cermeño et al., 2011). On the other hand, MFIs can avoid the problem of adverse selection by charging high interest rates (González, 2007). In this case, if the interest rate increases, the risk of default decreases; that is, the probability of failure decreases.

–   **Number of borrowers per employee:** This variable is used to approximate the MFI staff's workload. The higher the staff's workload, the less time they have to study each customer, which will increase the risk in these transactions and therefore lead to a greater probability of crisis in the institution (González, 2007; González, 2010; Wilhelm, 2000).

–   **Profitability:** Increased profitability is the result of better management, best practices, lower costs, and so on. Thus, higher profitability leads to less probability of crisis. In the microfinance sector, profitability is usually achieved after years of hard work that enable management techniques to be honed and adapted to the target market (Marulanda et al., 2010).

–   **Size of the MFI:** The effect of size on the probability of crisis can be twofold. Firstly, the size of the institution may be a reflection of its success and good practices. This is because the institutions that are better managed with lower costs are able to attract more customers and increase their market share (Demsetz, 1973; Peltzman, 1976). Therefore, larger institutions have a lower probability of crisis as a result of their better

management. On the other hand, growth that is too fast can lead to major imbalances within an MFI (Steege, 1998, Marulanda et al., 2010). These imbalances may lead to less efficiency, unsuitable loans being granted, and a lack of control over these. Therefore, a large size may also increase the probability of an MFI crisis.

2.2- *External factors*

The context in which a microfinance institution operates is also an important factor that can affect its financial health. The crisis in an MFI is a complex event whose interpretation is hampered by numerous external factors. Previous literature has found that the macroeconomic and institutional characteristics of the country in which it is located, as well as local events or factors of contagion, are often crucial to the survival of an MFI (Vanroose and D'Espallier, 2013; Ahlin et al., 2011; Chen et al., 2010; Reille, 2009; Patten et al., 2001).

Below, we review the main factors that may influence the probability of failure, grouped into macroeconomic variables and institutional variables.

Macroeconomic variables

- **Region:** Certain characteristics of MFIs vary depending on the geographic region where they are located (Pereira and Mourao, 2012; Bogan, 2012, Ahlin et al., 2011, Vanroose and D'Espallier, 2013). Maturities, the average loan, the profit margin, the number of borrowers per institution and the percentage of women tend to be different depending on the geographic region being studied. These differences can be of significant importance in business models of MFIs and also in their financial health.

- **Economic growth:** Economic growth is a good indicator of the economic health of a country and its technological and institutional progress (Vanroose and D'Espallier, 2013; Ahlin et al., 2011; González, 2010; Kappel et al., 2010.). In this sense, the incomes of companies and families are higher in favourable economic situations, so that

economic growth will reduce the probability of a microfinance institution failing due to a drop in defaults.

– **Remittances:** Households receiving remittances have a higher income to cope with their microcredit repayments, so a greater flow of remittances lowers the default rate that microfinance institutions have to bear (Ahlin et al., 2011; Kappel et al., 2010).

Institutional variables

– **Level of competition in the microfinance sector:** the microfinance sector has low barriers to entry. If there is a lot of competition it will be difficult to maintain customers' loyalty and payment incentives. Thus, competition could lead to excessively high loans being granted and a relaxation of the criteria for granting loans in order to avoid losing customers. Such actions will increase clients' indebtedness and therefore the portfolio at risk and the write-off of MFIs (Wilhelm, 2000; Chen et al., 2010; and Vogelgesang, 2003).

– **Depth of the financial system:** The depth of the financial system may have a positive or negative effect on the MFIs' situation. On the one hand, greater depth in the financial system complements the microfinance sector because it fosters incentives to keep up good credit records and opens up ways for micro-companies to go further than microcredit (Ahlin et al., 2011). On the other hand, a greater depth in the financial system may make it difficult for the microfinance sector to develop because the two sectors will enter into direct competition. This competition would lead to lending with fewer restrictions and for greater amounts, which in turn would lead the customers to greater indebtedness and therefore to an increase in the rate of default (Vanroose and D'Espallier, 2013).

– **Governance indicators:** Political instability and corruption may shorten planning horizons and affect borrowers' ability and capacity to pay loans back (Kappel et al.,

2010). In other words, countries with political instability and high levels of corruption may create disincentives for customers to pay back loans.

- – **Information exchange system:** This is measured as a private credit bureau, that is, the number of people and companies listed in a private credit registry. The existence of efficient systems for exchanging information about the indebtedness of borrowers improves the control that MFIs have over their loans. Moreover, these systems also improve the quality of portfolios with outstanding debt (Padilla and Pagano, 2000; Jappelli and Pagano, 2000; Luoto et al., 2007; Ahlin et al., 2011). This requires the time it takes a lender to access information about the borrower not to be too long, because otherwise the system's effectiveness is reduced (Kappel et al., 2010). In addition, information exchange systems have a disciplinary effect on borrowers, creating incentives to repay loans (Padilla and Pagano, 2000). If borrowers are aware of the existence of a credit information system, they will be more likely to repay loans (Kappel et al., 2010).

- – **Strength of legal rights:** Generally, greater protection of the legal rights of borrowers and lenders helps reduce failed loans from MFIs. So, MFIs operating in these countries are less likely to have a crisis. However, Ahlin et al. (2011) found that in some cases, greater legal protection can encourage lending to higher risk customers. This could lead to an increase in bad debts, so this variable could also have a negative effect on the probability of an MFI crisis.

3. Empirical analysis

3.1- *Sample*

The sample used for the empirical analysis consists of 4,463 observations of 832 MFIs from 74 countries between 2003 and 2011, which have at least three consecutive years of data.

Given the variety of factors considered, four different databases have been used in this study. On the one hand, Microfinance Information Exchange (MIX) provides information to create specific variables for microfinance institutions. On the other hand, World Development Indicators, World Governance Indicators and Doing Business provide macroeconomic and institutional variables.

Table 1 shows how the MFIs used in our analysis are mostly in Asia and Latin America, whereas Table 2 shows that the institutions most prevalent in the market are Non-Governmental Organizations (NGOs) and Non-Banking Financial Institutions (NBFIs), with 39.65 percent and 34.79 per cent respectively.

TABLES 1 & 2

3.2- *Methodology*

In this study we perform an analysis to test the effect that each of the factors analysed has on the probability of a crisis. To do this, a qualitative response model for discrete dependent variables is applied, since this type of data does not allow the classical regression model to be used.

The model is approached in terms of probability and is estimated using a logit analysis with panel data. The presence of unobserved heterogeneity may lead to biased results in the coefficients if a traditional estimation is made for maximum likelihood. To overcome this limitation, in this study an estimation is made using panel data, which is robust in the presence of unobserved heterogeneity and thus allows more efficient results to be obtained. In addition, discrete choice panel data models removed the bias of omitted variables that appears when unobserved individual effects are correlated with the explanatory variables (Pindado et al., 2008).

This study presents different models through a logit analysis with random effects, using the effect of the internal variables of the MFIs, the macroeconomic variables, and the institutional variables. The generic form of the models used is as follows:

$$LOG\left(\frac{P(CRISIS)}{P(NO\ CRISIS)}\right) = \beta_0 + \beta_j MFI_{it} + \beta_k MACRO_{it} + \beta_l INST_{it} + d_t + \eta_i + \upsilon_{it} \quad (1)$$

Where β_0, β_j, β_k, β_l are the coefficients of the model, MFI_{it} the internal variables of each microfinance institution each year, $MACRO_{it}$ the macroeconomic variables for each country each year, $INST_{it}$ the institutional variables for each country each year, d_t the time-specific effect, η_i the individual effect, and υ_{it} the random error.

Hence, the complete model follows this specification:

$$LOG\left(\frac{P(CRISIS)}{P(NO\ CRISIS)}\right) = \beta_0 + \beta_1 SIZE_{it} + \beta_2 LSIZE_{it} + \beta_3 LIQ_{it} + \beta_4 DEPLOANS_{it} +$$

$$\beta_5 YIELD_{it} + \beta_6 BORSTAFF_{it} + \beta_7 ROA_{it} + \sum_{k=1}^{6} \gamma_k REGION_{it} + \beta_8 GROWTH_{it} +$$

$$\beta_9 REMIT_{it} + \beta_{10} CONCEN_{it} + \beta_{11} PCREDIT_{it} + \beta_{12} STAB_{it} + \beta_{13} CORRUP_{it} +$$

$$\beta_{14} INFOR_{it} + \beta_{15} CRIGHTS_{it} + d_t + \eta_i + \upsilon_{it} \qquad (2)$$

The dependent variable takes the value 1 if an MFI is in crisis in year t, and 0 otherwise. In the microfinance sector, there is no commonly accepted, explicit definition of *failure* or *crisis*. However, several authors have tried to define it. Firstly, Marulanda et al. (2010) uses the term *failed experiences* when an MFI is suffering serious financial losses that threaten its solvency and it needs to capitalize, merge, restructure or close. Secondly, Rozas (2011) uses a more technical definition to determine what institutions are in crisis Such institutions in crisis would be microfinance institutions with a portfolio at risk for more than thirty days (PAR 30) and

write-off ratio higher than 20 per cent[3]. The latter definition will be used in this paper to select MFIs that are in crisis.

Table 3 shows the percentages for institutions in crisis compared to the total sample by region and year. We can see the effect the financial crisis has had on the microfinance sector.

TABLE 3

The independent variables are those that may have an influence on the probability of a crisis, according to the previous literature. These variables, which have previously been explained in the review of the literature, are divided into three categories: internal variables, macroeconomic variables and institutional variables. Table 4 shows the definition of each variable used in the model.

TABLE 4

<u>Internal variables</u>

LSIZE is the natural logarithm of the ratio gross loan portfolio over total number of active borrowers (Christen et al., 1995., Christen, 2001; Copestake; 2007; Cull et al., 2007; Cull et al., 2009, Gutiérrez-Nieto et al., 2007a).

LIQ refers to the excess liquidity as measured by the bank cash ratio over total assets (Kappel et al., 2010, Cermeño et al., 2011).

DEPLOANS refers to total deposits over the gross loan portfolio (Cermeño et al., 2011).

YIELD refers to the interest rate applied by the institution. It is calculated by adding income from the interest and commissions associated with the loans with respect to the gross loans

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[3] PAR 30 (portion of portfolio with payments more than 30 days overdue) = ((balance of loans overdue > 30 days) + (renegotiated portfolio)) / gross loan portfolio. Write-off ratio = Value of loans written off / average gross loan portfolio.

portfolio average, taking into account inflation (Gutiérrez, 2012; Ahlin et al., 2011; Rosenberg et al., 2009).

BORSTAFF represents the number of borrowers each employee is responsible for as measured by the number of active borrowers divided by the total staff of the MFI (González, 2007; Jansson, 2003). The number of active borrowers refers to individually identifiable borrowers who have at least one outstanding loan with the institution. The number of borrowers is used in the numerator instead of loans because the number of people served determines the workload better than the loans granted (Gutiérrez, 2012). Total staff is defined as the total number of people working full time in an MFI.

ROA is the return on assets calculated as net operating income less taxes, divided by the institution's total assets (Vanroose and D'Espallier, 2013; Rosenberg et al., 2009).

SIZE is the natural logarithm of total assets of an MFI (Vamroose and D'Espallier, 2013; Gutiérrez, 2012; Gutiérrez-Nieto et al., 2007b; Mersland and Strom, 2010).

Macroeconomic variables

REGION refers to dummy variables of the region in which the MFI operates. The sample is divided into six geographic regions (Africa; East Asia and Pacific; Eastern Europe and Central Asia; Latin America and the Caribbean; the Middle East and North Africa; and Southern Asia).

GROWTH is the annual GDP growth per capita of the country in which and MFI operates (Ahlin et al., 2011; Ahlin and Lin, 2006; Vanroose and D'Espallier, 2013).

REMIT refers to workers' remittances and compensation of employees as a percentage of GDP per capita (Ahlin et al., 2011; Kappel, et al., 2010).

Institutional variables

CONCEN represents the degree of competition in the microfinance sector. It is measured using the Herfindahl-Hirschman index, which measures the level of concentration in the sector[4].

PCREDIT represents the depth of the financial system measured as domestic credit to the private sector as a percentage of GDP (Ahlin et al., 2011; Demirgüç-Kunt and Levine, 2004; King and Levine, 1993; Rajan and Zingales, 1998; Westley, 2001). This ratio represents the credit granted by financial institutions to the private sector as a percentage of GDP, excluding the credit given by the central bank and development banks, or credit granted to the public sector, publicly owned companies and back-to-back loans between groups of intermediaries.

STAB is the political stability index from the World Governance Indicators database, ranging from -2.5 to 2.5; that is, low to high stability (Ahlin et al., 2011).

CORRUP represents the lack of corruption index from the World Governance Indicators database. This indicator ranges from -2.5 to 2.5; in other words, from high to low corruption (Ahlin et al., 2011).

INFOR measures the coverage of the private credit bureau that reports on the number of individuals and companies with data in a private credit agency for the last five years of the loan history, calculated as a percentage of the adult population, obtained from Doing Business database (Ahlin et al., 2011).

CRIGHTS is the index representing the strength of legal rights from Doing Business database. It measures the extent to which laws protect the rights of borrowers and lenders, thus facilitating lending. This indicator varies between 0 and 10; that is, low to high protection of the rights of borrowers and lenders. (Ahlin et al., 2011).

Tables 5 and 6 show the descriptive statistics and correlations between the variables.

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[4] The Herfindahl-Hirschman Index (HHI) is a measurement of concentration in a market. The higher the index, the more concentrated it is and therefore the less competitive the market.

TABLES 5 & 6

The sample size varies depending on the variables that are being used, due to the heterogeneity of the databases used.

3.3 RESULTS

The empirical analysis is carried out by estimating four models. The first one only takes into account the internal variables of the MFI; in the second, the macroeconomic variables are added to the previous model; and in the third and fourth, the institutional variables are included[5]. Table 7 shows the results of the four models through logit regression with random effects.

Regarding the internal variables, the results show that the ROA has a marginal effect that is significant and negative in the four estimated models. So, a high return on assets indicates a high return in the loan portfolio and that this portfolio is of better quality. This thus also leads to lower default rates and less probability of crisis. Both excess liquidity and the ratio of deposits to total loans have a positive and significant influence on the probability of crisis in the four models. Thus, increases in both variables may cause an increase in lending and/or relaxation of credit restrictions, which would increase the rate of defaults. A positive and significant relationship is also seen in all the models between the percentage of borrowers per employee and crises in microfinance institutions. Institutions with more borrowers per employee will have a poorer credit procedure and higher default rates. Finally, a positive and significant influence is seen only in model 1, between the average loan size and the probability of failure. In this sense, larger loans give a higher probability of default.

Regarding to macroeconomic and institutional variables, the results show a significant and negative relationship in models 2, 3 and 4, between economic growth and the probability of

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[5] The institutional variables are divided into two models. The first one includes the "political stability" and "lack of corruption" variables, which are taken from the World Governance Indicators, with observations for 2003-2011. The second includes "private credit bureau coverage" and "legal rights" variables, which are taken from Doing Business with observations only for 2005-2011.

crisis in the MFIs. If an economy of a country has a high rate of growth, companies have higher rates of profitability and borrowers have more resources to deal with the loan. There is a negative and significant relationship in models 3 and 4 between a country's political stability and the likelihood of an MFI crisis. This indicates that microfinance institutions experience lower default rates in countries with high political stability. There is a negative and significant relationship in model 4 between the private credit bureau and the likelihood of a crisis. This relationship shows us the need to build better systems of credit information so as to prevent over-indebtedness among borrowers and thus reduce the probability of crisis in microfinance institutions. Finally, there is a positive and significant influence only in model 2, for the region and the probability of crisis, indicating a slight influence from the geographic region on the probability of an MFI crisis.

4.   Conclusions

This study analyses the factors that influence the probability of a crisis in MFIs. Despite the great expansion of microfinance, there are hardly any studies on these institutions' crises. This study analyses these crises for the first time from an econometric perspective, comparing the situation of healthy institutions to those that have problems. It also analyses macroeconomic and institutional factors that influence the financial health of these institutions.

The results indicate that the failure of an MFI, measured in terms of a Portfolio at risk and loans written-off, is significantly affected not only by internal variables but also by external factors, macroeconomic or institutional.

Regarding the internal factors, the probability of an MFI crisis is negatively related to profitability and positively to an excess of resources (too much liquidity and/or too many deposits). A high return on assets indicates high returns in a loan portfolio, and thus a better quality portfolio. That is, if the institution is managing its loan portfolio properly, this will be clearly reflected in its profitability. As for an excess of resources, if there is excess liquidity or

a high proportion of deposits compared to total loans, this may cause an increase in credit disbursements and/or a relaxation of credit constraints. Therefore, MFIs should bolster their mechanisms for granting and managing credit, establishing objective criteria to avoid an increase in defaults.

In addition, the number of borrowers per employee plays an important part in the probability of crisis of an MFI. An overworked staff with too many borrowers spends less time studying and checking on each client, leading to failures in lending and an increase in the default rate. For this reason, it is necessary to have risk control methods adapted to the microfinance sector in order to help these organizations' staff manage their clients and take decisions about lending, enabling economies of scale.

Regarding external factors, the results show that the probability of crisis in a microfinance institution is lower, the higher the country's economic growth. This is because high growth leads to higher returns in microcompanies and higher incomes for families, reducing non-payment of loans. Furthermore, new market niches and opportunities for micro-companies appear as a result of the increased demand that comes with economic growth. Lastly, growth brings with it better institutions, technological advances and increases in physical and human capital. As well as economic growth, political stability is a factor that positively affects MFIs' financial health.

Finally, information exchange regarding the indebtedness of borrowers helps reduce the probability of crises, whether this is due to better control by the MFIs or due to a disciplinary effect on the borrowers. Unfortunately, data on credit information exchange systems in developing countries are often misleading due to the limitations of any official system over informal and semi-formal loans (Jappelli and Pagano, 2000; Luoto et al., 2007). For this reason, it is necessary to work on building better credit information systems to help study the borrowers,

preventing the latter from becoming too indebted, improving MFIs' loan portfolios, and creating incentives for borrowers to pay back.

These findings add another element to the debate over the performance of microfinance institutions. However, this paper is based on a quantitative perspective, but it would be essential to continue with the study of microfinance institutions failure adding qualitative elements to the analysis. Although there are some empirical evidence that outreach to the poor is negatively related to efficiency of MFIs (Hermes, Lensink and Meesters, 2011), a more in deep analysis of the relationship between MFIs social goals and their success is needed. One future line of research on this topic is the analysis of the effect that loyalty has on the performance of MFIs, taking into account that customer loyalty is the primary driver of long-term financial success of a MFI (Churchill, 2000).

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TABLES

Table 1. Sample distribution by region.

	Total	Africa	East Asia and the Pacific	Eastern Europe and Central Asia	Latin America and the Caribbean	Middle East and North Africa	South Asia
N (Observations)	4463	389	516	826	1812	224	696
n (MFIs)	832	78	102	152	319	37	144

Table 2. Sample distribution by legal status.

	Total	Bank	Credit Union / Cooperative	NBFI	NGO	Rural Bank
N (Observations)	4463	396	509	1553	1770	235
n (MFIs)	832	66	110	278	325	53

Table 3. MFIs in crisis by region and year.

	2003	2004	2005	2006	2007	2008	2009	2010	2011
Africa	7.1%	7.1%	9.5%	8.3%	11.4%	11.3%	13.0%	2.9%	0.0%
East Asia and the Pacific	5.6%	5.9%	9.8%	15.4%	13.8%	20.0%	12.3%	16.7%	9.1%
Eastern Europe and Central Asia	0.0%	2.5%	1.5%	0.9%	1.6%	4.2%	16.4%	14.9%	5.2%
Latin America and the Caribbean	2.6%	4.9%	6.7%	5.7%	7.0%	9.7%	13.1%	10.9%	5.9%
Middle East and North Africa	0.0%	0.0%	0.0%	12.9%	13.9%	17.1%	12.1%	7.4%	0.0%
South Asia	5.3%	6.9%	7.0%	6.9%	4.5%	7.8%	9.6%	11.7%	8.6%

Table 4. Variable definitions.

Variable	Description
SIZE	Size: log (total assets)
LSIZE	Loan size: log (gross loan portfolio / number of active borrowers)
LIQ	Liquidity: cash and banks / total assets
DEPLOANS	Deposits / gross loan portfolio
YIELD	Yield real: (yield on gross portfolio (nominal) − inflation rate) / (1 + inflation rate)
BORSTAFF	Borrowers per staff: Log (number of active borrowers / number of personnel)
ROA	Return On Assets: (Net operating income − taxes) / average total assets
REGION	Dummy variables that identify the region of the MFI (Africa, East Asia and the Pacific, Eastern Europe and Central Asia, Latin America and The Caribbean, Middle East and North Africa, South Asia)
GROWTH	Annual growth in real GDP per capita (%)
REMIT	Workers' remittances and compensation of employees (% GDP)
CONCEN	Concentration index: Herfindahl Hirschman Index (sum of the market shares of the MFIs squared).
PCREDIT	Domestic credit to private sector (% GDP)
STAB	Political stability index: Political stability and absence of violence/terrorism (-2.5 to 2.5)
CORRUP	Lack of corruption index: Control of corruption (-2.5 to 2.5)
INFOR	Private credit bureau coverage: Number of individuals and firms listed in a private credit bureau (% adult population)
CRIGHTS	Credit rights index: legal rights of borrowers and lenders (0 to 10)

Table 5. Descriptive statistics.

Variable	Obs	Mean	Std. dev.	Min	Max
SIZE	4463	16.075	1.774	10.682	22.267
LSIZE	4463	6.311	1.300	-5.174	12.260
LIQ	4463	0.154	0.125	-0.019	0.891
DEPLOANS	4463	1.013	3.615	0.000	69.054
YIELD	4463	0.248	0.168	-0.247	1.209
BORSTAFF	4463	3.379	2.965	-0.707	16.276
ROA	4463	0.017	0.086	-0.894	0.526
GROWTH	4370	4.112	4.296	-16.586	33.030
REMIT	4370	7.032	7.457	0.036	49.290
CONCEN	4170	0.282	0.222	0.038	1.000
PCREDIT	4170	34.181	17.448	2.839	161.980
STAB	4170	-0.780	0.618	-2.474	1.163
CORRUP	4170	-0.556	0.351	-1.525	0.709
INFOR	3712	24.671	27.174	0.000	100.000
CRIGHTS	3712	5.050	2.226	0.000	10.000

Table 6. Correlation Matrix.

	SIZE	LSIZE	LIQ	DEPLOANS	YIELD	BORSTAFF	ROA	GROWTH	REMIT	CONCEN	PCREDIT	STAB	CORRUP	INFOR	CRIGHTS
SIZE	1.000														
LSIZE	0.290	1.000													
LIQ	0.030	-0.168	1.000												
DEPLOANS	0.138	0.106	0.296	1.000											
YIELD	-0.179	-0.252	0.091	-0.051	1.000										
BORSTAFF	-0.092	0.278	0.060	0.094	-0.003	1.000									
ROA	0.172	0.102	-0.196	-0.050	0.040	-0.142	1.000								
GROWTH	-0.001	-0.072	-0.049	-0.013	-0.119	-0.025	0.094	1.000							
REMIT	0.003	-0.084	0.041	-0.023	-0.071	-0.044	0.022	-0.211	1.000						
CONCEN	-0.055	0.264	-0.055	-0.001	-0.023	0.190	-0.027	-0.021	-0.134	1.000					
PCREDIT	0.029	0.108	-0.078	-0.077	-0.240	-0.088	0.065	-0.037	0.114	0.164	1.000				
STAB	-0.056	0.432	-0.146	-0.069	0.086	0.219	-0.008	-0.102	-0.094	0.401	0.151	1.000			
CORRUP	0.003	0.154	-0.091	-0.105	0.116	-0.004	0.024	-0.047	-0.178	0.022	0.283	0.370	1.000		
INFOR	0.058	0.259	-0.119	-0.081	0.259	0.010	-0.059	-0.247	-0.047	-0.076	0.033	0.307	0.344	1.000	
CRIGHTS	0.128	-0.112	0.063	-0.053	-0.049	-0.091	-0.018	0.093	-0.004	0.075	0.156	-0.107	0.128	-0.126	1.000

Table 7. Results

	(1)	(2)	(3)	(4)
SIZE	-0.078	-0.068	-0.097	-0.090
	(-0.97)	(-0.80)	(-1.09)	(-0.95)
LSIZE	0.220*	0.160	0.219	0.178
	(1.92)	(1.07)	(1.33)	(1.02)
LIQ	1.882**	1.457*	1.752**	1.750**
	(2.54)	(1.87)	(2.15)	(2.00)
DEPLOANS	0.080***	0.068***	0.063**	0.072**
	(3.10)	(2.63)	(2.39)	(2.56)
YIELD	0.196	0.178	0.724	1.096
	(0.28)	(0.23)	(0.88)	(1.25)
BORSTAFF	0.068*	0.069*	0.079**	0.077*
	(1.88)	(1.85)	(2.06)	(1.93)
ROA	-11.763***	-11.864***	-12.390***	-12.379***
	(-10.18)	(-9.59)	(-9.62)	(-9.15)
REGION		10.36*	5.10	4.80
GROWTH		-0.126***	-0.127***	-0.151***
		(-5.46)	(-5.25)	(-5.80)
REMIT		-0.016	-0.019	0.003
		(-0.77)	(-0.74)	(0.12)
CONCEN			-0.150	-0.012
			(-0.23)	(-0.02)
PCREDIT			0.013	0.011
			(1.34)	(1.06)
STAB			-0.834***	-0.771**
			(-2.97)	(-2.58)
CORRUP			-0.128	0.368
			(-0.28)	(0.75)
INFOR				-0.014**
				(-2.10)
CRIGHTS				0.035
				(0.46)
CONSTANT	-5.266	-4.154	-5.843	-5.609
	(-3.90)	(-2.87)	(-3.60)	(-3.17)
N (Observations)	4463	4370	4170	3712
N (MFIs)	832	812	783	753
LR chi2(16)	137.65	151.84	153.09	145.17
Prob > chi2	0.000	0.000	0.000	0.000

(***) indicates a level of significance of 0.01 (**) indicates a level of significance of 0.05
(*) indicates a level of significance of 0.1 (t statistic between brackets)
Region: Wald's test of the joint significance of the region's dummy variables. Distributed as a chi-square under the null hypothesis of lack of relationship.