Luck or Skill?
MFI Performance in Macroeconomic Context

Christian Ahlin
Jocelyn Lin*

August 2006

Abstract

Microfinance institutions (MFI's) are often evaluated for purposes of emulation, replication, and funding. One potential ingredient of MFI success that has not been sufficiently explored is the impact of the macroeconomy. This question takes on special importance since MFI's often aim to bring improvement in precisely the places where the macroeconomy is faltering. We merge 5-9 years of data on each of 112 MFI's from 48 countries with country-level macroeconomic data. Two salient results emerge. Growth has a significant and salutary impact on MFI performance, both in terms of financial sustainability and default rates. This result holds even when controlling for MFI fixed effects. However, the degree of formalization and industrialization of the economy appears to adversely affect MFI's, particularly their rate of growth in outreach. In additional tests, we find hints of a negative effect from inflation; we find that growth affects the ability to cover costs, not just to pad profit margins; and we show that reverse causality is an unlikely explanation for the growth effect. Overall, the results suggest that the macroeconomy is an important determinant of MFI performance, though not moreso than institution-specific factors. MFI performance should be handicapped for the macroeconomic environment in which it was achieved.

*We thank a number of colleagues for valuable input. Lauren Merrell provided outstanding research assistance. Contact: c.ahlin@vanderbilt.edu.

1 Introduction

The microfinance movement is large and growing. It is reported that more than 100 million customers worldwide are borrowing small loans from around 10,000 microfinance institutions (MFI's).[1] A great deal of attention and funding has been directed toward microfinance by the development community over the past few decades.

Levels of success, however defined, vary across MFI's. Some fail and cease to be; others grow to reach millions of borrowers, covering costs in the process. In this context, evaluation of MFI's is a critical exercise. What determines MFI success? What kinds of institutional setups, financial products, and marketing practices are most effective?

A fair amount of research (see section 2) has sought to discover key ingredients of MFI success. The focus of this literature is typically on institution-specific practices and techniques – contract innovations, management techniques, organizational structure. This focus is justifiable: institution-specific factors are what can be controlled most readily by those who would design new MFI's or advise existing ones.

However, the literature has largely ignored determinants of success external to the institution. This is our focus. In particular, what portion of an MFI's success is determined by the macroeconomic environment in which it is situated? The benefit in answering this question lies not so much in advising MFI's as in evaluating them. By understanding how and to what degree success depends on outside factors, a clearer picture of institutional success and failure can emerge.

For example, two countries that are known for microfinance are Indonesia and Bangladesh. Both contain several successful and much-studied MFI's, including Bank Rakyat Indonesia (BRI) and the Grameen Bank of Bangladesh. Often omitted in discussions of these institutions is that the macroeconomic context over much of their histories was very different: Indonesia averaged 5.0% growth in real GDP per capita over 1980-1997, while Bangladesh averaged 1.7% over the same period. One wonders how much of BRI's success and finan-

[1] See Bellman (2006).

cial sustainability during this period was due to institution-specific practices and how much came simply because the economy was booming?[2] Conversely, might the Grameen Bank have achieved greater financial sustainability[3] had it operated in a less stagnant macroeconomic context?

The fact is that well-known MFI's are emulated, replicated, and funded, even though rigorous MFI evaluation is rare.[4] This paper argues that one way in which MFI evaluation could improve is by placing MFI performance in its macroeconomic context. Essentially, MFI evaluation ought to "handicap" for the macroeconomic environment.

Understanding the macroeconomic impact on MFI's may also help a growing number of investment funds that target their dollars toward MFI's, with the dual goal of earning returns for investors and achieving social impact.[5] Since they value financial returns, these funds cannot afford to ignore major determinants of MFI financial success – though of course the investment return implications would have to be weighed against social impact considerations.

The discussion above has assumed good macroeconomic performance would be good for MFI's. Surely, a growing economy would involve growing incomes and perhaps room for new micro-entrepreneurs to find new niches. A growing economy might also raise households' current or expected future incomes to the degree that they are willing to take on more risk by investing capital in a business venture. Ingredients of growth – increasing physical and human capital, better institutions, technological advancement – may also make micro-entrepreneurship more profitable.

On the other hand, one could argue that microfinance depends on a poor economy to survive. MFI's have not seemed to fare as well among poorer populations of developed countries. Microfinance may tend to thrive where there is a vibrant informal economy, a

[2]Henley (2005) draws on Indonesian financial history to argue that macroeconomic factors had a greater role in recent Indonesian MFI success than is commonly appreciated.

[3]See Morduch (1999) for an analysis of Grameen financial results.

[4]The scarcity of careful evaluations is noted by Armendariz de Aghion and Morduch (2005) and others.

[5]See Silverman (2006).

situation that tends to grow rarer as an economy grows. Further, it seems plausible that the growing abundance of wage-earning opportunities that often accompanies growth may siphon away current and potential clients from MFI's. Default may also be higher, since growth of economic opportunities can weaken borrowers' incentives to maintain their MFI credit relationships. A deceleration of growth may also raise demand for products produced by micro-enterprises as consumers substitute away from imports or higher quality goods.[6]

It also seems just as plausible that no consistent pattern exists relating macroeconomic factors and MFI performance. Perhaps MFI success is mostly due to institutional skill, or to micro-scale luck. Or, the typical MFI and its clients may be sufficiently isolated from the bulk of macroeconomic activity and thus essentially operate in a parallel economic world.

This paper addresses empirically the question of MFI dependence on the macroeconomic context. Data on MFI's come from a relatively new organization that tracks the microfinance movement and posts data on hundreds of MFI's throughout the world: The Mix Market. Our dataset includes only MFI's ranked as having relatively high data quality and with at least five years of data. This leaves us with 112 MFI's from 48 countries. The performance variables we use measure financial self-sustainability, default rates, costs per borrower, and growth in clientele. These capture only a subset of what MFI success is typically defined as, but an important one.

We merge these data with macroeconomic variables taken from the World Bank's database of World Development Indicators. Macroeconomic performance is measured by real per capita income growth rates, as well as inflation, labor force participation rates, manufacturing's share in GDP, and net foreign direct investment as a fraction of GDP.

MFI performance indicators are then each predicted in a simple linear regression model by the macroeconomic variables, as well as indicator variables for institutional type and MFI-age variables to capture learning effects. We also run analogous within (fixed effect) and between regressions. Given the nature of the data, we focus on estimation approaches

[6]Patten et al. (2001) make a similar point.

that are robust to outliers, heteroskedasticity, and within-MFI error term correlation.

Two main results emerge. First, macroeconomic growth has robust and significant relationships with (higher) MFI financial sustainability and (lower) default rates. The magnitudes are somewhat large – one percentage point of growth translates into two percentage points in the revenue/cost ratio – though far from the majority of the story. For example, the interquartile difference in growth rates is associated with 20% of the interquartile difference in the MFI self-sufficiency variable. The similar magnitudes for default are 15-17%. The effect of growth on financial sustainability is robust across a number of specifications, including one with MFI fixed effects. The evidence suggests that while the macroeconomy is not an MFI's destiny, its effect is significant and should not be ignored.

The second set of results points to a more rivalrous relationship between microfinance and the macroeconomy. The variables that proxy for the degree of formalization and industrialization of the economy – workforce participation, manufacturing, and FDI – all show up as negative predictors of MFI growth. Workforce participation is also a negative predictor of MFI financial sustainability in some specifications. We view this as evidence that microfinance may not work as well in countries that are following more industrial, wage-labor based paths of development.

In addition to the focal results, we estimate a (quadratic) learning curve that peaks at about twenty years. The cumulative learning effect accounts for about 80% of the interquartile range of the self-sufficiency ratio; thus there appears to be a significant role for acquired skill in MFI success.

Several additional tests are run. One set explores in more detail the effects of inflation on MFI performance as in Boyd et al. (2001), finding hints of a negative relationship. One examines whether the effect of growth is just in helping profit-driven MFI's pad profit margins rather than helping MFI's break even – the evidence overwhelmingly suggests the latter. We also discuss the case for causality, providing evidence against a reverse causality interpretation of the results. We are not able to rule out all forms of omitted variable bias,

but most forms still enable us to answer our main question: MFI performance seems to be non-negligibly driven by the macroeconomic environment.

The paper is organized as follows. Section 2 discusses the related literature and the specific contribution of this paper. Section 3 describes the dataset, its sources and key variable definitions. Section 4 describes estimation methodology. Section 5 reports the baseline (pooled) results, as well as the within (fixed effect) and between results. Section 6 discusses causality and performs some additional robustness tests. Section 7 concludes.

2 Relation to the Literature

This paper is related to a number of others. There is a significant literature evaluating MFI success and failure, much of it with a view toward arriving at best practices. See, for example, Yaron (1994), Chaves and Gonzalez-Vega (1996), Kaboski and Townsend (2005), Armendariz de Aghion and Morduch (2005), and Cull et al. (2006). Our study differs from these in focusing on the macroeconomic, rather than micro-institutional, determinants of MFI success.[7] It has most in common with Cull et al., who pioneered the use of cross-country, cross-MFI data in statistical tests aimed at understanding determinants of success; however, their focus is not on macroeconomic determinants.

We know of two exceptions, papers that spotlight the link between the macroeconomy and microfinancial performance. Patten et al. (2001) perform a case study of BRI's performance in the wake of the late-1990's Indonesian financial crisis. They find that repayment rates for BRI's micro-loans were basically unchanged. However, they also note that BRI's nominal interest rates on micro-loans increased little, rising about thirteen percentage for just one year; this compares with a spike in annual inflation of more than fifty percentage points. Evidently, BRI was willing to accept significantly lower real revenues in order to maintain client goodwill. Henley (2005) studies Indonesian finance over the past century and argues

[7] Chaves and Gonzalez-Vega (1996) do allow that Indonesian macroeconomic success (growth, stable inflation) played a role in Indonesian MFI success, but their focus lies elsewhere.

based on historical evidence that robust macroeconomic growth contributed significantly to the recent success of Indonesian microfinance. Our paper makes a point related to Henley's, but differs from both Henley and Patten et al. mainly in its more quantitative methodology.

Also related is a large literature that tries to establish a reverse proposition: that finance affects growth (see Levine, 2005, for an introduction). However, the measures of finance used tend to be country-level indicators, such as total credit issued to the private sector as a fraction of GDP. It is much less believable that a single microfinance institution, or even the microfinance sector in a country, is driving a significant portion of growth in the short run.[8] Nonetheless, we address the issue of reverse causation in the robustness section.

Research has also studied the effect of macroeconomic variables on formal banking performance. Demirguc-Kunt and Detragiache (1998, 2000, 2005), Kaminsky and Rinehart (1999), and Eichengreen and Rose (2001) all address bank sector crises and their correlates. Boyd et al. (2001) examine the impact of inflation on the aggregate financial sector. Our study's main difference from these is its exclusive focus on MFI's. It is far from a foredrawn conclusion that what holds true for large, commercial banks or the banking sector as a whole will also hold true for MFI's.

More broadly, the question of how growth correlates with representative firms' performance may appear uninterestingly obvious. In the case of microfinance – given its operation among economically marginal clientele, its concentration in informal sectors, its frequent reliance on local markets, and its common non-profit status – the answer seems far from obvious a priori. There are similarities between this question and another that has received much attention, the relationship between growth and poverty. However, the main application of our results is to improve MFI evaluation by enabling a systematic discounting for the macroeconomic environment.

[8] In the long run, however, microfinance may affect the level of income, an issue that Ahlin and Jiang (2005) explore theoretically.

3 Data

The dataset is assembled from two sources. MFI data come from a relatively new organization called the Mix Market (mixmarket.org). This organization's aim is to promote "investment and information flows" within the world of MFI's and donors, as well as to improve reporting standards in the microfinance industry. Its publicly available website currently contains information on 729 MFI's, 75 investors (e.g. Calvert Foundation), and 134 partners (which tend to be umbrella organizations that facilitate multiple MFIs' operations).[9]

Mix Market puts the reporting MFI's into five categories – one- through five-stars – based on amount and reliability of information reported. We restrict our dataset to include only four- and five-star institutions. Four-star and higher institutions have financial statements audited by a third-party accounting firm or similar; thus this seems a reasonable cutoff for reliable data. Further, we include only those institutions with five or more years of data on at least one key variable (described below) through 2004, during the time of our data collection, June and July 2006. We also include only MFI's of the following institutional types: bank, cooperative/credit union, non-bank financial institution, and non-profit (NGO). This excludes the smallest two categories: rural banks and "other", the former because it does not have enough observations to provide significant within-category variation and the latter because it is too vague. Finally, we restrict the sample to MFI's whose fiscal year corresponds to the calendar year, for comparability to the annual country-level data discussed below.[10]

In all, we have 112 MFI's in the database, from 48 countries, each with 5-9 years of data (on at least one key variable described below) from the years 1996-2004. The MFI's are listed in Table 1, along with founding year, institutional type, and recent numbers for number of borrowers and loan size. Many are relatively small, though some large and well-known institutions are included, e.g. ASA and BRAC of Bangladesh. The breakdown by institutional type is as follows: 9 cooperative/credit unions, 10 banks, 39 non-bank financial

[9]Descriptive information here and below is taken from the mixmarket.org website on August 3, 2006.
[10]We also exclude MFI's from Kosovo, for lack of available country data.

institutions, and 54 non-profit NGOs. These MFI's represent 48 countries, 2 from South Asia, 5 from East Asia, 9 from Eastern Europe or Central Asia, 5 from the Middle East or North Africa, 15 from sub-Saharan Africa, and 12 from Latin America.

While the MFI sample is quite geographically dispersed and varied in other ways, e.g. size, we cannot claim it is a representative sample of the MFI universe. Rather, it is selected based on availability and quality of data, as described above, as well as desire to publicly report it. All results should be viewed in that light.

We use five indicators of MFI success from these data, each measured on an annual basis. Table 2 summarizes these and other key variables described below, including measures of central tendency, dispersion, and the percentage of the variance accounted for by between-MFI variation.

The first, our focal one, is called operational *self-sufficiency*. It equals total financial revenue divided by (financial expense plus loan loss provision expense plus operating expense). Hence, a number greater than one (100%) indicates that the MFI has sufficient revenue from lending to cover its costs, including the cost of capital, accounting for bad loans, and paying operating expenses.

From this measure we calculate two additional ones. The *sufficiency index* ranges from zero to one and is a monotonic transformation of *self-sufficiency*. While self-sufficiency equals $revenue/expense$, the sufficiency index equals $revenue/(revenue + expense)$.[11] We make this transformation to reduce outlier problems; compare the ranges and coefficients of variation (σ/μ) of these two variables using Table 2. We also create a dummy variable called *sustainable*, which equals one if and only if self-sufficiency is at least 100%. That is, sustainable indicates whether the MFI has covered costs in the given year.

The second and third indicators we take measure different levels of default. The *write-off*

[11] The formula for the index in terms of self-sufficiency is

$$sufficiency\ index = \frac{1}{1 + \frac{1}{self-sufficiency}}.$$

ratio gives the value of loans written off during the year as uncollectible, as a percentage of average gross loan portfolio over the year. This is obviously a form of serious default involving final non-repayment. A more mild measure is the *at-risk ratio*, which gives the fraction of the gross loan portfolio that has been considered at risk (e.g. behind schedule with payments) for more than a month. Surely some of these loans are eventually repaid, but this is an early indicator of default problems.

The fourth measure we take is the dollar *cost per borrower*, which equals the MFI's annual operating expense divided by the annual average number of borrowers. This is obviously one component of an MFI's ability to break even financially: containing costs. On the other hand, wise use of resources obviously does not mean cutting all corners; some positive degree of monitoring may often be optimal, as Cull et al. (2006) suggest. Thus changes in cost per borrower can also reflect changes in degree of monitoring employed, as well as changes in wages.

The fifth measure captures *MFI growth*, in terms of number of borrowers. This is constructed as the percent increase relative to the previous year in the number of active borrowers, i.e. those who have an outstanding loan balance with the MFI.

Finally, a key control variable taken from these data is the year the MFI was founded, which is used to calculate the MFI's age. This allows controlling for learning effects in MFI success.

This MFI-level dataset is relatively unique. The only others to analyze this kind of cross-country, cross-MFI data appear to be Cull et al. (2006). Relative to their data, our dataset has the advantage of incorporating the time dimension and allowing panel techniques. However, their data has a different advantage: it is actually a reworking of the publicly reported MFI data using a single methodology and proprietary MFI data to ensure realistic accounting and comparability. This reworking tends to lower the self-sufficiency measures, for example; the median self-sufficiency in their data is 111.5% as compared with 115% in our data. Nonetheless, the quality of our data seems reasonable, and any measurement

error that exists will not bias results as long as it is not correlated with MFI age and the macroeconomic environment.

The MFI-level dataset is merged with country-level data from the World Development Indicators. From these indicators we take real GDP per capita levels expressed in 2000 U.S. dollars, for each of the countries and years corresponding to MFI's in the dataset. From these we also calculate annual GDP per capita growth rates – our focal measure of the macroeconomic environment.

We also take the annual rate of consumer price inflation. Inflation clearly affects returns to lending, borrowing, and saving, at least when unanticipated and not indexed for.

Annual data on unemployment rates are spotty, so we use a substitute, the workforce participation rate. This is constructed as the total labor force as a fraction of the population aged 15-64. We interpret this as to some degree proxying for work opportunities in the official economy, since unofficial economic activity is underrepresented in official labor force figures.

Finally, we take the manufacturing value added in the economy and the net inflows of FDI, both as fractions of GDP. These reflect to some degree the availability of wage labor at a level accessible to potential MFI clients. Thus, they allow rough assessment of the degree of rivalry between MFI-led development and development based on industrialization and wage labor.

4 Estimation Methodology

Let y_{ijkt} be a year-t outcome of MFI i located in country j and of institutional type k; and X_{jt} be a set of macroeconomic variables describing country j at time t. The baseline specification pools all MFI's and estimates

$$y_{ijkt} = \alpha + \beta_{age}\ age_{it} + \beta_{age^2}\ age_{it}^2 + \beta_{lny}\ ln(y_{j,t-1}) + \beta_X\ X_{jt}\ + \nu_k + \epsilon_{ijkt}.$$

This includes a potentially non-linear effect of age on MFI outcomes, reflecting a learning curve. It also controls for the level of income in the country prior to this year's macroeconomic realizations. Finally, it controls for any level differences between institutional types.

The data suffer from several problems that dictate our choice of estimation procedure. First, there can be little confidence in assuming homoskedastic errors. Second, errors may be correlated within MFI's, for example since individual MFI's do their own record-keeping. Third, outlier problems are potentially severe, as a glance at Table 2 suggests.

As a response to these problems, we attempt to take as conservative an approach as is reasonable. To address the outlier issue, we estimate conditional median functions rather than conditional mean functions. That is, we use median regression, which minimizes the sum of absolute residuals rather than the sum of squared residuals and tends to be less susceptible to outlier problems than least squares. We supplement this with "robust regression", a weighted least squares approach that iteratively downweights outlier observations until the weights and coefficient estimates converge.

To address the potential heteroskedasticity and within-MFI standard error correlation, we bootstrap standard errors and confidence intervals for both estimation techniques, clustering by institution. That is, for each specification and technique, we randomly create 10,000 samples by sampling with replacement from the dataset at the institution level.[12] This approach does not require homoskedasticity or error terms to be independent within MFI's. The estimation is repeated for each of the 10,000 samples, producing a dataset of parameter estimates. Standard errors for each parameter estimate are calculated straightforwardly. Significance levels of tests for zero coefficients come from eliminating two symmetric tails of the parameter estimate data (e.g. the top and bottom 2.5% for significance at 5%) and checking whether zero is contained within the remaining data.

We next estimate the same relationships, alternately using only within-MFI and between-

[12]For example, if 112 MFI's are in the original regression, then each bootstrap dataset is formed from 112 random draws (with replacement) of MFI's in the dataset, with each year available for each chosen MFI included in the bootstrap dataset. Since our panel is unbalanced, bootstrapped datasets vary in size.

Reported results are from 10,000 bootstrapped replications, unreported results from 1000 replications.

MFI variation. The within regressions simply substitute MFI-level fixed effects for the institutional-type fixed effects. They also exclude the income level $y_{j,t-1}$ since it involves very little within-MFI variation (see Table 2). The specification is:

$$y_{ijkt} = \alpha + \beta_{age}\ age_{it} + \beta_{age^2}\ age_{it}^2 + \beta_X\, X_{jt}\ + \nu_i + \epsilon_{ijkt}.$$

A key advantage of MFI fixed effect estimation is the ability to control for unobserved MFI or country attributes that may be correlated with the macroeconomic context and important for MFI financial sustainability. For example, it may be that more profitable or profit-driven MFI's choose to locate in faster growing economies. To take another example, it may be that an omitted country variable, e.g. corruption or financial development, is (partially) responsible for both the macroeconomic growth and the MFI performance. In either of these cases, the observed positive relationship between growth and MFI performance of the previous section would clearly not be causal. To the extent that these country or MFI attributes are relatively fixed over time,[13] however, finding the result in a fixed effect specification bolsters the case for causality.

However, a disadvantage of fixed effect estimation here is that it only picks up high-frequency relationships between the variables. For example, it cannot directly address the question of whether MFI's in consistently high-growth economies have an easier time achieving financial sustainability than those in consistently low-growth economies. Rather, it answers the question of whether a year of growth that is high *relative* to a given economy's recent performance (5-9 years, depending on the MFI) is good for MFI financial performance in that year. This eliminates a lot of the growth variation in the data and focuses on the high-frequency relationship.

On the other hand, if unobserved MFI or country heterogeneity that is correlated with the macroeconomic variables is not a key concern, a between-MFI approach can address the question at a lower frequency and make use of the significant cross-country variation.

[13]Since none of our MFI's switch country location, the MFI fixed effect picks up country attributes also.

Between median regressions are run by replacing each variable (left- and right-hand sides) in the baseline specification by its within-MFI median value. For each regression, the medians are calculated using only the observations included in the regression. Between robust regressions are run similarly using within-MFI mean values.[14]

Both of these non-baseline specifications estimate the relationships using only a subset of the total variation, however, so significance levels are generally expected to be lower than in the baseline (pooled) case.

5 Results

We discuss and interpret the results in this section. We focus on causal interpretations, and defer most discussion of the validity of these conclusions to the next section.

5.1 Baseline (pooled) Results

Baseline results from median regressions are reported in Table 3, along with significance levels from both these and unreported robust regressions (see section 4).

Sustainability. The first two columns of Table 3 correspond to financial sustainability dependent variables, operational self-sufficiency and the sufficiency index, respectively. Most striking and robust is that macroeconomic growth is a positive predictor of MFI self-sufficiency, using either technique and with a high degree of statistical significance. The quantitative impact is also significant: an additional percentage point of growth in GDP/capita translates into an additional two percentage points of operational self-sufficiency,[15] the ratio of revenues to expenses. A difference in growth equal to the interquartile range (3.75 percentage points, roughly equal to the standard deviation) is associated with a 7.5 percentage point higher operational self-sufficiency ratio. This is not a large increase relative to self-

[14] Since median regression estimates a conditional median function and robust regression estimates a conditional mean function, this approach seemed reasonable. We are unaware of theoretical results giving guidance on this issue.

[15] Point estimates using robust regression are nearly identical.

sufficiency's standard deviation, which is inflated by extreme outliers (see Table 2). It is, however, 20% of self-sufficiency's interquartile range and would lift an MFI 43% of the way from the 25th percentile to the 50th, and 38% of the way from the 50th to the 75th. The numbers are quite similar with the sufficiency index. Put differently, a growth differential equal to the interquartile range is worth about the first 2 1/2 years of learning, or about one quarter of the total learning effect.

Thus, while the macroeconomy is certainly not an MFI's destiny, it seems to play a substantial role in an MFI's financial success. Evidently, the increased enterprise opportunities that come with growth tend to be an overall benefit to existing and potential borrowers, and this outweighs the outside temptation and competition arising from growth outside of microfinance.

Workforce participation rate is negative and marginally significant (significant at 15% in the self-sufficiency median regression and at 10% in the sufficiency index robust regression). The implication seems to be that holding fixed the level and growth rate of income, environments with more formal economic activity and job opportunities are less conducive to sustainable MFI operations. This may be because more formalized economic environments crowd out informal enterprise opportunities, which are often the bread and butter of MFI clients. Also, better job opportunities may lower the MFI's value added to clients and make them more willing to default.

The point estimate suggests that one percentage point more of workforce participation lowers operational self-sufficiency by 0.55 percentage points. Thus, the interquartile difference in workforce participation rate (7.2 percentage points) is associated with a 4.0 percentage point difference in the self-sufficiency ratio. This is just over half of the impact that growth has, and, as with growth, it is neither overwhelming nor negligible.

Also salient are the learning effects estimated, reflected in the significant quadratic age relationship. The peak for both measures is at about 19 years; less than 6% of the data is beyond this peak. The accumulated effect of 19 years of learning is about 30 percentage

points in the self-sufficiency ratio, just over 80% of the interquartile range. Not surprisingly, there seems to be a significant learning curve in operating a sustainable MFI – acquiring skill, and perhaps reputation, seems also very important.

Default. A key component of running a sustainable MFI is keeping default rates down. The results on the write-off ratio and at-risk ratio, contained in columns 3 and 4 of Table 3, are also revealing. Growth is again a key factor, with higher growth consistently associated with lower default rates. One percentage point higher growth is associated with a 0.054 percentage point lower write-off ratio. The interquartile growth difference is associated with 0.20 percentage points of the write-off ratio, which is 11% of the interquartile range.

The write-off ratio is a lower-frequency measure of default; loans may be written off well after the funded project failed and relevant macroeconomic conditions were realized. Hence we run a similar specification but use two-year averages, over years t and $t-1$, for the macroeconomic variables – growth, inflation,[16] workforce participation, manufacturing, and FDI – and control for income level in year $t-2$, using $ln(y_{j,t-2})$. The specification does slightly better and the growth coefficient magnitude increases to 0.097. An interquartile two-year growth difference (equal to 3.06 percentage points) lowers the write-off ratio by 0.30 percentage points, which is 17% of the interquartile range, 43% of the distance from the 25th to the 50th percentile, and 29% of the distance from the 50th to the 75th percentile.

The at-risk ratio is an early-warning measure of default and thus we stick with contemporaneous macroeconomic variables. Here, a one percentage point higher growth rate is associated with a 0.19 percentage point lower at-risk ratio. The interquartile growth difference translates into a 0.71 percentage point lower at-risk ratio. This is 15% of the interquartile range, 39% of the distance from the 25th to the 50th percentile, and 25% of the distance from the 50th to the 75th percentile. The quantitative impacts are remarkably similar across the two default rates when two-year averages are used for the write-off ratio and current-year indicators for the at-risk ratio.

[16] Geometric averages are used for growth and inflation.

Thus growth has a moderate, salutary impact on the default rates of MFI's. The most straightforward explanation we see is that growth improves the economic opportunities for even the informal economic enterprises that predominate among MFI clients, bringing solvency to marginal loans. One might expect growth also to improve non-MFI economic opportunities for clients also, raising the temptation to default. Evidently, the direct effect of growth in raising informal profitability dominates and lowers MFI default rates. This appears to be one key mechanism by which growth helps MFI sustainability.

There is also a bit of evidence that inflation is associated with a lower write-off ratio. It is significant at 5% in the robust regression and also in the two-year average specification (unreported) in both median and robust regressions. A simple explanation for this could be that it reflects the cheapening real cost of repayment caused by unanticipated inflation.

Interestingly, a statistically significant age relationship is not estimated with default. This is consistent with the idea that managing default risk from the outset is critical for an MFI's survival.

Cost containment. According to the results of column 5, Table 3, the most strongly significant factor in explaining cost per borrower is the expected one, the level of income in the country. A doubling of income level adds about \$25 ($36.6 * ln[2]$) to the cost per borrower. This is likely particularly due to higher labor costs.

None of the other contemporaneous macroeconomic variables enter significantly. One might have expected an effect if macroeconomic conditions affect the quality of loans and cause MFI's to alter their monitoring intensities. However, there is no significant evidence here that this is the case.

There are also significant institutional-type differences. Cooperatives/credit unions and non-profits (NGO's) have significantly lower costs, both approximately \$90 lower than banks. Perhaps more of their labor is volunteer, semi-volunteer (low-paid), and/or done by borrowers themselves via joint-liability groups.

MFI growth. The results on MFI growth in number of borrowers are contained in

column 6, Table 3. An interesting rivalry, or substitutability, surfaces between microfinance and industrial, formal-sector led growth. All three indicators that are related to the formal economy and industrialization are negative and significant predictors of MFI growth: workforce participation, share of manufacturing, and FDI. This result reinforces the view of microfinance-led growth as an alternative to more traditional avenues of industrial growth. When these other approaches are working, microfinance may have a harder time making inroads.

One percentage point more of workforce participation is associated with a one percentage point lower MFI growth rate; thus a difference in workforce participation rate equal to the interquartile range (7.2 percentage points) is associated with about 16% of the interquartile range for MFI growth (45.7 percentage points). A percentage point of FDI is associated with two and a quarter percentage points lower MFI growth rate. This implies that the interquartile range of FDI (3.2 percentage points) is also associated with about 16% of the interquartile range for MFI growth. Finally, a percentage point of manufacturing share is associated with a one and three quarters percentage points lower MFI growth rate, with 19% of the MFI growth interquartile range explained by the interquartile range difference in manufacturing (4.9 percentage points). Put together, the difference between an MFI in an environment where each of these three macroeconomic indicators is at the 25th percentile rather than the 75th percentile is about 23 percentage points of MFI growth, roughly *half* the interquartile range.

Clearly, the macroeconomic environment seems to play a significant role in MFI growth. Further, this result seems to illuminate the precarious role of MFI's – as a kind of substitute development strategy when more traditional avenues are for some reason blocked. It raises the question of whether microfinance can be instrumental in broad-based industrial growth with rising wages and efficiency, an issue explored theoretically by Ahlin and Jiang (2005).

Growth is positive and nearly significant (and is significant at 10% when two-year average rather than contemporaneous macroeconomic variables are used) in the robust regression

results. This provides a bit of evidence that, holding the structure of the economy fixed (e.g. manufacturing, FDI, etc.), growth increases demand for small credit and/or gives MFI's the financial wherewithal to expand operations.

The age curve estimated here is significant and U-shaped, suggesting that MFI's tend to grow fast initially and then taper off. It is similar to the ones estimated with financial sufficiency, bottoming out between 21 and 22 years and accounting for about 38 percentage points over that period, just over 80% of the interquartile range.

5.2 Within (fixed effect) and Between Estimation

Within results, from estimation of the baseline model with MFI fixed effects included in place of institution-type fixed effects and the national income level, are reported in Table 4. Between results, from using within-MFI medians/means in the baseline model, are reported in Table 5.

Sustainability. The first two columns of Tables 4 and 5 report results for financial sustainability. It is the within regressions that echo the baseline results: macroeconomic growth is a consistently positive and significant predictor of MFI self-sufficiency in the within regressions, but positive and not significant in the between regressions (significant at 20% in three of the four regressions).

The estimated impacts differ across specifications. The baseline (pooled) self-sufficiency specification yielded a coefficient of about two; here, the fixed effect regression gives a coefficient of 1.07 while the between regression gives a coefficient of 2.17. One might interpret this as suggestive of omitted variables positively correlated with growth and MFI performance. However, the low fixed effect coefficient may be due rather to the high-frequency relationship being estimated. Indeed, when two-year average instead of contemporaneous macroeconomic variables are used, the point estimate for self-sufficiency is up to 1.86. Overall, the results strongly suggest a causal and substantial impact of growth on MFI performance.

Workforce participation rate is consistently negative and significant in the fixed effect

regressions, and with a significantly larger magnitude than in the baseline regressions: a one percentage point increase in workforce participation lowers operational self-sufficiency by 2.3 percentage points (as compared with 0.55). Thus, increasing workforce participation – probably due to an improving formal labor market – inhibits MFI sustainability.[17] The between coefficient estimated is nearly zero. This suggests that business cycle changes in workforce participation, rather than persistent structural differences, are what affect MFI financial performance. Perhaps formal sector job growth raises clients' temptation to abandon MFI-funded projects, or gives clients incentives to lower borrowing from the MFI. Once the new level of participation has been achieved, the MFI can maintain a more stable, less mobile clientele.

Default. No significant default relationships are estimated using fixed effects, save a hint of a positive relationship between FDI and the at-risk ratio (significant at just above the 10% level in the robust regression). FDI is also a positive and significant predictor of the write-off ratio in one between regression. This adds a bit of evidence on the rivalry between microfinance and industry-led growth: higher FDI can lower loan quality, perhaps by tempting borrowers to leave for factory jobs.

The baseline results on growth and default are echoed in the between regressions: higher growth episodes correspond to lower default rates, measured either way. The estimated magnitudes are significantly higher, especially for the write-off ratio. One percentage point of growth is associated with a 0.17 percentage point lower write-off ratio and 0.25 percentage point lower at-risk ratio (compared with 0.054 and 0.19, respectively). The relatively stronger between results, especially for write-off ratio, suggest that the effect of growth on default is not a transitional phenomenon; rather, persistently high growth is associated with persistently higher quality MFI loans

The salutary effect of growth on default is perhaps due to higher profitability of informal projects. On the other hand, as argued above, one might expect high growth also to raise

[17] The coefficient estimate and significance level are nearly identical when all other macroeconomic variables are removed from the regression.

opportunities in more formal, non-MFI sectors, thus raising the temptation to default on MFI loans. But note that the positive growth effect controls for workforce participation rates, which proxy for the extent of formal labor market opportunities. Indeed, the at-risk ratio coefficients on workforce participation rates are positive and nearly significant (at 20% in the median regression and 15% in the robust regression), hinting that the more formalized the economy in which a given amount of growth is occurring, the greater MFI default rates.

Cost containment. Again, a country's income level is most significant in explaining cost per borrower. This is seen in the between regression coefficient on log income per capita. A doubling of income level adds about $27 to the cost per borrower, nearly identical to the $25 of the baseline results.

A few macroeconomic variables show up as significant. Controlling for FDI and other macroeconomic factors, growth is associated with a lower cost per borrower in the fixed effect median regression. This is consistent with MFI's responding to a slowing economy by increasing monitoring, presumably to maintain current loans and also to screen future loans more carefully.

It seems puzzling that the manufacturing share is a significant and negative predictor of cost per borrower in the fixed effect regressions. This is the one bit of evidence that seems to contradict the rivalry between MFI and industry-led growth. It may be, though, merely a high-frequency phenomenon: manufacturing jobs appear and lure away MFI workers, leaving the MFI to make do temporarily with a smaller staff.

MFI growth. The between results essentially echo the baseline results. Growth has a positive effect on MFI growth in number of borrowers, while the three indicators related to the formal economy and industrialization are negative and significant predictors of MFI growth: workforce participation, share of manufacturing, and FDI.

The more puzzling result is that MFI growth increases with the workforce participation rate in the fixed effect regressions. Thus the estimated overall (pooled) and between effects of workforce participation are negative, while the estimated within effect is positive. A

potential reconciliation of these results is that high-frequency effects are indeed positive while low-frequency effects are negative. For example, in years of growing job opportunities MFI's also have increased demand for their services; but as the labor market growth takes effect, MFI's face attrition of new and old borrowers. The net effect seems to be negative, reinforcing the idea of rivalry between MFI's and formal sector growth.

6 Further Tests and Robustness

6.1 Inflation

Inflation can hinder the MFI lending mission. An unanticipated inflation tends to lower real rates of return for an MFI, and may cause it to react by building conservative (large) inflation premia into already high future lending rates. However, the results here give little evidence that inflation is a key variable for MFI sustainability. This may suggest that MFI's have good ways of hedging inflation risk and/or that they are somehow insulated from it. Or, it may reflect the lack of high-inflation episodes in our dataset – the 95th percentile involves just 26% inflation and the 99th percentile involves 96% inflation.

A third alternative is that it has to do with our linear functional form. Boyd et al. (2001) explore several alternatives to a linear relationship in examining the relationship between inflation and (formal) financial sector development. One allows for an a priori fixed threshold inflation level, at which the effect of inflation can jump and on either side of which the effect of inflation can have a different slope. The second uses the inverse of inflation rather than inflation. We experiment with three specifications to examine these possibilities.

First, we use a simple inflation threshold model that allows inflation to have an effect only if it exceeds some threshold – here 10%. That is, the baseline results are run with an indicator variable for inflation of higher than 10% (about a quarter of the data) replacing the actual inflation rate. The results (not reported) are a bit more salient, with high-inflation negative and significant at the 10% level in the sufficiency index robust regression. The quantitative

impact is relatively large, equal to about 1.6 percentage points on the sufficiency index (which ranges from 0% to 100%). This is 20% of the sufficiency index's interquartile range, and equal to the impact of about four percentage points of growth.

The baseline results with linear inflation showed that inflation was associated with a lower write-off ratio. Using the high-inflation dummy, this result disappears. Instead, high-inflation is associated with a higher at-risk ratio, about 1.3 percentage points in the median regression, with 10% significance. It's not clear to us why the different results appear with the different specifications. However, it makes sense that high inflation would give borrowers incentives to delay loan repayment (raising the 30-day at-risk ratio) while also perhaps enabling more borrowers eventually to repay (lowering the write-off ratio).

Second, we run a more complicated threshold model that includes inflation, the high-inflation dummy, and the interaction of the high-inflation dummy and inflation (not reported). This allows inflation's effect to jump at 10% and to have a different slope below and above 10%. Most coefficients are insignificant, but two salient results emerge. First, as in the simple threshold model, the high-inflation dummy is a positive and significant (at 10%) predictor of the at-risk ratio, this time in the robust regression. Second, inflation at low levels is a positive predictor of MFI growth, significant in the robust regression at 1%. The net effect at high levels of inflation (above 10%) is slightly negative but not significantly different from zero. Thus, when inflation is in a moderate range (and perhaps stable), higher inflation seems to attract clients to MFI's. This result is not too surprising, if households' main outside option to financial services is to save in hard local currency. If the goal is to fund an investment project, for example, higher inflation makes taking a loan (with a relatively accurate inflation premium) more attractive relative to saving for it. When inflation gets too high and unpredictable, however, the inflation premium built into a loan may become prohibitive in expected value.

Third, we use the inverse of inflation, $1/(1+\pi_t)$, rather than π_t. The results (not reported) turn out to be very similar to the baseline results, with one difference: inflation is a negative

and significant (at 10%) predictor of the sufficiency index in the robust regression.[18] This echoes the results with the high-inflation dummy, and provides a bit more evidence that inflation hurts MFI financial performance.

6.2 Padding Margins or Breaking Even?

One might wonder if a good growth rate helps mainly those MFI's that are profit-maximizing, or helps sustainable MFI's to further pad their profit margins, but does not enable MFI's to break the key 100% sustainability barrier. Note that the median self-sufficiency ratio in the data is 115%, which is well above 100% – thus the median regressions are focused on a part of the distribution significantly above the critical break-even point.

There are a number of ways to address this. First, we estimate the conditional quantile function at the quantile corresponding to the key 100% margin, which is roughly the 25th percentile.[19] The results for self-sufficiency and the sufficiency index are contained in columns 1 and 2 of Table 6. Growth is still significant, at the 1% level, and the coefficients are only slightly smaller: 1.56 instead of 1.98 for self-sufficiency and 0.38 instead of 0.41 for the sufficiency index.

Second, we interact growth with institutional type, allowing each type of institution to have its own growth-related sustainability gradient. The idea is that there are likely to be systematic differences between institutional types, with non-profits (NGO'S) less profit-oriented than banks and non-bank financial institutions. The results for self-sufficiency and the sufficiency index are in columns 3 and 4 of Table 6. The growth effect on non-profit MFIs' sustainability turns out to be the strongest. It is consistently significant at 1% and 40-50% larger in magnitude than the effect estimated in the baseline regressions. Thus growth seems to matter most for financial sustainability of institutions that ostensibly are not maximizing

[18] That is, inverse inflation is positive and significant.

[19] In principle, quantile regression can be used to estimate the conditional quantile function for any quantile. Our baseline estimates have all focused on the 50th quantile, i.e. the median, which amounts to choosing estimates that minimize the sum of absolute deviations. For different quantile functions, estimates are chosen that minimize the sum of weighted absolute deviations, where a different weight is used for positive and negative deviations, respectively. See Koenker (2005).

profits.

Finally, we collapse the self-sufficiency measure into *sustainable*, a dichotomous variable equalling one if and only if the ratio is at least 100%. We then run a logit specification, with standard errors bootstrapped in the same way as before. Results are reported in column 5 of Table 6. Growth is a significant predictor of breaking even, at the 1% level. Quantitatively, the interquartile growth difference (3.75 percentage points) is associated with a 7.5 percentage point increase in the probability of a non-profit MFI breaking even.[20] (The unconditional probability is 73%.) Put differently, this amount of growth has the same impact on the probability of breaking even as about the first one and two thirds years of MFI learning.

Overall, the evidence is strong that the relationship between MFI financial performance and growth is not isolated at the upper end of the MFI distribution. Rather, growth is strongly related to an MFI's ability to achieve financial sustainability, and it is especially strongly related to the financial success of non-profit MFI's.

6.3 Causality

Growth seems strongly correlated, then, with an MFI's ability to cover costs self-sufficiently. To what extent is it reasonable to think of this relationship as a causal link from growth to MFI performance? Here we discuss several potential interpretations.

Most simply, it could indeed be that growth and its determinants are a significant causal factor behind MFI performance. Growing incomes create new demands and opportunities for MFI clients to use loans more productively. Growth may also be driven by increases in technology or capital that directly increase feasibility of MFI projects.

A second interpretation is reverse causation: good financial performance of the MFI's in our data is directly fueling economic growth. This is somewhat far-fetched, given the small size relative to each economy of most MFI's in our dataset. Few, if any, MFI's would claim

[20] This is calculated by setting all non-dummy variables at their medians.

to have large macroeconomic impacts (and MFI's are not generally known for moderate self-assessments).

Nonetheless, we address the possibility of reverse causation in several ways. We add to the baseline regressions MFI size (number of borrowers) and its interaction with the growth effect. If reverse causation is behind the correlation between growth and MFI performance, we would expect a positive coefficient on the interaction term, since the effect of an MFI on aggregate growth would surely be increasing in size. Interestingly, the results (not reported) go in the opposite direction, with the growth-size interaction term negative and significant at the 10% level in three out of the four regressions (median and robust regressions on the two measures of financial sustainability). Growth is evidently even more strongly related to the performance of smaller MFI's, with quantitative estimates more than 10% higher than the baseline results for the smallest MFI's and 55-65% of the data registering stronger growth effects than in the baseline regressions. At any rate, this result casts doubt on reverse causation.

We also rerun the baseline results dropping the MFI observations in which borrower size exceeds 50,000; this gets rid of about 14% of the data. We find it implausible that an institution of less than 50,000 micro-borrowers is affecting national GDP appreciably. The results (not reported) are nearly identical with the baseline results. Growth remains a significant predictor of operational self-sufficiency and the sufficiency index, always at 1% levels. The coefficient magnitudes are very close to the baseline levels (5-6% lower). Overall, it does not strike us as plausible that the causality is going in the other direction.

A third interpretation is omitted variable bias at an aggregate level: it may not be growth per se, but something correlated with growth that is causing better MFI performance. One variant of this interpretation is that the MFI or informal sector as a whole is doing well for some unobserved reason that is causing higher growth and better performance of the particular MFI in our data. This is plausible, though the fixed effect specifications control for omitted MFI-level or country-level factors that are time-invariant and still find positive

growth effects. At any rate, we do not need to rule out this interpretation in order to answer our main question, that is, to what extent is MFI performance dependent on the surrounding macroeconomic context. Whatever the aggregate factors that are omitted may be, e.g. well developed financial system or lack of corruption, it is implausible that the particular MFI in our dataset is responsible for them. Therefore, a non-negligible part of the MFI's success is out of its control.

A fourth interpretation involves a selection story: it may be that more sustainable MFI's choose to locate in high-growth economies, while MFI's that are content to be dependent on subsidies (a seemingly dying breed) locate in low-growth economies. This story, however, almost requires a causal macroeconomic effect behind it: why else would financially driven MFI's tend to prefer high-growth economies unless growth were conducive to better financial performance? And again, it is put in question by the fixed effects analysis that shows that even within MFI's over time, growth significantly affects financial self-sufficiency.

A fifth interpretation involves a more subtle selection story. It may be that MFI's shift between goals depending on the health of the aggregate economy – an issue that does not arise with purely profit-maximizing firms. For example, MFI's may prioritize their social mission when growth is poor, letting loans be delinquent and taking losses; but may prioritize financial goals when growth resumes, returning to strictness and profitability. They may do this even though financial sustainability is equally attainable in both scenarios, simply because their various goals take on different urgency depending on the state of the economy. We are not able to rule this kind of story out, even with panel data. In fact, even an experimental design that found a truly exogenous growth shock could not rule out this story. Disentangling the effect of changing goals due to macroeconomic factors seems to us to require some way of getting at the propensity of an MFI to shift weights between different components of its mission. This is left to future research.

With these caveats in mind, then, we interpret the results as suggestive of causal effects of growth on MFI performance.

7 Conclusion

Overall, the data indicate that MFI success, at least in terms of financial sustainability, growth, and repayment rates, is significantly affected by the macroeconomic environment in which they are situated. Generally, high growth is good for MFI performance. Further, there are indications that microfinance is complementary to the unofficial economy, as proxied by low official workforce participation rates. On the other hand, there appear to be some signs of rivalry between microfinance and industrial-led growth, proxied by share of GDP in manufacturing and by FDI: the more industrially advanced the country, the more difficult for MFI's to grow and recover loans. This parallels the work of Ahlin and Jiang (2005), which shows theoretically that microfinance can impede industrial development under some conditions.

The main point of the paper is not that macroeconomy is destiny. Indeed, the majority of performance is left unexplained by the macroeconomy, and the importance of institution-specific age effects makes clear that much of success originates within the institution.

Our point is also not that MFI's should seek to locate in high-growth economies. This leaves aside the social impact that MFI's can have in situations where the macroeconomy leaves little hope.

The point is rather that in interpreting and evaluating MFI performance, it is imperative to take into account – to handicap for – the macroeconomic context. Not doing so skews the evaluator's perspective about which institutions are truly successful on their own terms and which are most to be emulated.

References

[1] Christian Ahlin and Neville Jiang. Can micro-credit bring development? Mimeo, Vanderbilt University, July 2005.

[2] Beatriz Armendariz de Aghion and Jonathan J. Morduch. *The Economics of Microfinance*. MIT Press, Cambridge MA, 2005.

[3] Eric Bellman. Invisible hand: Entrepreneur gets big banks to back very small loans. *Wall Street Journal*, page A1, May 15, 2006.

[4] John H. Boyd, Ross Levine, and Bruce D. Smith. The impact of inflation on financial sector performance. *Journal of Monetary Economics*, 47(2):221–248, April 2001.

[5] Rodrigo A. Chaves and Claudio Gonzalez-Vega. The design of successful rural financial intermediaries: Evidence from Indonesia. *World Development*, 24(1):65–78, January 1996.

[6] Robert Cull, Asli Demirguc-Kunt, and Jonathan Morduch. Financial performance and outreach: A global analysis of leading microbanks. Working Paper, May 25, 2006.

[7] Asli Demirguc-Kunt and Enrica Detragiache. The determinants of banking crises in developing and developed countries. *International Monetary Fund Staff Papers*, 45(1):81–109, March 1998.

[8] Asli Demirguc-Kunt and Enrica Detragiache. Monitoring banking sector fragility: A multivariate logit approach. *World Bank Economic Review*, 14(2):287–307, May 2000.

[9] Asli Demirguc-Kunt and Enrica Detragiache. Cross-country empirical studies of systemic bank distress: A survey. *National Institute Economic Review*, 0(192):68–83, April 2005.

[10] Barry Eichengreen and Andrew K. Rose. Staying afloat when the wind shifts: External factors and emerging-market banking crises. In Guillermo A. Calvo, Rudi Dornbusch, and Maurice Obstfeld, editors, *Money, Capital Mobility, and Trade: Essays in honor of Robert A. Mundell*. MIT Press, 2001.

[11] David Henley. Learning from the future: Lessons from contemporary microfinance for the interpretation of Indonesian past. Conference Paper, National University of Singapore, October 2005.

[12] Joseph P. Kaboski and Robert M. Townsend. Policies and impact: An analysis of village-level microfinance institutions. *Journal of the European Economic Association*, 3(1):1–50, March 2005.

[13] Graciela L. Kaminsky and Carmen M. Reinhart. The twin crises: The causes of banking and balance-of-payments problems. *American Economic Review*, 89(3):473–500, June 1999.

[14] Roger Koenker. *Quantile Regression*. Econometric Society Monographs, no. 38. Cambridge University Press, 2005.

[15] Ross Levine. Finance and growth. In Philippe Aghion and Steven N. Durlauf, editors, *Handbook of Economic Growth*, volume 1A. Elsevier Press, 2005.

[16] Jonathan Morduch. The role of subsidies in microfinance: Evidence from the Grameen Bank. *Journal of Development Economics*, 60(1):229–248, October 1999.

[17] Richard H. Patten, Jay K. Rosengard, and Don E. Johnston, Jr. Microfinance success amidst macroeconomic failure: The experience of Bank Rakyat Indonesia during the East Asian crisis. *World Development*, 29(6):1057–1069, 2001.

[18] Rachel Emma Silverman. A new way to do well by doing good. *Wall Street Journal*, page D1, January 5, 2006.

[19] Jacob Yaron. What makes rural finance institutions successful? *World Bank Economic Review*, 9(1):49–70, January 1994.

Table 1 – MFI's

MFI Name	*Country*	*Year est.*	*Type*	*Number of Borrowers*	*Average Loan ($)*
ABA	Egypt	1983	Non-Profit (NGO)	40,041	224
ACEP	Senegal	1987	Cooperative/Credit Union	17,641	1,709
ACF	Kazakhstan	1997	Non-Bank Financial Inst.	452	4,336
ACLEDA	Cambodia	1993	Bank	122,173	539
ACODEP	Nicaragua	1989	Non-Profit (NGO)	31,314	328
ACSI	Ethiopia	1995	Non-Bank Financial Inst.	351,163	104
ACTUAR Famiempresas – Antioquia	Colombia	1983	Non-Profit (NGO)	8,913	609
ACTUAR – Tolima	Colombia	1986	Non-Profit (NGO)	4,083	459
ADEFI	Madagascar	1995	Cooperative/Credit Union	4,960	797
ADOPEM	Dominican Republic	1982	Non-Profit (NGO)	39,999	241
ADRI	Costa Rica	1986	Non-Profit (NGO)	592	6,244
AgroCapital	Bolivia	1992	Non-Profit (NGO)	4,826	2,821
Al Amana	Morocco	1997	Non-Profit (NGO)	160,610	308
Al Majmoua	Lebanon	1997	Non-Profit (NGO)	6,027	855
AMC	Jordan	1999	Non-Profit (NGO)	1,269	2,523
AMRET	Cambodia	1991	Non-Bank Financial Inst.	105,283	77
ASA	Bangladesh	1979	Non-Profit (NGO)	2,772,719	73
ASEI	El Salvador	1991	Non-Profit (NGO)	5,225	129
Banco Los Andes ProCredit	Bolivia	1995	Bank	64,698	1,759
Banco Solidario	Ecuador	1995	Bank	135,855	1,303
BASTOB	Bangladesh	1997	Non-Profit (NGO)	5,394	70
BESA	Albania	1998	Non-Profit (NGO)	5,442	3,409
BRAC	Bangladesh	1972	Non-Profit (NGO)	3,993,525	61
BTFF	Kyrgyzstan	2000	Non-Profit (NGO)	2,068	1,701
BURO Tangail	Bangladesh	1990	Non-Profit (NGO)	155,819	81
CARD NGO	Philippines	1986	Non-Profit (NGO)	73,065	93
CEP	Vietnam	1991	Non-Profit (NGO)	49,330	135
CERUDEB	Uganda	1983	Bank	52,682	847
CMAC – Arequipa	Peru	1986	Non-Bank Financial Inst.	84,869	1,376
CMAC – Maynas	Peru	1987	Non-Bank Financial Inst.	27,158	712
CMAC - Sullana	Peru	1986	Non-Bank Financial Inst.	55,960	1,084
COAC Accion Rural	Ecuador	2000	Cooperative/Credit Union	3,295	824
COAC Jardin Azuayo	Ecuador	1996	Cooperative/Credit Union	17,775	1,376
COAC La Merced	Ecuador	1964	Cooperative/Credit Union	1,098	2,668
COAC Maquita Cushunchic	Ecuador	1998	Cooperative/Credit Union	1,989	1,478
COAC Mushuc Runa	Ecuador	1997	Cooperative/Credit Union	12,300	1,416
COAC San Jose	Ecuador	1964	Cooperative/Credit Union	6,398	1,196
Compartamos	Mexico	1990	Non-Bank Financial Inst.	309,637	326
Constanta	Georgia	1997	Non-Profit (NGO)	18,657	264
COVELO	Honduras	1991	Non-Profit (NGO)	13,227	63
CRAN	Ghana	1994	Non-Profit (NGO)	5,246	46
CREDIMUJER	Costa Rica	1984	Non-Profit (NGO)	1,635	388
CRG	Guinea	1989	Non-Bank Financial Inst.	127,573	44
Crystal Fund	Georgia	1998	Non-Profit (NGO)	1,431	584
DBACD	Egypt	1995	Non-Profit (NGO)	32,699	193
D-miro	Ecuador	1997	Non-Profit (NGO)	9,295	484
EBS	Kenya	1984	Bank	59,306	676
EDPYME Confianza	Peru	1994	Non-Bank Financial Inst.	17,029	808
EDPYME Crear Arequipa	Peru	1992	Non-Bank Financial Inst.	10,134	1,044
EDPYME Crear - Tacna	Peru	1992	Non-Bank Financial Inst.	6,296	994
EDPYME EDYFICAR	Peru	1997	Non-Bank Financial Inst.	45,136	924
EDPYME PROEMPRESA	Peru	1998	Non-Bank Financial Inst.	10,527	949
EKI	Bosnia and Herzegovina	1996	Non-Bank Financial Inst.	18,815	1,377
Enda	Tunisia	1990	Non-Profit (NGO)	15,946	248
FADES	Bolivia	1986	Non-Profit (NGO)	20,897	877
FAMA	Nicaragua	1991	Non-Profit (NGO)	31,672	517
Faulu - UGA	Uganda	1995	Non-Bank Financial Inst.	15,213	226
FIE	Bolivia	1985	Non-Bank Financial Inst.	41,888	1,295

Finamerica	Colombia	1993	Non-Bank Financial Inst.	24,404	1,140
Finca – PER	Peru	1993	Non-Profit (NGO)	6,666	145
FINCOMUN	Mexico	1994	Non-Bank Financial Inst.	25,300	597
FINDESA	Nicaragua	1993	Non-Bank Financial Inst.	22,130	1,507
FMM – Popayan	Colombia	1989	Non-Profit (NGO)	75,188	396
FONDESA	Dominican Republic	1983	Non-Profit (NGO)	2,705	1,183
Fonkoze	Haiti	1994	Non-Profit (NGO)	5,297	194
FOR A	Russia	1993	Non-Profit (NGO)	15,885	962
Fundacion LEON 2000	Nicaragua	1994	Non-Profit (NGO)	6,622	499
HKL	Cambodia	1996	Non-Bank Financial Inst.	6,620	375
IMON	Tajikistan	1999	Non-Bank Financial Inst.	6,083	297
KAFC	Kyrgyzstan	1996	Non-Bank Financial Inst.	32,855	1,122
Kafo	Mali	1987	Cooperative/Credit Union	93,839	245
KAMURJ	Armenia	1998	Non-Profit (NGO)	6,536	317
KLF	Kazakhstan	1996	Non-Bank Financial Inst.	11,449	538
K-rep	Kenya	2000	Bank	55,441	492
KSF	Ghana	1996	Non-Profit (NGO)	6,517	57
LAPO	Nigeria	1987	Non-Profit (NGO)	29,812	63
MFW	Jordan	1994	Non-Bank Financial Inst.	10,034	363
MiBanco	Peru	1992	Bank	113,505	1,134
MI-BOSBO	Bosnia and Herzegovina	1996	Non-Bank Financial Inst.	9,206	1,018
MIKRA	Bosnia and Herzegovina	1998	Non-Bank Financial Inst.	7,940	901
Mikrofin	Bosnia and Herzegovina	1997	Non-Bank Financial Inst.	14,033	2,057
Mikrofond	Bulgaria	1999	Non-Bank Financial Inst.	1,175	2,967
NovoBanco	Mozambique	2000	Bank	11,350	608
NWTF	Philippines	1984	Non-Profit (NGO)	54,863	94
ODEF	Honduras	1992	Non-Profit (NGO)	13,310	446
PADME	Benin	1993	Non-Profit (NGO)	37,661	1,171
Partner	Bosnia and Herzegovina	1997	Non-Bank Financial Inst.	19,834	1,485
PRASAC	Cambodia	1995	Non-Bank Financial Inst.	73,002	121
PRIDE – TZA	Tanzania	1994	Non-Profit (NGO)	63,359	175
PRIZMA	Bosnia and Herzegovina	1997	Non-Bank Financial Inst.	12,603	733
PRODEM	Bolivia	1986	Non-Bank Financial Inst.	55,876	1,550
ProMujer - Bolivia	Bolivia	1990	Non-Profit (NGO)	48,496	147
ProMujer – Nicaragua	Nicaragua	1996	Non-Profit (NGO)	14,167	136
ProMujer – Peru	Peru	1999	Non-Profit (NGO)	22,871	119
PSHM	Albania	1999	Non-Bank Financial Inst.	4,295	2,188
SEAP	Nigeria	1998	Non-Profit (NGO)	3,960	59
SEF – TZ	Tanzania	2000	Non-Profit (NGO)	1,632	128
SEF-ZAF	South Africa	1991	Non-Profit (NGO)	22,110	142
SKS	India	1997	Non-Bank Financial Inst.	24,799	109
SMEP	Kenya	1975	Non-Bank Financial Inst.	20,599	235
SOCREMO	Mozambique	1998	Bank	5,861	711
SPBD	Samoa	2000	Non-Profit (NGO)	2,993	156
Sunrise	Bosnia and Herzegovina	1997	Non-Bank Financial Inst.	10,294	1,246
TSKI	Philippines	1986	Non-Profit (NGO)	122,832	60
VF	Benin	1998	Non-Profit (NGO)	12,508	669
Vision de Finanzas	Paraguay	1992	Non-Bank Financial Inst.	41,360	740
WAGES	Togo	1994	Non-Profit (NGO)	20,245	187
WWB - Cali	Colombia	1982	Non-Profit (NGO)	92,533	713
WWB - Medellín	Colombia	1985	Non-Profit (NGO)	21,468	499
XacBank	Mongolia	1998	Bank	31,962	504
Zakoura	Morocco	1995	Non-Profit (NGO)	174,480	144
Zambuko Trust	Zimbabwe	1992	Non-Bank Financial Inst.	10,252	49

Note: There are 112 total MFI's, of which 10 are banks, 9 are cooperative/credit unions, 39 are non-bank financial institutions, and 54 are non-profits (NGO's). These come from 48 countries, of which 2 are in South Asia, 5 are in East Asia, 9 are in Eastern Europe or Central Asia, 5 are in the Middle East or North Africa, 15 are in sub-Saharan Africa, and 12 are in Latin America. Number of borrowers and average loan size are taken from the most recent year in which they are available, up to 2004.

Table 2 – Variable Descriptions

Variable	*Description*	*Obs.*	*Mean*	*Std. Dev.*	*% between*	*Median*	*Min*	*Max*
Operational **self-sufficiency**	Financial revenue / (Financial expense + Loan loss provision expense + Operating expense)	735	122%	90.4%	48.5%	115%	0.00%	1850%
Sufficiency index	Financial revenue / (Financial expense + Loan loss provision expense + Operating expense + Financial Revenue)	735	52.5%	10.2%	53.5%	53.6%	0.00%	94.9%
Sustainable	Equals 1 if *self-sufficiency* ≥ 100%, 0 if not	735	0.741	0.438	42.5%	1	0	1
Write-off ratio	Annual value of loans written off / annual average gross loan portfolio	555	1.63%	3.54%	36.4%	0.82%	-0.84%	55.2%
At-risk ratio	Value of loans at-risk > 30 days / annual average gross loan portfolio	680	4.20%	6.36%	60.7%	2.60%	0.00%	64.3%
Cost per borrower	Operating expense / annual average number of active borrowers ($)	604	146	188	76.6%	96.7	0	2690
Borrowers	Number of active borrowers	713	63,400	327,000	92.5%	10,000	19	3,990,000
MFI growth	Annual percent growth in the number of active borrowers	587	55.0%	155%	28.0%	27.2%	-78.8%	2050%
Age	Age of the MFI (years)	767	9.25	6.64	90.1%	8	0	40
Income	Real GDP per capita (year-2000 $)	766	1310	1100	99.4%	1080	95.4	5970
Growth	Annual growth in real GDP per capita	766	2.51%	3.59%	45.0%	2.43%	-15.1%	31.4%
Manufacturing	Manufacturing value added (% of GDP)	750	15.1%	4.47%	93.4%	15.4%	2.84%	37.2%
Workforce participation	Labor force / Population aged 15-64	767	73.0%	8.14%	97.9%	73.4%	48.3%	94.4%
FDI	Net foreign direct investment inflows (% of GDP)	767	3.48%	2.62%	61.3%	2.95%	-0.67%	13.1%
Inflation	Annual consumer price inflation	700	8.74%	13.5%	46.0%	5.59%	-8.24%	140%

Note: Variables above (below) the third double line are MFI-level (country-level) variables. "Std. Dev." stands for standard deviation. The "% between" column reports the percent of the sample variance explained by between-MFI variation.

Table 3 – Baseline (Pooled) Results

Variable	*Self-sufficiency*	*Sufficiency index*	*Write-off ratio*	*At-risk ratio*	*Cost per borrower*	*MFI growth*
$Growth_t$	1.98[a,a]	0.411[a,a]	-0.0544[b,b]	-0.190[b,a]	0.442	0.824
	(0.512)	(0.116)	(0.0293)	(0.0913)	(1.69)	(0.801)
$Workforce_t$	-0.550	-0.112[-,c]	0.0140	0.0647	0.505	-0.979[b,b]
	(0.379)	(0.0779)	(0.0158)	(0.0466)	(1.14)	(0.426)
$Manufacturing_t$	-0.00706	0.00717	0.0428	0.0372	-1.89	-1.74[b,-]
	(0.775)	(0.164)	(0.0365)	(0.0795)	(1.50)	(0.644)
FDI_t	-0.297	-0.0626	0.0259	0.0665	3.09	-2.27[b,b]
	(0.627)	(0.136)	(0.0399)	(0.0951)	(3.34)	(0.764)
$Inflation_t$	-0.170	-0.0312	-0.00451[-,b]	-0.00075	-0.00216	0.221
	(0.185)	(0.0447)	(0.00585)	(0.0301)	(0.569)	(0.793)
Age_t	3.15[a,a]	0.661[a,b]	0.0901	0.0729	-3.85[c,-]	-3.47[a,b]
	(1.43)	(0.295)	(0.0603)	(0.123)	(3.11)	(1.49)
Age_t^2	-0.0832[b,a]	-0.0174[b,c]	-0.00225	0.000607	0.0775	0.0798[b,-]
	(0.0466)	(0.00949)	(0.00184)	(0.00404)	(0.101)	(0.0516)
$Ln(income_{t-1})$	-1.88	-0.323	0.0620	0.00388	36.6[a,a]	-1.97
	(4.34)	(0.911)	(0.196)	(0.552)	(9.76)	(3.53)
Coop/CU	22.7	4.66	-0.665	0.234	-94.9[b,a]	-12.2
	(21.9)	(3.78)	(0.416)	(1.74)	(39.6)	(17.7)
Non-bank	-5.13	-1.12	-0.386	0.814	-23.6	1.84
	(6.15)	(1.34)	(0.401)	(1.12)	(31.2)	(9.61)
Non-profit	-4.57	-0.946	-0.540	-0.198	-86.9[a,a]	-1.22
	(5.87)	(1.27)	(0.319)	(1.19)	(28.3)	(9.62)
Constant	150[a,b]	60.0[a,a]	-1.40	-3.20	-87.7	173[a,a]
	(50.4)	(10.5)	(1.95)	(6.17)	(132)	(53.4)
Obs.	654	654	491	601	533	518

Note: Each column reports coefficient estimates from a median regression of the column variable on the row variables. MFI-clustered bootstrapped standard errors are in parentheses (see section 4). Coefficients significantly different from zero in the median regression and the (unreported) robust regression, respectively, are marked by superscript letters. Significance levels 1%, 5%, and 10% are denoted by ‘a’, ‘b’, and ‘c’, respectively.

Table 4 – Within (Fixed Effect) Results

Variable	*Self-sufficiency*	*Sufficiency index*	*Write-off ratio*	*At-risk ratio*	*Cost per borrower*	*MFI growth*
$Growth_t$	1.07[b,a]	0.275[a,a]	-0.00142	-0.0184	-0.906[c]	-0.260
	(0.507)	(0.105)	(0.0137)	(0.0367)	(0.542)	(1.12)
$Workforce_t$	-2.30[c,b]	-0.547[c,b]	-0.000220	-0.0560	1.54	4.90[b,b]
	(1.20)	(0.246)	(0.0260)	(0.0861)	(1.94)	(2.46)
$Manufacturing_t$	0.448	0.128	0.0307	-0.0223	-3.40[c]	-1.06
	(1.08)	(0.224)	(0.0828)	(0.104)	(2.25)	(2.14)
FDI_t	0.736	0.106	-0.0199	0.0388	-1.91	-1.29
	(0.683)	(0.144)	(0.0320)	(0.0700)	(1.50)	(1.28)
$Inflation_t$	0.0301	0.0138	-0.000420	-0.0122	-0.471	0.600
	(0.183)	(0.0398)	(0.00410)	(0.0175)	(0.462)	(0.770)
Age_t	6.45[a,a]	1.70[a,a]	0.0388[-,c]	0.0222	-1.17	-9.86[a,a]
	(2.03)	(0.392)	(0.0438)	(0.108)	(2.91)	(3.05)
Age_t^2	-0.131[b,a]	-0.0382[b,c]	-0.00210[-,c]	-0.00121	0.0306	0.214[a,b]
	(0.0731)	(0.0142)	(0.00172)	(0.00514)	(0.115)	(0.118)
Obs.	654	654	491	601	533	518

Note: Each column reports coefficient estimates from a median regression of the column variable on the row variables, plus a constant and MFI dummies. MFI-clustered bootstrapped standard errors are in parentheses (see section 4). Coefficients significantly different from zero in the median regression and the (unreported) robust regression, respectively, are marked by superscript letters. Significance levels 1%, 5%, and 10% are denoted by ‘a’, ‘b’, and ‘c’, respectively.

Table 5 – Between Results

Variable	*Self-sufficiency*	*Sufficiency index*	*Write-off ratio*	*At-risk ratio*	*Cost per borrower*	*MFI growth*
$Growth_t$	2.17	0.463	-0.171[b,a]	-0.254[c,b]	0.384	2.73[-,c]
	(1.49)	(0.309)	(0.0696)	(0.210)	(5.52)	(1.34)
$Workforce_t$	-0.00249	-0.00882	0.0237	0.108	0.972	-1.28[-,b]
	(0.549)	(0.114)	(0.0227)	(0.0618)	(1.46)	(0.662)
$Manufacturing_t$	0.360	0.0573	0.103	0.151	-2.06	-1.77[c,c]
	(1.10)	(0.236)	(0.0528)	(0.157)	(2.66)	(1.04)
FDI_t	-0.551	-0.104	0.0750[-,c]	-0.146	3.01	-1.19[c,b]
	(1.24)	(0.269)	(0.0633)	(0.177)	(5.44)	(0.946)
$Inflation_t$	-0.263	-0.0613	-0.0158	0.00618	0.851	1.40
	(0.480)	(0.120)	(0.0241)	(0.111)	(1.28)	(1.13)
Age_t	1.88[-,c]	0.414[-,b]	0.0596	-0.119	-4.17	0.568
	(1.93)	(0.388)	(0.0883)	(0.235)	(4.93)	(1.57)
Age_t^2	-0.0430	-0.00930[-,c]	-0.00165	0.00727	0.0918	-0.0284
	(0.0716)	(0.0140)	(0.00269)	(0.00813)	(0.158)	(0.0489)
$Ln(income_{t-1})$	0.562	0.168	-0.132	0.0248	39.0[a,-]	-2.80
	(5.68)	(1.20)	(0.253)	(0.703)	(14.7)	(4.25)
Coop/CU	6.36	1.32	-0.175	-0.242	-63.4[-,b]	-10.5
	(23.2)	(4.01)	(0.568)	(2.45)	(55.5)	(21.7)
Non-bank	-2.90	-0.592	-0.440	1.08	-23.9	0.0706
	(9.45)	(2.09)	(0.494)	(1.49)	(43.2)	(14.2)
Non-profit	-5.99	-1.37	-0.223	-0.171	-79.5[c,a]	-11.6
	(8.67)	(1.87)	(0.385)	(1.57)	(39.2)	(14.5)
Constant	98.3[c,c]	50.4[a,a]	-1.38	-6.33	-146	164[b,b]
	(69.1)	(14.5)	(2.57)	(7.72)	(177)	(79.9)
Obs.	654	654	491	601	533	518

Note: Each column reports coefficient estimates from a median regression of the within-MFI median of the column variable on the within-MFI medians of the row variables. The medians are taken only over observations included in the regression. MFI-clustered bootstrapped standard errors are in parentheses (see section 4). Coefficients significantly different from zero in the median regression and the (unreported) robust regression (which uses within-MFI means instead of medians), respectively, are marked by superscript letters. Significance levels 1%, 5%, and 10% are denoted by 'a', 'b', and 'c', respectively.

Table 6 – Breaking Even or Padding Profits?

Variable	*Self-sufficiency*	*Sufficiency index*	*Self-sufficiency*	*Sufficiency index*	*Sustain-able*
$Growth_t$	1.56[a] (0.559)	0.382[a] (0.139)			0.108[a] (0.0415)
$Growth_t$*Bank			-0.216 (1.15)	-0.0414 (0.259)	
$Growth_t$*Coop/CU			2.40 (3.36)	0.538 (0.624)	
$Growth_t$*Non-bank			0.556 (0.892)	0.119 (0.204)	
$Growth_t$*Non-profit			2.85[a,a] (0.717)	0.614[a,a] (0.158)	
$Workforce_t$	-0.0610 (0.654)	0.0175 (0.177)	-0.574 (0.364)	-0.123[-,c] (0.0756)	-0.00273 (0.0274)
$Manufacturing_t$	0.0742 (0.743)	0.0725 (0.194)	0.179 (0.757)	0.0443 (0.159)	0.0154 (0.0492)
FDI_t	0.472 (0.774)	0.137 (0.206)	-0.319 (0.634)	-0.0728 (0.136)	0.0318 (0.0568)
$Inflation_t$	-0.104 (0.215)	-0.0419 (0.0649)	-0.143 (0.180)	-0.0292 (0.0441)	-0.0105 (0.0104)
Age_t	4.76[a] (1.64)	1.25[a] (0.466)	2.90[a,a] (1.34)	0.600[a,b] (0.278)	0.259[a] (0.0848)
Age_t^2	-0.118[a] (0.0553)	-0.0312[a] (0.0158)	-0.0772[b,a] (0.0441)	-0.0159[b,b] (0.00904)	-0.00655[c] (0.00325)
$Ln(income_{t-1})$	2.74 (5.16)	0.882 (1.33)	-3.10 (4.39)	-0.673 (0.925)	0.139 (0.306)
Coop/CU	6.05 (18.1)	1.86 (4.10)	16.0 (21.2)	3.36 (3.64)	-0.146 (1.74)
Non-bank	-14.4[c] (6.73)	-3.66[c] (1.73)	-6.28 (6.76)	-1.19 (1.48)	-1.45[b] (1.45)
Non-profit	-18.0[b] (7.45)	-4.63[b] (1.97)	-10.8[-,b] (6.39)	-2.25[-,c] (1.43)	-1.29[b] (1.41)
Constant	58.6 (78.5)	34.5 (21.4)	164[a,b] (49.1)	63.8[a,a] (10.4)	-0.505 (3.76)
Obs.	654	654	654	654	654

Note: The first two columns report estimates from 25th-percentile quantile regressions of the column variables on the baseline set of independent variables. The third and fourth columns report estimates from median regressions with interactions between macroeconomic growth and institutional type. The fifth column reports estimates from a logit specification with dependent variable 'sustainable' and independent variables the same as the baseline specification. MFI-clustered bootstrapped standard errors are in parentheses (see section 4). Coefficients significantly different from zero in the median regression and the robust regression (unreported, applies only to columns 3 and 4), respectively, are marked by superscript letters. Significance levels 1%, 5%, and 10% are denoted by 'a', 'b', and 'c', respectively.