Where does Microfinance Flourish? Microfinance Institution Performance in Macroeconomic Context

Christian Ahlin
Jocelyn Lin
Michael Maio*

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Abstract

Microfinance institutions ("MFI"s) are often evaluated for purposes of emulation, replication, and funding. However, one potential ingredient of their success that has not been sufficiently explored is the country-level context, in particular macroeconomic and macro-institutional features. Understanding these linkages can make evaluation more accurate and, further, can help to locate microfinance in the broader picture of economic development. We merge 4-11 years of data on each of 329 MFIs from 70 countries with country-level macroeconomic and institutional data. We find that growth has a significant and beneficial impact on MFI performance, in terms of financial sustainability, default rates, and loan-size growth. Financial depth is associated with lower operating costs, lower default rates, and lower interest rates, suggesting that competition benefits micro-borrowers. However, labor force participation rates and the share of manufacturing in the economy appear to affect MFIs adversely, particularly their rate of growth in outreach. We also document relationships between inequality, remittances, FDI, and the service sector, respectively, and MFI performance. Several measures of institutional quality are found to be associated with higher MFI operating costs and slower loan-size growth, while an index of credit information availability is strongly associated with lower MFI operating costs. Overall, the results suggest that the country context is an important determinant of MFI performance, though not moreso than MFI-specific factors. MFI performance should be handicapped for the environment in which it was achieved.

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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, vary across MFIs. Some fail and cease to be; others grow to reach millions of borrowers, covering costs in the process. In this context, evaluation of MFIs is a critical exercise, and indeed, a growing literature seeks 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 start new MFIs or advise existing ones.

However, in the attempt to discover determinants of micro-financial success, scant attention has been paid to factors that are outside the control of an MFI. In particular, little is known about what portion of an MFI's success is determined by the macroeconomic structure and outcomes of the country where it is located.Is the relationship between an MFI and its host economy best characterized by interdependence, rivalry, or a dualistic independence? Is it harder to break even in a poor or low-growth economy, so that a longer period of start-up subsidization is reasonable? Does the broader institutional environment matter for MFI performance, above and beyond any impact it has on growth? Here is where this paper's focus lies.

These questions are important for several reasons.For one, MFIs are often assessed and compared for purposes of evaluation, funding, and replication. But any comparison that does not take into account the macro-economic and macro-institutional environment, if these are found to robustly and non-negligibly predict MFI performance, is incomplete.Accounting for context allows a clearer picture of institutional success and failure to emerge.

[1] See Bellman (2006).

Consider two well-known, much-studied, and widely imitated MFIs: 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 financial 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 more vibrant macroeconomic context? Questions like these are rarely asked, let alone answered, in the literature.

Understanding the macroeconomic impact on MFIs may also help a growing number of investment funds that target their dollars toward MFIs, sometimes with the dual goal of earning returns for investors and achieving social impact.[4] Since they value financial returns, these funds cannot afford to ignore major determinants of MFI financial success – though for dual-purpose investors the return implications would have to be weighed against social impact considerations.

Beyond sharpening MFI evaluation, answers to the question of where MFIs tend to flourish can provide indirect evidence on how micro-credit works and how it fits into the process of development.[5] For example, is it rivalrous or complementary with a development path based on industrialization, manufacturing, and foreign trade and investment? Does it work best in the context of well-developed institutions, or dogood institutionstend to squeeze it out, perhaps prematurely? How do MFIs perform in countries with greater financial depth? All of these questions are addressed by the results in this study.

It should be emphasized that impacts of key macroeconomic or macro-institutional vari-

[2]This point is emphasized in a provocative way by Henley (forthcoming), who argues that BRI and other Indonesian micro-banks owe most of their recent success to the Indonesian macroeconomic boom.In essence, the argument goes that regarding specific policies, contracts, or institutional arrangements, the picture is much more one of continuity than of change, especially compared to the rapid macroeconomic acceleration.

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

[4]See Silverman (2006), and Krauss and Walter (2008).

[5]Ahlin and Jiang (2008) explore the latter question theoretically.

ables are not often clear a priori. Take per-capita income growth rates. High growth can increase demand and createnew niches for micro-enterprises to fill as well as profitable expansion opportunities for existing ventures.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, it is easy to argue that microfinance depends on a poor economy to survive, since MFIs 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 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 MFIs. 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]

As an intermediate option, it may be that most micro-credit clients operate in small, segmented local markets that are not very sensitive to macroeconomic conditions.[7] Inshort, the relationship between growth and MFI performance does not at all seem pinned down by a priori considerations, raising the need for empirical evidence.

Consider also an institutional outcome such as corruption. It may be that high corruption taxes micro-enterprise operations and creates barriers to their expansion, reducing demand for and quality of micro-loans. On the other hand, corruption may make it easier for micro-enterprises to avoid regulations, or may push would-be entrepreneurs out of the formal economy and the formal credit market and into informal micro-enterprise with demand for

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

[7]For example, work of Patel and Srivastava (1996) suggests that the official and unofficial economy in India move relatively independently of each other.

micro-loans.

This paper addresses empirically the question of MFI dependence on the macroeconomic context. Data on MFIs come from the Mix Market. We construct a panel dataset that includes only MFIs ranked as having relatively high data quality and with at least four years of data on a key variable. This leaves us with 1912 observations on 329 MFIs from 70 countries (in the largest regression). We analyze two types of MFI performance variables: operational self-sufficiency (revenues/costs) and growth. Operational self-sufficiency is decomposed into three components: interest markup (average interest rate minus average cost of capital), losses due to default, and operating costs. These decompositions allow us in some cases to identify the channel through which a given variable affects operational self-sufficiency. Growth in dollars loaned is decomposed into two components: extensive margin growth (in number of borrowers) and intensive margin growth (in average loan size).

We merge these data with macroeconomic variables taken from the World Bank's database of World Development Indicators. The four key indicators of macroeconomic performance and structure are real per capita GDP growth rate, labor force participation rate, manufacturing's share in GDP, and private credit as a fraction of GDP. A number of auxiliary variables that reflect macroeconomic outcomes or structure, such as inflation and remittances as a share of GDP are also taken from the WDI. Institutional measures and outcomes, some of which are focused on credit markets, are also included, from the Kaufmann et al. (2007) governance indicators and the Doing Business indicators of the World Bank.

MFI performance indicators are then each predicted in a pooled linear regression model by the four key macroeconomic variables, as well as indicator variables for MFI-institution type, MFI-age and asset variables to capture MFI age and size effects, and the previous year's GDP per capita level. We also run a specification that isolates within-MFI and between-MFI variation in the key variables. Specifications are also run that add one-by-one the other macroeconomic and institutional variables. Given the nature of the data, we focus on estimation approaches that are robust to outliers, heteroskedasticity, and within-MFI error

term correlation.

Several results emerge from the baseline specification. First, macroeconomic growth is a robust and significant predictor of higher MFI operational self-sufficiency, which auxiliary regressions suggest is due in part to its negative relationship with default rates and operating costs. The magnitudes are somewhat large – one percentage point of growth translates into one and a half 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 17% of the interquartile difference in the MFI operational self-sufficiency variable. The effect of growth on operational self-sufficiency is robust across a number of specifications, and the same basic result obtains using only within-MFI or only between-MFI variation. Further, macroeconomic growth is strongly related to MFI intensive growth: average loan sizes increase 3/4 percentage points with every percentage point of growth. Overall, the evidence suggests that while the macroeconomy is not an MFI's destiny, its effect is significant and should not be ignored.

Second, while the size and development of the country's financial sector, private credit, does not significantly affect an MFI's operational self-sufficiency, it is strongly associated with lower default, lower operating costs, and lower interest markups (and interest rates). This is consistent with the idea that financial competition spurs (or selects for) more effective and efficient intermediation, with cost savings passed on to the borrowers. The result is robust to controlling for a number of credit market institution variables directly, suggesting the effect is operating via competition.

Third, some evidence emerges for a rivalrous relationship between microfinance-led development and growth based on industrialization, manufacturing, and wage work. In particular, workforce participation and manufacturing show up as negative predictors of extensive MFI growth, in number of borrowers. Workforce participation is also a negative predictor of MFI operational self-sufficiency. Evidently, microfinance faces a more difficult expansion path in countries that are following more industrial, wage-labor based paths of development.

Among the other macro-economic determinants, remittances emerge as a positive predictor of MFI operational self-sufficiency and foreign direct investment predicts faster growth in MFI loan sizes. These seem to be examples of synergy rather than rivalry between microfinance and wage-earning opportunities; perhaps the difference is due to borrowers' perception of these foreign-based opportunities as relatively transitory in nature as compared with the more domestic opportunities reflected in the variables of the previous paragraph.

The institutional variables do not typically add much predictive power to the baseline set of control variables.[8] There are some exceptions. A number of variables predict slower growth in MFI loan size, including regulatory quality, a rigidity of employment index, and indices capturing credit rights and credit information availability, respectively. Regulatory quality, government effectiveness, and rule of law all predict higher operating costs driven by smaller loan sizes rather than higher costs per borrower. One interpretation (among several) is that well-meaning regulations that are enforced can actually stifle informal enterprise, leading micro-borrowers to start and stay smaller.[9]

More positively, the credit information index is associated with a significant drop in operating costs per dollar loaned, and this appears to be mostly passed on to borrowers via lower interest markups. This result is consistent with MFIs economizing on screening and monitoring when good information systems are in place, and is suggestive of the importance of credit information institutions.

Overall, the results give evidence that MFI performance is non-negligibly driven by the surrounding macroeconomic and institutional environment. Consequently, an MFI should be judged in context.

The paper is organized as follows. Section 2 describes the data and variables. Section 3 describes estimation methodology. Section 4.1 reports the baseline (pooled) results, as well

[8] Nor do they much affect the estimated relationship between macroeconomic growth and MFI operational self-sufficiency; see section 5.2.

[9] A more favorable interpretation of weaker loan-size growth that makes most sense with the credit rights and information indices is that good credit institutions ease the path of graduation to the formal credit sector and away from micro-finance institutions (and hence out of the data).

as the results isolating within-MFI and between-MFI variation. Sections 4.2 and 4.3 present the results on additional macroeconomic variables and institutional variables, respectively. Section 5 discusses causality and performs some additional robustness tests. Section 6 discusses the related literature and the specific contribution of this paper. Section 7 concludes.

2 Data

The dataset is assembled from several sources. Microfinance institution ("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 MFIs and donors, as well as to improve reporting standards in the microfinance industry. Its publicly available website currently contains information on 1229 MFIs, 101 investors (e.g. Calvert Foundation), and 167 partners (which tend to be umbrella organizations that facilitate multiple MFIs' operations).[10]

Our dataset contains only MFIs that meet certain criteria. First, Mix Market puts the reporting MFIs into five categories – one- through five-diamond – based on amount and reliability of information reported. We collect data only on four- and five-diamond institutions. Institutions with data rated four-diamond and higher have financial statements audited by a third-party accounting firm or similar; thus this seems a reasonable cutoff for reliable and comparable data.[11] Second, the dataset includes only institutions that were founded no later than 2004 and that have four or more years of data on the key operational self-sufficiency variable (described below), during the time of our data collection, June/July 2008. Further, the four years of data must correspond to a calendar-year fiscal year, for comparability to the annual country-level data discussed below. Third, MFIs reporting that the percentage of their operations comprised by microfinance is 80% or below

[10] Descriptive information here and below is taken from the mixmarket.org website during June/July 2008.

[11] Audit reports often explicitly state that they comply with international accounting standards, raising our confidence that the data are comparable across banks. However, we also use several econometric approaches that allow for MFI-specific differences in reporting standards: clustering standard errors at the MFI-level and using only within-MFI variation. See section 3.

are excluded. Fourth, only MFIs that report one of the following institutional types are included: bank, cooperative/credit union, non-bank financial institution, and non-profit (NGO). This excludes the two smallest categories: rural banks and "other", the former because it does not have enough observations (only four rural banks, all in the Philippines, meet the preceding criteria) and the latter because it is too vague.[12] Finally, MFIs from Afghanistan, East Timor, Kosovo, Palestine, and Serbia and Montenegro are excluded for lack of available country data.

In all, we have 329 MFIs with sufficient data, from 70 countries, each with 4-11 years of data (on at least the key variable) from the years 1996-2006. Many are relatively small, though some large and well-known institutions are included, e.g. ASA, BRAC, and the Grameen Bank of Bangladesh. The breakdown by institutional type is as follows: 42 co-operative/credit unions, 27 banks, 125 non-bank financial institutions, and 135 non-profit NGOs. The breakdown by region is: 12 from South Asia,[13] 28 from East Asia and the Pacific, 67 from Eastern Europe or Central Asia, 18 from the Middle East or North Africa, 72 from sub-Saharan Africa, and 132 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 several performance indicators from these MFI data, summarized in Table 1a. The focal indicator is called operational *self-sufficiency*. It is the ratio of annual financial revenue to annual total expense (which equals 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.

[12]Institutional type and percentage of operations devoted to micro-finance are reported only as current variables rather than year-by-year.

[13]This number would be higher except for the non-calendar year reporting of many MFIs from South Asia, especially India.

The ability to cover costs thus depends on doing well in some combination of three categories: financial revenue versus costs (ignoring default); default costs; and operating costs. Informative measures exist for each of these three categories.

Our main indicator of financial revenue versus costs is the *interest markup*. This equals the difference between its two components, the *average interest rate* (financial revenue per dollar loaned) and the *average cost of capital* (financial expenses per dollar loaned).[14]

Two indicators are used to measure default costs. The *loan loss expense rate* is the amount provisioned for bad loans as a fraction of the average loan portfolio over the year.[15] This is supplemented by a more mild measure, the *PAR-30*, which gives the fraction of the loan portfolio that has been considered at risk (e.g. behind schedule with payments) for more than a month. Some of these loans are eventually repaid, but this is an early indicator of default problems and one perhaps more objectively measured (in terms of timing, at least) than the loan loss expense rate.

We measure operating costs mainly by the operating *cost per dollar loaned*, which equals annual operating costs divided by the year-average size of the loan portfolio. This can be decomposed as the product of the operating *cost per borrower* and (the reciprocal of) the *average loan* size;[16] in other words, lower costs per dollar loaned can come from lower costs per borrower or larger average loans. This is a potentially interesting decomposition if costs per borrower are largely fixed, i.e. do not vary much with loan size, as is often argued.

A second category of outcome variable focuses on growth of the MFI. Perhaps the simplest measure would be portfolio growth, annual growth in total dollars loaned. We focus instead

[14]These are not directly reported, but are calculated from the reported financial revenue per asset and financial expense per asset ratios. These ratios are renormalized, multiplying by the year-average asset-holdings and dividing by the year-average loan portfolio. (Year-average amounts are calculated averaging the previous year's and current year's reported values, since these values apply to the final day of the year.)

[15]This too is reported with average asset-holdings in the denominator; we renormalize by average size of loan portfolio.

[16]The former is reported directly. The latter is calculated as the operating cost per borrower divided by the operating cost per dollar loaned, or alternatively as the year-average loan portfolio divided by the year-average number of active borrowers. In the vast majority of cases, both approaches yield non-missing values. When they do, they are virtually identical, up to rounding error; one predicts the other with an $R^2 = 1.0000$. In a handful of cases, one of the two approaches yields a missing value but can be imputed from the other, and is.

on a decomposition of this MFI growth variable into growth on the extensive and intensive margins. Note that the loan portfolio is the product of the number of borrowers and the average loan size. It follows that portfolio growth is composed of *borrower growth*, i.e. annual growth in number of borrowers (extensive margin), and *loan-size growth*, i.e. annual growth in the average loan size (intensive margin).[17]

Finally, as control variables *age* is calculated using data on the year the MFI was founded; and *assets* and the (current) institutional type are also collected as reported.

The MFI-level dataset is merged with country-level data from a number of sources; see Table 1b for a description of key variables. From the World Development Indicators (WDI) come data on real GDP per capita levels and growth rates. We focus on growth as arguably the most informative single indicator of progress in economic development. It can be considered an approximate summary statistic for the various institutional, technological, and factor-accumulation related ingredients of economic development. Three other baseline macroeconomic variables are drawn from the WDI, each reflecting an aspect of the macroeconomic environment that is potentially important to MFIs. The *workforce participation* rate is the labor force divided by the population aged 15-64. This partly reflects the prevalence of labor opportunities in the economy, which may be complementary to micro-financed activities or may crowd them out. The *manufacturing* value-added to GDP ratio, similarly, captures the existence of a potentially alternate route to development that is associated with wage labor rather than small enterprise. The *private credit* variable equals the amount of domestic credit to the private sector, divided by GDP. It tends to be the preferred measure of financial development in the finance and growth literature. Clearly the level of development of the financial sector may have a significant bearing on an MFI's ability to operate, though it is not clear in which direction.

Other variables from the WDI are the gini coefficient of inequality,[18] inflation, foreign

[17]Each of these growth variables is calculated as a log difference.

[18]Since year-to-year data on inequality are typically sparse, we use for each year the average of all reported figures over 1994-2006.

direct investment inflows as a percent of GDP, remittances as a percent of GDP, percent of population in rural areas, and the share in GDP of agriculture, services, and industry.

A number of variables intended to capture various aspects of the institutional environment are also included. The Kaufmann et al. (2007) governance indicators aggregate and normalize a number of existing country ratings along several institutional dimensions. They produce six annual series, in all of which a higher number reflects a more ideal institutional outcome: control of corruption, rule of law, regulatory quality, government effectiveness, political stability/lack of violence, and voice/accountability.

A complementary approach to measuring institutional characteristics, with roots in de Soto (1989) and pathbreaking examples in Djankov et al. (2002) and Botero et al. (2004), seeks to quantify specific barriers to starting and operating a firm, enforcing a contract, etc., via detailed case studies and extensive consultation with experts. This is the approach taken in the Doing Business indicators of the World Bank.[19]

From these indicators we include (where available) the number of procedures, number of days required, the monetary cost (as a percentage of income/capita), and the monetary plus time cost, to start a business and to enforce a contract. Also included are minimum capital requirements for starting a formal business, as a percent of average income. In each of these cases, restrictive institutions and regulations may harm microfinance customers in their micro-enterprise endeavors; but they also may push households out of the formal economy and into the market for microloans.

Doing Business indicators also measure specific aspects of the credit market. A credit rights index captures aspects of the efficiency of the legal environment supporting lending;[20] a credit information index captures aspects of quality and accessibility of credit information;[21] and two variables capture the percent of adults covered by public credit registries and private

[19]Since the data published each year apply to the previous year, we attribute them to the year-published minus one.

[20]There are ten components of this index, seven related to collateral (types of collateral allowed, seniority rules, etc.) and three to bankruptcy law; see World Bank (2006, p. 67).

[21]There are six components of this index, reflecting various aspects of the coverage depth and quality of information available via public or private credit registries; see World Bank (2006, pp. 67-8).

credit bureaus, respectively.

Doing Business indicators also include a summary measure of rigidity of employment law (aggregating difficulty of hiring, difficulty of firing, and rigidity of hours), which may be thought to affect outside options of potential micro-credit customers as well as the expansion paths of actual customers.

3 Estimation Methodology

Let y_{ijkt} be a year-t outcome of MFI i (which is 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 MFIs and estimates

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

This includes a potentially non-linear relationship between age and MFI outcomes, and allows asset-holdings to have an effect. It also controls for the level of real GDP/capita in the country prior to this year's macroeconomic realizations, $inc_{j,t-1}$. Finally, it controls for any level differences between institutional types.

The focal outcomes are operational self-sufficiency and the extensive- and intensive-growth variables. We also look at the three components of operational self-sufficiency: default, operating costs, and interest markups.[22]

The focal macroeconomic variables are contained in X_{jt}. Our baseline set includes growth in real GDP per capita, labor force participation rate, manufacturing's share of GDP, and private credit.[23] Additional tests add other macroeconomic variables one at a time to X_{jt}. We emphasize that with all variables besides growth, estimated effects are conditional on a

[22] Within the following internally-related sets of variables, we use the same sample by dropping all observations that do not appear in every regression in the set: operating cost per dollar loaned, operating cost per borrower, and average loan size (costs); average interest rate, average cost of capital, and average interest markup (financial); and growth in borrowers and growth in average loan size (growth).

[23] Section 2 discusses the anticipated importance of these variables in explaining MFI performance.

given growth rate. This isolates a variable's effects on MFIs that operate other than through its influence on economic growth.

Certain characteristics of the data direct our choice of estimation procedure. First, there can be little confidence in assuming homoskedastic errors. Second, errors may be correlated within MFIs, for example since individual MFIs do their own record-keeping or due to serially correlated MFI-specific shocks. Third, outlier problems are potentially severe, as preliminary work with the data made clear.

To address the outlier issue, we focus on estimating 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. For robustness, median regression is supplemented by two other approaches. First, significance levels from "robust regression" are also reported. This is a procedure that drops extreme outliers (typically zero, at most two in our case) and then iterates using weighted least squares with weights negatively related to the size of the residual, until the weights and coefficient estimates converge. Second, the top and bottom $\{0,1,2,3,4,5\}\%$ of the sample based on the dependent variable is eliminated and OLS is run in each of these six cases.[24] The median significance level of each coefficient across the six runs is then reported. Of course, there is no necessary reason that these three approaches should give the same results, especially when there are valid but influential outliers or when the underlying distribution is not symmetric. However, when the results do coincide, it increases confidence that results are not being driven by outliers.

To address the potential heteroskedasticity and within-MFI standard error correlation, we bootstrap standard errors and confidence intervals for both the median and robust regressions, clustering the bootstrap by institution. This approach does not require homoskedasticity or error terms to be independent within MFIs. Standard errors for each parameter estimate are calculated straightforwardly from the bootstrapped estimates. Significance lev-

[24]We eliminate all relevant tied observations. This leads to a few cases of asymmetry due to the mass points at zero for the default variables.

els 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. For the six OLS runs, significance levels are calculated using standard methods and clustering at the institution level.

We also estimate a variation on the baseline specification that separates within-MFI and between-MFI variation for the key macro-economic variables. That is, each regressor can be decomposed into a within-MFI median (e.g. the median macroeconomic growth rate for the years the MFI reports data) and a deviation from this median. We include both of these respective components, the median and the deviation, rather than each of the following focal variables: growth, workforce participation, manufacturing, and private credit.[25][26] Significance levels are calculated as before.

A key advantage of isolating within-MFI variation in the 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 MFIs choose to locate in faster growing economies. Or, it may be that a slow-changing omitted country variable, e.g. some aspect of culture, is (partially) responsible for both the macroeconomic growth and the MFI performance. However, a result obtained using only within MFI-variation is much less vulnerable to both of these kinds of concerns.

However, a disadvantage of within-MFI variation is that it only picks up high-frequency relationships between the variables. For example, it cannot directly address the question of whether MFIs in consistently high-growth economies have an easier time achieving operational self-sufficiency than those in consistently low-growth economies. It also eliminates much of the variation in slow-changing variables, also potentially decreasing the signal/noise ratio. (This is especially true for the three focal variables besides growth, for which nearly

[25] In each case, only the observations used in the given regression are used to calculate the median.

[26] One can also replicate the baseline with all variables (including the dependent variable and the controls) set at their respective medians (between) or at their respective deviations from median (within). Results are similar and are not reported for brevity.

all variation is between-MFI variation; see Table 1b.) Estimation using only between-MFI variation thus sheds light on more low-frequency relationships between the variables under analysis.

4 Results

For brevity, not all results are reported in tables – unreported results are available from the authors upon request.

4.1 Baseline Results

Baseline results from median regressions are reported in Table 2, along with significance levels from both these and unreported robust and least squares regressions (see section 3). Table 3 reports results from a specification that separates between- and within-MFI variation, which are also discussed here.

Growth. Quite robustly, growth impacts positively an MFI's ability to cover costs, operational self-sufficiency. An additional percentage point of growth is associated with a 1.5 percentage point higher revenue/cost ratio (Table 2). A difference in growth equal to the interquartile range[27] (about 3.9 percentage points) is associated with a 5.9 percentage point higher revenue/cost ratio, which is about 17% of this variable's interquartile range. Put differently, a growth differential equal to the interquartile range is worth about the first 3 2/3 years of the age effect, or just under one third of the peak age effect (which occurs just past 20 years); and is worth more than a quadrupling of MFI assets.

Thus, while the macroeconomy is certainly not an MFI's destiny, it seems to play a non-negligible role in an MFI's financial success. Further insight comes from looking at the components of operational self-sufficiency.

1) Growth could lead to higher micro-enterprise returns and the ability of MFIs to charge

[27]The interquartile range is a measure of dispersion less sensitive to outliers than the more commonly used standard deviation. It equals the difference between the 75th and 25th percentile values.

higher interest rates. But the impact of growth on the interest markup is negative, though insignificant, suggesting that growth is not raising self-sufficiency by supporting higher interest rates. In fact, the respective relationships (not reported) between growth and both average interest rates and average cost of capital, the two components of the interest markup, are negative and significant (in the former case, marginally so), while the net effect is near zero. (The decline in the cost of capital and in interest rates are likely related to the results of the following two paragraphs: lower default rates and operating costs.)

2) Growth clearly seems to bolster financial sustainability by reducing default. Robust evidence for this is found in the results for the loan loss provision rate and the PAR-30. An additional percentage point of growth is associated with a 0.07 percentage point lower loan loss provision rate and a 0.18 percentage point lower PAR-30. The interquartile range of growth is associated with declines in the loan loss provision rate and PAR-30 equal to 10% and 13% of their respective interquartile ranges. This result is consistent with the view that higher growth provides greater solvency to the projects for which micro-banks lend, and seems to belie a strict dualism between micro-financed projects and the broader economy.

3) Growth also has a detectible negative relationship with an MFI's operating costs, though significance of the results depends to some degree on the estimation method used. An additional percentage point of growth reduces costs per dollar loaned by 25 basis points and costs per borrower by two dollars. An increase in growth equal to the interquartile range is associated with drops in costs per dollar loaned and per borrower equal to 5% and 6% of the respective interquartile ranges. As discussed in section 2, cost per dollar loaned can be lowered by reducing cost per borrower or by raising average loan size; but growth has a near-zero association (not reported) with average loan sizes (in levels). Thus, it seems likely that any cost-reducing effect comes mainly via monitoring and collection costs.

The results separating between- and within-MFI variation (Table 3) essentially echo the baseline results. One difference comes in the magnitudes: the between (median) variables have larger estimated effects of growth on operational self-sufficiency, default variables, and

operating costs. For example, a percentage point of median growth translates into nearly 2 percentage points in the revenue/cost ratio, rather than about 1.5, and lowers operating costs per dollar loaned by 67 basis points rather than 25. By contrast, the within results remain significant in all cases except operating costs but tend to produce smaller coefficient estimates.[28] It appears that the low-frequency growth effects are dominant in explaining MFI performance, and in particular that operating in a persistently high-growth environment involves a significant financial advantage.

The other key outcome variables capture growth of the MFI. The results indicate that macroeconomic growth is not significantly related to extensive growth (in the number of borrowers), but is quite significantly related to intensive growth (in the size of loans). Using the point estimate, an additional percentage point of macroeconomic growth is associated with 3/4 of a percentage point of growth in an MFI's average loan size; the estimate is also within a standard deviation of 1.[29] One interpretation is that borrowers' ability to expand projects profitably (and related, perhaps their ability to meet debt obligations so as to raise future credit limits) tend to shift up and down nearly in step with the economy as a whole, a striking sign of interdependence. The overall explanatory power of growth is about the same as in previous cases: about 11% of the interquartile range of loan growth is explained by the interquartile range of macroeconomic growth. Results separating between and within variation are quite similar.[30]

Labor force participation, Manufacturing. We group these together because both seem strongly associated with the extent and availability of labor market opportunities.

Unlike growth, workforce participation robustly and negatively impacts an MFI's ability

[28]Results are largely similar when separate between and within regressions are run, that is with all dependent and independent variables set at their MFI-median and deviation-from-median values, respectively. However, differences in between and within coefficient magnitudes tend to be larger. For example, for operational self-sufficiency the between coefficient is 2.11 and the within coefficient is 0.81, both strongly significant.

[29]The point estimate for growth in total dollars loaned, which involves both intensive and extensive growth, is significant and greater than one: 1.18, s.e. of 0.29.

[30]Quantitatively, the purely within regression produces a smaller estimate for intensive growth: 0.28, s.e. 0.14.

to cover costs. An additional percentage point in the workforce participation rate is associated with a 0.6 percentage point drop in the revenue/cost ratio. Similar to growth, the interquartile range of workforce participation (9.9 percentage points) accounts for 18% of self-sufficiency's interquartile range. The same basic result is borne out when separating between and within variation, though the within result is only marginally significant (perhaps because less than 2% of variation in workforce participation is within-MFI, see Table 1b).

Evidently, MFIs do better when there is a larger pool of individuals not officially active in the labor force. This could be because MFIs are able to achieve a given growth trajectory more selectively when more people are not already active, or because the pool of potential clients is of higher quality when there are structural reasons for its large size. Unfortunately, the auxiliary regressions do not help to pinpoint where workforce participation is having its most salient effect, except for the wisp of significance in raising operating costs per dollar loaned. If true, this increased cost could come from time spent on screening or training, in line with either of the above two hypotheses.

Manufacturing (as a percent of GDP) does not seem to affect operational self-sufficiency. That said, it is positively associated with the interest markup, at 56 basis points per percentage point of manufacturing. This extra markup and its failure to affect financial sustainability is probably explained in part by the (marginally significant) 45 basis point rise in operating cost per dollar loaned attributable to a percentage point of manufacturing. That manufacturing is associated with higher cost per dollar loaned may seem puzzling given evidence that it appears to be associated with lower cost per borrower. But, manufacturing also has a significant and negative relationship with average loan size (not reported). Thus, more manufacturing is associated with smaller loans, lower cost per borrower, but (smaller loans being the dominant effect) higher cost per dollar loaned. Apparently, a more vibrant manufacturing sector crowds out all but smaller endeavors among the pool of micro-borrowers.[31]

[31]The baseline results are perfectly echoed in the MFI-median variables of Table 3 – not surprising given that more than 95% of variation in manufacturing is between-MFI. There is a significant negative relationship between manufacturing and loan loss expense rate using the MFI-deviation measure. This may be because high-frequency fluctuations in manufacturing lead to gains and losses in jobs that are used to help repay

Turning to MFI growth, manufacturing and workforce participation are both negatively and significantly associated with MFI growth in number of borrowers, i.e. extensive growth. One percentage point of workforce participation (manufacturing) is associated with a 0.35 (0.27) percentage point lower percentage extensive growth. The interquartile difference in workforce participation (manufacturing) explains 11% (6%) of the interquartile range in extensive growth. Similar results are evident in the MFI-median variables in Table 3, but not in the MFI-deviation variables – again, not surprising given the lack of within-MFI variation in manufacturing and workforce participation; see Table 1b.

These results suggest that MFI extensive growth is harder to come by when more people are economically active and manufacturing jobs are more abundant. They are consistent with the idea of a rivalry between two routes to development, one based on increasing wage-earning opportunities and the other based on microfinance and self-employment.[32]

Private Credit. The results give no strong evidence that private credit – reflecting the size and development of the financial sector – affects an MFI's operational self-sufficiency. Behind this general result are interesting correlations of private credit with components of the ability to cover costs.

Private credit is negatively and significantly associated with both forms of default. Its interquartile range accounts for 9% and 10% of the respective interquartile ranges of the loan loss expense rate and the PAR-30. This result does not appear consistent with the idea that competition in lending generally raises micro-finance default rates by providing temptation to switch lenders. One potential explanation is that a well-developed financial sector complements micro-finance by providing incentives to maintain good credit histories and opening up pathways for enterprises to advance beyond micro-credit. Another is that a strong financial sector simply reflects the presence of well-functioning credit market institutions that benefit bank recovery rates at all levels. However, this interpretation is put in

micro-loans when other avenues fail.

[32]Related issues are explored in Ahlin and Jiang (2008), who find there can be rivalry between industrializing growth and development driven by self-employment.

some doubt by the robustness of the relationship between private credit and default measures when various credit institution variables are controlled for (see section 4.3).

Private credit is also significantly associated with lower operating costs, both on a per-dollar loaned and a per-borrower basis. Its interquartile range accounts for 12% and 10% of the respective interquartile ranges of the cost per dollar loaned and cost per borrower. Again, this could reflect the efficiency-enhancing credit market institutions associated with better financial development; but again, inclusion of direct measures of credit market institutions (discussed in section 4.3) does not affect results. Instead, it may be that future financial prospects beyond micro-finance affect micro-borrowers' incentives and reduce the MFI's need to screen and/or monitor. There may also be a competition-related story: greater financial competition drives down costs of delivery via selection or incentive effects at the MFI level.

Competition also comes to mind in the result that private credit is statistically significantly associated with a lower interest markup. Quantitatively, a percentage point in the credit/GDP ratio predicts a 21 basis point drop in the interest markup. Most of this is coming through the average interest rate charged, where the drop is estimated at 23 basis points (not reported), though the median cost of capital also falls a statistically significant 5 basis points (not reported). The interquartile range of private credit (about 18 percentage points) predicts a 375 basis point drop in the interest markup, which is about 18% of its interquartile range.

Note that the 375 basis point drop in interest markup can be mostly but not entirely accounted for (using the point estimates) by the drops in default costs, 27 basis points, and in operating costs, 267 basis points, attributable to the interquartile range of private credit. Interestingly then, MFIs operating in the context of better developed financial markets seem to (more than) pass on cost savings and default reductions in the form of lower interest rate markups to borrowers – perhaps due to competition. The combination of lower costs and default but lower markups explains why the net effect on financial self-sufficiency is not distinguishable from zero.

The between variables of Table 3 largely echo the pooled results. The within variables generally lose significance, though there are hints of some dramatic differences: private credit being associated with lower operational self-sufficiency and higher default. Interpreting this as a high-frequency phenomenon, one can imagine that unusually rapid growth of the financial sector may induce default via the temptation/opportunity to switch lenders. However, the results ought not be pushed too far since they are coming from less than 8% of the variation in private credit.

MFI growth is not statistically significantly affected by private credit, though the coefficients are negative on both extensive and intensive growth, not inconsistent with the possibility of some crowding out.[33]

4.2 Other Macroeconomic Determinants

The structure of the economy can have an impact on MFI performance; some evidence for this has already been seen. Obviously, there are other structural characteristics of the economy not yet controlled for that may be thought to matter for microfinancial success. We alternately add one at a time to the baseline specification remittances, foreign direct investment inflows, agricultural sector value-added, service sector value-added, industrial sector value-added, all as fractions of GDP; average (gini) inequality over 1994-2006; and the rural fraction of the population.

Table 4 reports (for brevity) only specifications in which the additional variable registers a significant coefficient in at least two out of the three types of regressions (median, robust, and least squares). It also reports on only the key outcome variables – operational self-sufficiency, borrower growth, and loan-size growth.

Remittances are positively and significantly associated with operational self-sufficiency

[33]We also run a more conservative approach that clusters standard errors at the country level rather than the MFI level. This does not drastically alter the picture, though significance levels do fall a bit. In particular, growth and private credit become insignificant (in all but at most one technique) in explaining operating costs; private credit becomes insignificant against one default measure except in the OLS; and manufacturing loses significance except in the OLS in explaining borrower growth.

(see Table 4). The regressions on the three components of sustainability give some hints about channels of operation. Remittances statistically significantly go with lower default as measured by the PAR-30. One percentage point of remittances also significantly predicts about a 10 basis point drop in the cost of capital, which feeds in (with marginal significance) to a similar hike in the interest markup (there is a near-zero impact on the average interest rate). There is no measured impact on the cost per dollar loaned, though this masks two opposing effects: a higher cost per borrower but larger loans associated with remittances.

That prevalence of remittances goes with higher loan size and lower default may reflect the greater ability to take on risk that comes from more households having access to a reliable source of (foreign) wage earnings. If so, this is evidence for synergy rather than rivalry between wage-earning opportunities and microfinance, unlike the results on workforce participation and manufacturing have suggested. Perhaps foreign wage-earning opportunities are seen as temporary and complementary to (current and future) domestic economic activity by other household members, while domestic wage-earning opportunities are seen as potentially long-term and substitutable. That remittances predict a drop in the cost of capital may suggest they promote greater savings, which can be a relatively cheap source of funds in the semi-local markets where MFIs operate.

Percent rural has no significant impact on any of the three main indicators, though it is a significant negative predictor of the loan loss expense rate (not reported). Similarly, **agriculture** has a statistically significant negative relationship with the loan loss expense rate; oddly, though, it has an opposite, positive relationship with the PAR-30. These are reconcilable if, for example, agricultural loans are repaid more tardily but ultimately more reliably. However, overall agriculture is negatively related to operational self-sufficiency: one percentage point of agriculture/GDP lowers an MFI's revenue/cost by 0.55 percentage points. This appears to be due to a lower interest markup by MFIs where agriculture is more prevalent – due to higher cost of capital and lower (though not statistically significantly) interest rates. One can speculate that part of the explanation for higher cost of capital

could involve the relative scarcity of monetary savings in agricultural environments; and for average interest rate, lower productivity of agricultural projects may play a role.

Unlike agriculture, the relative size of **services** is positively associated with operational self-sufficiency.[34] It also has a significant negative relationship with the PAR-30 and the cost of capital (not reported). Perhaps a larger service economy provides more viable micro-enterprise opportunities, at least in comparison to a more agricultural economy.

Industry registers no significant key relationships, though is not far from significance in negatively predicting MFI borrower growth, like manufacturing (which is already controlled for). Also like manufacturing, **foreign direct investment** is a negative predictor of MFI borrower growth, in the least squares only, and is positive and significant in predicting MFI loan-size growth. Again, there is some evidence that MFIs grow more slowly (on the extensive margin) where industrialization is greater. Here, there is evidence that loan sizes may grow faster in such countries as perhaps there is greater opportunity or necessity to increase scale toward efficiency. It is interesting that the potential synergy with microfinance again shows up with foreign-related opportunities (as it did with remittances), which may be seen as temporary and complementary to, rather than permanent and substitutable with, micro-financed activities.[35]

Theoretically, **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 conservatively large inflation premia into interest rates. For similar reasons, inflation may also affect an MFI's cost of capital. Borrowers' incentives for delay and default can also be affected.

To check for an effect, we add to the baseline macroeconomic variables the inflation rate – alternately measured by the consumer price index and the GDP deflator. Perhaps surprisingly, no significant results (using at least two out of three techniques) emerge. Using previous-year instead of current-year inflation again produces no significant results, except

[34]Economy shares of services and agriculture are negatively correlated at about 0.7.

[35]Note also that FDI is measured as a flow, while manufacturing is more reflective of a stock.

that higher lagged (GDP deflator) inflation predicts a 25 basis point higher interest rate charged. Using a dummy equaling one if inflation exceeds 10% (as in Boyd et al., 2001) also does not give any significant results for the key variables but does consistently predict a higher cost of capital, by between 100-200 basis points (depending on whether consumer price of GDP deflator inflation is used and whether it is lagged or not).

Thus, there is some evidence that higher inflation raises (real) interest rates that MFIs charge and pay; but there does not seem to be a significant effect on sustainability or growth. This may reflect the lack of high-inflation episodes in our dataset – the 95th percentile involves just about 20% inflation and the 99th percentile involves 33% (for GDP deflator) and 56% (for consumer price) inflation.

Inequality measured by the gini coefficient is a negative predictor of operational self-sufficiency and MFI borrower growth, but a positive predictor of MFI loan-size growth. Quantitatively, the interquartile inequality difference accounts for 16% of the interquartile difference in the operational self-sufficiency variable – similar to the magnitude of the growth effect in the baseline results (an effect which drops about 20% here). The negative impact on sustainability stems partly from a significant and positive relationship with default, using either measure of default (not reported).

The results may stem from a relationship between inequality and the degree of dualism in the economy. A dualistic economy arguably makes it harder for micro-enterprises to achieve viability, as they lack helpful linkages to broader markets. This can lead to slower MFI extensive growth and the higher default rates that hinder sustainability. But, it could also potentially lead to faster average loan-size growth as some funded projects expand, perhaps out of necessity in order to straddle the dual economy, while less dynamic ones fold. An alternative explanation may have to do with social capture: access to micro-credit is partly restricted in favor of relatively well-off local elites, who quickly increase loan sizes. In this scenario repayment discipline may be lower because borrowers are less dependent on the MFI. Further research would be needed to distinguish these stories or pinpoint others,

but the evidence does suggest that an MFI's path to financial sustainability and growth in outreach is harder in more unequal economies.

4.3 Institutional Determinants

It is potentially insightful into the workings of microfinance to see how specific institutions and institutional outcomes affect an MFI's operation. For example, higher corruption may hinder micro-enterprises' ability to operate and grow, much as it has been seen to impact small and medium enterprises throughout the world (see for example Fisman and Svensson, 2007). On the other hand, it may lower wages (see Ahlin, 2005) and push more households to small-scale self-employment, allowing for faster MFI growth. Similarly, rule of law may create the stable environment micro-borrowers need to succeed; but it may also make it harder for micro-enterprises to operate avoiding regulations and tax-free.

We first add to the baseline pooled regressions the six broad governance indicators of Kaufmann et al. (2007), one at a time (see section 2 for a description). As already stressed, estimated effects are above and beyond any effects operating through macroeconomic growth. Table 5 reports the regressions involving one of the three key dependent variables in which the included governance indicator was significant using at least two of the three methods (median, robust, and least squares regression). It turns out there is only one:[36] better **regulatory quality** predicts slower growth in average MFI loan size. One interpretation is that "good" regulations make it harder for micro-enterprises to grow while remaining informal – for better or worse. This would be consistent with arguments some have put forward in favor of relaxed regulations for micro-enterprises. On the other hand, it may reflect a formal business sector that is healthy due to rational regulation and leaves less room (or need) for all but smaller micro-enterprises.

Related to these results, **regulatory quality** and, especially, **rule of law** and **govern-**

[36] In each series, 1997, 1999, and 2001 are missing; we experiment with linearly extrapolating these values from neighboring years, and the results change little.

ment effectiveness are all[37] predictive of higher operating costs per dollar loaned, and the evidence suggests that this effect comes through lower loan sizes (in levels) rather than higher per-borrower operating costs. Again, rule of law and good government and regulation may limit the scope of the informal economy and keep micro-enterprises small. **Voice and accountability**[38] also predicts higher costs per dollar loaned, but the channel is via higher costs per borrower rather than smaller loans. Perhaps this is related to the cost of more feedback mechanisms or responsiveness in the MFIs. At any rate, this paragraph's results provide evidence that MFIs face higher operating costs where institutions are stronger – suggesting that the relevant margin may be between MFIs that operate largely under the radar and those that are supervised or regulated.[39]

We also examine relevant Doing Business indicators of the World Bank. Unfortunately for our purposes, this dataset is relatively recent and covers only since 2003, which significantly reduces sample sizes.

The first set of indicators we examine measures difficulty in officially **starting a business**: start-up capital requirements, number of procedures, amount of time needed, amount of money needed as a percent of GDP/capita, and a total cost that includes the money and time cost (the latter valued based on average income). Added one at a time to the baseline specification, none of them is significantly related to any of the three key MFI outcomes. However, two of them significantly and positively impact the operating cost per dollar loaned: the number of start-up procedures and start-up capital requirements. One interpretation is that typical micro-borrowers are going through the official procedures and attaining the minimum capital requirements needed, in which case the higher costs may partly be explained by increased training costs (which MFIs often partly bear). This could also help explain the fact that higher capital requirements predict lower default, measured by loan loss expenses – loans to better capitalized micro-enterprises are better insured against downside risk. But

[37]These three are correlated at about 0.7-0.8 in the dataset.

[38]Measuring the "extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media" (Kaufmann et al., 2007).

[39]Unclear, of course, is whether these higher costs are justified by net social benefits.

a different interpretation seems preferable, since in both cases the higher costs seem to be coming from smaller loan sizes rather than higher costs per borrower.[40] Namely, a large number of formal start-up procedures and capital requirements may push micro-borrowers to start out informal and relatively small. Lower default could also be related to the smaller projects involving less risk. However, there is no registered effect on *growth* in loan size (the point estimates are positive but insignificant), suggesting that the effects are concentrated on start-up and do not continue to affect the growth trajectory.[41]

Also examined were number of procedures and time required for **contract enforcement**. The time required was a significant and positive predictor of MFI borrower growth. This is consistent with the idea that barriers to efficient, formal firm operation grows the pool of potential demand for MFI products. Both number of procedures and time required are significantly associated with smaller loans and smaller per-borrower costs, though the net effect on costs per dollar loaned are in neither case significant. The smaller loans, again, suggest that borrowers start smaller in these more dysfunctional environments. The reduced risk of smaller ventures may explain the lower loan loss expense rate associated with the number of procedures.[42]

The **rigidity of employment** index from Doing Business is a marginally significant and negative predictor of MFI loan-size growth (and of loan-size levels, though not significantly). It is not hard to imagine that labor-related regulations can hinder the expansion of micro-enterprises, making the transition from use of family or informal or own labor to use of formal labor more costly. The index also predicts a lower PAR-30 – again, perhaps associated with smaller loans in levels and growth rates.

[40] The relevant results are significant for capital requirements but not for the number of procedures.

[41] Supplementing the numbers on start-up time and cost with numbers from Djankov et al. (2002), which correspond to the year 1999, did not appreciably affect results.

[42] Time and number of procedures required for registering property and various tax-related variables are also available in the Doing Business database. The latter are available for significantly fewer years, and so are not considered here. The property variables are also available for fewer years, putting typical regression sample sizes in the 800s. This may help explain the paradoxical result that time required to register property is negatively related to MFI loan-size growth while the number of procedures required is positively related to loan-size growth.

We turn finally to a set of Doing Business variables capturing two aspects of **credit market institutions**, the legal backdrop and information flows. Oddly, the **credit rights index** predicts slower growth in MFI loan-size and, marginally, higher default (PAR-30). One favorable interpretation of the loan-growth result is that better credit rights extend the reach of the formal, commercial credit sector, that is, they make graduation away from the MFI sector more feasible. More negatively, it could relate to the higher delinquency rate which induces MFIs to raise loan size more cautiously.

A similar result obtains with the **credit information index**: it is associated with lower loan-size growth, perhaps for similar reasons. The magnitude is quite remarkable: one point higher on the index is associated with a 2.4 percentage point drop in loan growth, and the interquartile range of the index (4 points, out of 6) is associated with 37% of the interquartile range of loan growth. (This is more than four times the comparable figure for the credit rights index.)

The credit information index is also statistically significantly associated with lower costs per dollar loaned. This result appears to be driven both by larger loans (in levels)[43] and smaller costs per borrower, though neither result is significant using at least two of three techniques. Again, the magnitude is remarkable: one point on the index lowers costs per dollar loaned by about 180 basis points, and the interquartile range of the index accounts for 33% of the interquartile range of the cost per dollar loaned. One obvious interpretation is that screening and monitoring costs can be lowered when information flows are better. It is also interesting that most of these cost savings seem to translate into lower interest markups, by a statistically significant 150 basis points per point on the index.

Harder to explain are the positive relationships with default using either default measure. Similar results for default obtain for the two remaining measures of information flows, **public credit registry coverage** and **private credit bureau coverage**. Perhaps propensity

[43]Perhaps larger loan sizes in levels help explain the lower loan-size growth associated with the credit information index. If so, they do not seem to go vary far in doing so: the interquartile range of the index accounts for only 11% of the interquartile range of the average loan size (using the statistically insignificant point estimate), as compared with 37% of the interquartile range in loan-size growth.

to report loans gone bad is positively associated with more extensive credit information reporting. Another reverse causality story would be that a systemic default problem led to these institutions' establishment – however, it is hard to imagine any MFI or even the micro-credit sector as driving these institutions. A different interpretation is that with greater information flows MFIs substitute away from screening and/or monitoring, or in some other way lessen repayment pressure, to such a degree that defaults actually rise. But the point estimates (for credit information index) indicate that the 180 basis points in operating costs per dollar loaned saved per index point significantly outweigh the 20 basis points higher loan loss expense rate per index point.

Overall, the evidence suggests that increasing credit information flows appears to have appreciable positive effects on the micro-lending market.[44]

5 Further Tests and Robustness

5.1 Padding Profits or Breaking Even?

One might wonder if a good growth rate helps sustainable MFIs to further pad their profit margins, but does not enable MFIs to break the key 100% sustainability barrier. Note that the median self-sufficiency ratio in the data is 115% (and the mean is 118.5%), 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 of self-sufficiency corresponding to the key 100% mark, which is roughly the 25th percentile of the operational self-sufficiency variable.[45] Estimates of the

[44] One might wonder whether some of the counterintuitive results involving the credit market institution variables reflect an odd partial effect since they condition on the general size and development of the financial sector (private credit). However, results on these four variables run without private credit turn out to be very similar. Conversely, the results for private credit discussed in section 4.1 are robust to the inclusion of the credit institutions variables discussed here.

[45] In principle, quantile regression can be used to estimate the conditional quantile function for any quantile. See Koenker (2005).

conditional 25th percentile function of operational self-sufficiency are contained in columns 1 and 2 of Table 6. Growth remains significant, at the 1% level, with a slightly smaller coefficient than at the median: 1.44 instead of 1.53. Workforce participation also is negative and significant, though only at 10%, and with a smaller magnitude: -0.44 rather than -0.62. Column 2 shows that both the between-MFI and within-MFI variation in growth are statistically significantly related to operational self-sufficiency at the 25th percentile, as they are at the median. By contrast, though, it appears to be the within-MFI variation in workforce participation – high-frequency movements – that is significant for MFIs at the 25th percentile, rather than the between-MFI variation which is more robustly predictive at the median.

Next, we collapse the operational self-sufficiency measure into *sustainable*, a dummy variable that equals 1 if and only if the revenue/cost ratio is at least 100%. About 75% of observations have sustainable = 1. We then run a logit specification, with standard errors clustered at the institution level. Results are reported in columns 4 and 5 of Table 6. Growth is a significant predictor of breaking even, at the 1% level. Quantitatively, the interquartile growth difference (3.9 percentage points) is associated with a 5.2 percentage point increase in the probability of a non-profit MFI breaking even.[46] 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 the age effect or a 130% increase in assets. Separating the between- and within-MFI variation of the key variables (column 5) shows that both low-frequency and high-frequency growth differences are significantly associated with the ability to break even.

Interestingly, log-income level of the country becomes significant and positive at the 10% level – consistent with the idea that it is easier to break even in richer countries. Further, when log-income is replaced by a quadratic, both terms are significant at the 1% level and the shape is an inverted-U peaking at around $2680. Similarly, when a quadratic specification is used in the 25th quantile regression, both terms are significant and the peak is at $2410;

[46] Quantitative calculations for the logit are made by setting all non-dummy variables at their medians and using the modal institutional type.

see columns 3 and 6 of Table 6.[47] This leaves 6-7% of the data beyond the peak, mainly from institutions in South and Central America. Quantitatively, in the logit specification an MFI where income is at the 75th percentile ($1780) has a 10.2 percentage point higher probability of breaking even than an MFI where income is at the 25th percentile ($370) – about twice the comparable number for growth. A straightforward interpretation of these results is that it is easier to break even in richer countries, up to a point. However, one might also wonder if the result is because, for MFIs operating in poorer economies, breaking even is less necessary – subsidies being easier to obtain for work in poorer economies, e.g. – or less desirable.

Overall, the evidence is strong that the relationship between MFI financial performance and macroeconomic growth is not isolated at the upper end of the MFI distribution. Rather, both year-to-year fluctuations in growth and growth trends are strongly related to an MFI's ability to achieve financial sustainability.

5.2 Causality and Growth

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? Several non-causal interpretations can be given.

One such interpretation is reverse causation: good financial performance of the MFIs in our data is directly fueling economic growth. This seems far-fetched, given the small size relative to each economy of most MFIs in our dataset. Few, if any, MFIs would claim to have substantial macroeconomic impacts (and MFIs are not generally known for moderate self-assessments).

Still, the possibility of reverse causality can be addressed. Since it is especially implausible with small institutions, we rerun the baseline results on operational self-sufficiency, alternately dropping the MFI observations in which a) the number of borrowers is not miss-

[47] Quadratic terms for income in the baseline specification are not significant, except the squared term in the median regression only, at the 10% level.

ing and exceeds 1% of the country's population and b) the value of the loan portfolio is not missing and exceeds 1% of private credit in the economy. These drops reduce the sample size by about 3% and 17%, respectively. However, the results (not reported) are very similar to the baseline results. Growth remains a significant predictor of operational self-sufficiency, at the 1% significance level for all techniques and both subsamples. The coefficient magnitudes are close to the baseline levels: respectively, 1.58 and 1.71 as opposed to 1.53 in the baseline.[48] Thus, it seems implausible that the results are being driven by causality flowing in the other direction.

A second 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 informal sector as a whole is doing well for some unobserved reason that is both causing higher growth and better performance of the MFI sector.

We cannot completely rule out omitted variable bias. Several points can be made though. First, given that within-MFI growth differences are significant predictors of operational self-sufficiency, omitted variable bias due to time-invariant MFI-level or country-level factors does not seem to be causing the positive growth effect.[49] Second, the large number and variety of additional macro-structural and institutional variables that are controlled for without growth losing its explanatory power for operational self-sufficiency[50] gives greater confidence that obvious omitted variables are not lurking. Finally, we do not need to rule out this interpretation in order to answer our main question, namely, whether MFI performance is

[48] Workforce participation also remains significant at the 1% level in all cases with very similar coefficients to the baseline.

[49] When country, region, or MFI fixed effects are included (not reported), growth remains significant though its coefficient drops by about 1/3-1/2. However, these specifications remove much of the low-frequency growth variation.

[50] Growth is always significant at the 1% level using all three techniques (median, robust, and least squares) when the additional variables of sections 4.2 and 4.3 are included, with one exception: it falls to significance at the 5% level in at most two of three techniques when the Doing Business indicators are included. This drop in significance seems surely related to the fact that the Doing Business indicator regressions involve subsamples 50-60% the size of the baseline sample (since the data begin in 2003). Further, the *minimum* estimated coefficient on growth (from the median regressions) across all the added variables, excluding inequality, is 1.42 compared to the 1.53 of the baseline; for inequality it is 1.19.

significantly dependent on the surrounding macroeconomic context. Whatever the aggregate factors that are omitted may be, it is implausible that the particular MFI in our dataset is responsible for them. Hence, the results do establish that a substantial part of the MFI's success is out of its control.

A third interpretation involves a selection story: it may be that more sustainable MFIs choose to locate in high-growth economies, while MFIs that are content to be dependent on subsidies locate in low-growth economies. This story, however, almost requires a causal macroeconomic effect behind it: why would financially driven MFIs tend to prefer high-growth economies unless growth were conducive to better financial performance? And again, it is put in question by the within results, which show that even within MFIs over time growth significantly affects operational self-sufficiency.

A fourth interpretation involves a more subtle selection story. It may be that MFIs shift between goals depending on the health of the aggregate economy – an issue that does not arise with purely profit-maximizing firms. For example, MFIs 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 operational self-sufficiency 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. In fact, even an experimental design that found an exogenous growth shock could not rule out this story. Disentangling the effect of shifting objectives due to macroeconomic factors seems 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.

6 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 sound practices. See, for example, Yaron (1994), Chaves and Gonzalez-Vega (1996), Kaboski and Townsend (2005), Armendariz de Aghion and Morduch (2005), and most similarly, Cull et al. (2006), who pioneered the use of cross-country, cross-MFI data in this area. Our study differs from these in focusing on the macroeconomic and macro-institutional, rather than micro-institutional, determinants of MFI success.

There is also a literature examining determinants of the performance of standard commercial banks or the financial sector as a whole. Boyd et al. (2001) examine the impact of inflation on the aggregate financial sector and find inflation hinders financial development. Demirguc-Kunt and Huizinga (1999) and Demirguc-Kunt et al. (2004) are most comparable to our study in that they use panel datasets of banks across countries to examine macroeconomic and institutional determinants of bank interest markups and (in the former case) profitability. Interestingly, Demirguc-Kunt and Huizinga do not find an effect of growth on bank profitability, and they find that lower corruption and better contract enforcement lower profitability.[51]

Our study's main difference from these is its exclusive focus on MFIs. It is far from clear that what holds true for commercial banks or the banking sector as a whole will also hold true for MFIs. There are significant differences. First, a number of MFIs are subsidized, indefinitely or at least during an initial start-up phase. Thus it is not a foregone conclusion that MFIs failing to break even for a number of years will cease to exist. In other words, there appears to be much more significant and persistent variation on the financial sustainability margin in the MFI sector than in the formal banking sector. Second, MFIs by definition tend to serve a different client base and finance relatively small projects. The MFI's technologies of

[51] Research has also attempted to understand causes of systemic banking crises, e.g. Demirguc-Kunt and Detragiache (1998, 2000, 2005), Kaminsky and Rinehart (1999), and Eichengreen and Rose (2001).

service delivery, screening, and monitoring may significantly differ from those in the formal banking sector, and clients' projects also may face different determinants of viability. In summary, 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 relationship with the macroeconomy cannot likely be extrapolated from results on the broader banking sector.[52]

There are a few papers that do focus on the relationship between the macroeconomy and MFI performance. The Patten et al. (2001) case study of BRI in the wake of the late-1990's Indonesian financial crisis finds 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 points for just one year; this compares with a spike in annual inflation of more than fifty percentage points. Apparently, BRI charged significantly lower real interest rates, and hence had lower real revenue rates, as a result of the crisis. Henley (forthcoming) studies Indonesian finance over the past century and argues 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.

Several studies more closely related to ours appeared since our first draft (Ahlin and Lin, 2006). Independently of us, Krauss and Walter (2006, updated 2008) examine correlations between MFI performance and stock market indices as well as domestic income levels, using MFI fixed effects. They find that MFI performance is less correlated with stock market indices than comparison groups of emerging market firms and emerging market banks, but more correlated with GDP levels.[53] Also independently, Gonzalez (2007) examines measures of portfolio at risk and default using similar data to ours in an MFI fixed effect specification. He finds that only the PAR-30 measure is significantly related to growth, while other

[52]There are similarities between this question and another that has received much attention, the relationship between growth and poverty.

[53]Given their MFI fixed effect specification, including GDP levels could partially pick up an age effect, which is not directly included in their specification.

measures of default, including the loan loss expense rate, are not.

There are a number of differences between our approaches. We aim to test a broader set of macroeconomic and macro-institutional determinants, and we examine both broad indicators of MFI sustainability and growth as well as their components; we focus on solving outlier and data quality issues as well as endogeneity issues; and, related, we use and isolate both within- and between-MFI variation. Krauss and Walter (2008), on the other hand, include correlation with stock indices and also compare to emerging market firms and banks; Gonzales (2007) uses a richer set of MFI controls and default measures. We view the results as complementary and in agreement where they overlap.[54]

Of course there 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 the private credit measure used here. 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. Nonetheless, we addressed the issue of reverse causation in the robustness section 5.2.

7 Conclusion

This study is a first attempt to place the performance of microfinance institutions in the relevant national context. We examine country-level determinants of success of more than 300 MFIs from around the world. The broad conclusion that emerges is that MFI success – at least in terms of financial sustainability and its components, and extensive and intensive growth – is significantly affected by the macroeconomic and macro-institutional environment in which an MFI is situated.

Specifically, the evidence is that growth – both cyclical and sustained – is good for

[54]The exception would be in the emphasis of Gonzales (2007) on the macroeconomic resilience of MFIs. One difference is in estimation techniques, where again we focus on outlier issues and use both within- and between-MFI variation, while Gonzales focuses on endogeneity issues by using only within-MFI variation. However, our results are still significant, though quantitatively muted, when we use only within-MFI growth variation to explain default.

MFI financial performance and is strongly associated with loan-size growth. Also, a more developed financial sector predicts lower operating costs and lower default, along with commensurate drops in interest markups – suggesting that broad financial competition does benefit micro-borrowers.

But, signs of rivalry between microfinance and industrial-led growth also appear: workforce participation is associated with lower operational self-sufficiency, and both it and manufacturing's share of GDP predict slower growth of MFIs. This parallels the work of Ahlin and Jiang (2008), which shows theoretically that microfinance can impede industrial development under some conditions.

There are also hints that institutions may be in danger of over-reaching and diminishing the space in which micro-enterprise can easily operate – for better or worse. However, credit information systems do seem to have a significant role to play in lowering costs of lending, and thus borrowing.

However, the macroeconomic and macro-institutional context is not the whole story; it does not appear to be even the majority of the story of MFI success. But its effects seem non-negligible and systematic enough to be factored into any rigorous evaluation of an MFI. MFI evaluation ought to "handicap" for the country environment.

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Table 1a – MFI Variable Descriptions

Variable	*Description*	*Obs.*	*Mean*	*Std. Dev.*	*% between*	*Median*	*25th %ile*	*75th %ile*
Operational **self-sufficiency**	Financial revenue / (Financial expense + Loan loss provision expense + Operating expense)	1912	118%	58.9%	46.3%	115%	100%	134%
Sustainable	Equals 1 if *self-sufficiency* ≥ 100%, 0 if not	1912	0.751	0.433	46.3%	1	1	1
Loan Loss Expense Rate	Loan Loss Provision Expense / average gross loan portfolio	1479	3.07%	5.78%	34.1%	1.90%	0.83%	3.68%
PAR-30	Value of loans at-risk > 30 days / average gross loan portfolio	1767	4.84%	6.88%	59.5%	2.84%	0.83%	6.01%
Interest markup	Difference between average interest rate and average cost of capital	1578	36.0%	26.7%	57.4%	30.7%	22.4%	43.8%
Cost per dollar loaned	Operating expense / average gross loan portfolio	1577	30.3%	29.8%	70.7%	22.3%	15.0%	36.6%
Cost per borrower	Operating expense / average number of active borrowers ($)	1577	147	171	75.2%	103	53.5	176
MFI borrower growth	Growth in the MFI's number of active borrowers	1536	26.3%	36.5%	36.7%	21.8%	7.94%	38.4%
MFI loan-size growth	Growth in the MFI's average loan size	1536	11.1%	31.6%	25.3%	10.6%	−1.9%	24.1%
Total Assets	Total of all net asset accounts ($M)	1912	21.5	66.7	84.1%	4.34	1.33	15.2
Age	Age of the MFI (years)	1912	9.70	7.12	91.1%	8	5	13

Note: For each variable, statistics are calculated based on the observations included in the regression that has the maximum number of observations and includes this variable. The %-between column gives the between-MFI variance as a fraction of the total variance.

Table 1b – Macroeconomic and Institutional Variable Descriptions

Variable	*Description*	*Obs.*	*Mean*	*Std. Dev.*	*% between*	*Median*	*25th %ile*	*75th %ile*
Income$_{t-1}$	Lagged Real GDP per capita (year-2000 $)	1912	1297	1159	99.1%	1039	369	1784
Growth	Annual growth in real GDP per capita	1912	3.67%	3.93%	57.4%	3.26%	1.58%	5.46%
Workforce participation	Labor force / Population aged 15-64	1912	70.8%	8.31%	98.2%	71.8%	65.4%	75.3%
Manufacturing	Manufacturing value added (% of GDP)	1912	14.9%	5.26%	95.4%	15.7%	11.3%	18.1%
Private credit	Domestic credit to private sector (% of GDP)	1912	27.3%	17.2%	92.4%	24.0%	16.8%	35.0%
Remittances	Workers' remittances and compensation of employees, received (% GDP)	1887	6.29%	6.77%	84.3%	4.02%	1.52%	8.29%
Agriculture	Agriculture, value added (% GDP)	1912	18.9%	11.3%	97.6%	15.4%	9.14%	26.1%
Services	Services, value added (% GDP)	1912	52.7%	9.20%	94.2%	54.2%	47.5%	58.7%
Inequality	Average gini coefficient over 1994-2006	1860	44.3	8.27	100%	44.2	36.5	50.6
Foreign direct investment	Net foreign direct investment inflows (% of GDP)	1912	3.97%	4.19%	51.9%	3.29%	1.81%	4.97%
Regulatory Quality Index	Index of quality of government regulations related to private sector development (-2.5 to 2.5; KKM)	1613	-0.326	0.433	85.7%	-0.349	-0.593	-0.0405
Rigidity of Employment Index	Index of regulations affecting employment rigidity (0 to 100; Doing Business)	1165	41.7	14.5	94.0%	41	30	51
Credit Rights Index	Index of legal rights of borrowers and lenders (0 to 10; Doing Business)	904	3.39	1.77	94.6%	3	2	4
Credit Information Index	Index of credit information availability (0 to 6; Doing Business)	1159	2.91	2.14	92.0%	3	1	5
Contract enforcement time	Time required to enforce a contract (days; Doing Business)	1165	572	306	98.8%	498	381	626

Note: For each variable, statistics are calculated based on the observations included in the regression that has the maximum number of observations and includes this variable. The %-between column gives the between-MFI variance as a fraction of the total variance.

Table 2 – Baseline (Pooled) Results

Variable	*Self-sufficiency*	*Interest markup*	*Loan loss expense rate*	*PAR-30*	*Cost per dollar loaned*	*Cost per borrower*	*Borrower growth*	*Loan-size growth*
Age_t	1.78^{aaa}	0.147	-.0199	0.205^{bac}	-0.219	-2.77	-2.20^{aaa}	-0.917^{bbb}
	(0.539)	(0.329)	(0.0442)	(0.0731)	(0.334)	(1.87)	(0.577)	(0.306)
Age_t^2	-0.0433^{aaa}	-0.00641	0.00127^{--c}	-0.00207	0.00318	0.0503	0.0442^{aaa}	0.0211^{c-c}
	(0.0163)	(0.00769)	(0.0116)	(0.00228)	(0.00823)	(0.0519)	(0.0163)	(0.00887)
$\ln(Assets_t)$	3.99^{aaa}	-3.33^{aaa}	0.0242^{--x}	-0.143^{--a}	-4.09^{aaa}	0.997	1.35^{ca-}	0.912
	(0.958)	(0.637)	(0.0702)	(0.118)	(0.639)	(2.61)	(0.846)	(0.529)
$\ln(Income_{t-1})$	0.623	1.74^{--c}	0.107^{--c}	-0.0323	1.46	53.1^{aaa}	-0.559	0.512
	(1.85)	(1.16)	(0.122)	(0.245)	(1.20)	(5.76)	(1.26)	(0.971)
$Growth_t$	1.53^{aaa}	-0.0670	-0.070^{aaa}	-0.177^{aaa}	-0.252^{c-b}	-1.99^{-b-}	0.151	0.764^{aaa}
	(0.302)	(0.173)	(0.0247)	(0.0484)	(0.133)	(1.03)	(0.292)	(0.242)
$Workforce_t$	-0.616^{aaa}	0.0795	-0.0109	0.00572	0.129^{--c}	0.681	-0.348^{baa}	0.184
	(0.194)	(0.139)	(0.0126)	(0.0227)	(0.117)	(0.536)	(0.168)	(0.110)
$Manufacturing_t$	0.110	0.561^{bba}	0.00975	0.0154	0.448^{c--}	-0.648^{--b}	-0.270^{cbc}	0.164
	(0.313)	(0.197)	(0.0211)	(0.0405)	(0.200)	(0.952)	(0.207)	(0.159)
Private $Credit_t$	-0.0682	-0.208^{bba}	-0.0149^{aaa}	-0.0292^{bbb}	-0.147^{bba}	-0.689^{bb-}	-0.0241	-0.0674
	(0.0779)	(0.0740)	(0.00462)	(0.0101)	(0.0623)	(0.273)	(0.0732)	(0.0504)
Obs.	1912	1578	1479	1767	1577	1577	1536	1536

Note: Each column corresponds to a separate regression, with the dependent variable listed atop the column. Included in all regressions are institutional-type dummies. Significance at 1%, 5%, and 10% is denoted by **a**, **b**, and **c**, respectively. Significance in the median regression is denoted by the first letter, significance in the robust regression by the second letter, and significance using the median p-value of six OLS regressions dropping varying numbers of outliers by the third letter. (A significant coefficient with opposite sign to the one reported in the table is denoted by an **x**.)

Table 3 – Within and Between Results

Variable	*Self-sufficiency*	*Interest markup*	*Loan loss expense rate*	*PAR-30*	*Cost per dollar loaned*	*Cost per borrower*	*MFI growth*	*Loan growth*
Age_t	1.81^{aaa} (0.562)	0.0198 (0.351)	-0.0199 (0.0443)	0.167^{cb-} (0.0783)	-0.324 (0.346)	-3.61^{cb-} (1.91)	-2.13^{aaa} (0.580)	-0.948^{bbb} (0.323)
Age_t^2	-0.0443^{aaa} (0.0168)	-0.00382 (0.00830)	0.00133^{-cb} (0.0118)	-0.00114 (0.00236)	0.00622 (0.00863)	0.0720 (0.0539)	0.0418^{aaa} (0.0164)	0.0213^{c--} (0.00916)
$\ln(Assets_t)$	4.17^{aaa} (1.02)	-3.50^{aaa} (0.650)	0.0328^{--x} (0.0703)	-0.213^{c-a} (0.139)	-4.56^{aaa} (0.698)	0.0585 (2.61)	1.42^{ca-} (0.875)	0.829 (0.551)
$\ln(Income_{t-1})$	0.482 (1.91)	1.83^{--b} (1.17)	0.107^{--c} (0.118)	-0.0366 (0.280)	1.54 (1.21)	51.2^{aaa} (5.59)	-0.886 (1.29)	0.296 (0.985)
Growth Median	1.95^{aaa} (0.625)	-0.518^{--c} (0.383)	-0.0924^{aaa} (0.0284)	-0.305^{aaa} (0.0905)	-0.669^{bbb} (0.323)	-3.52^{ba-} (1.31)	0.242 (0.432)	0.710^{baa} (0.311)
Growth $Deviation_t$	1.42^{aab} (0.316)	0.203^{-bb} (0.144)	-0.0265^{-bb} (0.0276)	-0.0845^{baa} (0.0408)	0.114 (0.158)	0.940 (0.816)	0.182 (0.392)	0.866^{aaa} (0.334)
Workforce Median	-0.575^{aaa} (0.196)	0.0665 (0.157)	-0.00697 (0.0125)	0.00404 (0.0263)	0.121 (0.127)	0.705 (0.577)	-0.378^{baa} (0.169)	0.133 (0.111)
Workforce $Deviation_t$	-1.07^{-b-} (0.811)	-0.119^{--b} (0.390)	-0.143^{bcc} (0.0596)	-0.0235 (0.0897)	0.306 (0.349)	5.79^{bb-} (1.89)	0.179 (1.17)	0.559 (0.752)
Manufacturing Median	0.113 (0.333)	0.638^{aaa} (0.203)	0.0204 (0.0212)	0.0398 (0.0472)	0.480^{cc-} (0.201)	-0.142^{--b} (1.02)	-0.382^{cbc} (0.227)	0.117 (0.167)
Manufacturing $Deviation_t$	0.368 (0.860)	-0.742 (0.589)	-0.133^{ba-} (0.0573)	-0.0349 (0.113)	-0.248 (0.474)	-2.43^{-b-} (2.08)	0.639 (0.892)	0.989 (0.793)
Private Credit	-0.0401 (0.0962)	-0.258^{bba} (0.0923)	-0.0169^{aaa} (0.00479)	-0.0354^{aaa} (0.0129)	-0.188^{bca} (0.0740)	-0.776^{ba-} (0.323)	-0.00629 (0.0799)	-0.0835 (0.0505)
Private Credit $Deviation_t$	-0.219^{-c-} (0.192)	-0.0141 (0.0817)	0.0187^{c-c} (0.0122)	-0.00528 (0.0204)	-0.0319 (0.0665)	-0.0698 (0.458)	-0.00713 (0.166)	-0.0132 (0.144)
Obs.	1912	1578	1479	1767	1577	1577	1536	1536

Note: See Note to Table 2. The "Median" variables are within-MFI medians (calculated using only the observations used in the regression), while the "$Deviation_t$" variables are deviations from this median in a given year.

Table 4 – Other Macroeconomic Determinants

Variable	*Self-sufficiency*				*Loan-size growth*		*Borrower growth*
$Growth_t$	1.43^{aaa} (0.300)	1.46^{aaa} (0.306)	1.83^{aaa} (0.337)	1.19^{aaa} (0.334)	0.653^{aaa} (0.237)	0.976^{aaa} (0.298)	0.0163 (0.319)
$Workforce_t$	-0.459^{bba} (0.205)	-0.579^{aaa} (0.194)	-0.587^{aaa} (0.202)	-0.462^{baa} (0.231)	0.230^{c--} (0.107)	0.0495 (0.107)	-0.307^{ccb} (0.171)
$Manufacturing_t$	0.0778 (0.329)	0.0530 (0.321)	0.181 (0.333)	0.0301 (0.339)	0.199 (0.153)	0.136 (0.146)	-0.392^{cbb} (0.204)
$Private\ Credit_t$	-0.092^{-bc} (0.088)	-0.0813^{-c-} (0.0757)	-0.0674 (0.0873)	-0.0717 (0.0851)	-0.0717^{c-c} (0.0485)	-0.0750^{c-c} (0.0524)	-0.0369 (0.0747)
$Remittances_t$	0.428^{bb-} (0.178)						
$Agriculture_t$		-0.548^{bb-} (0.276)					
$Services_t$			0.446^{cb-} (0.272)				
Inequality				-0.391^{ccb} (0.219)		0.323^{bbc} (0.125)	-0.260^{-cb} (0.176)
FDI_t					0.333^{bbc} (0.161)		
Obs.	1887	1912	1912	1860	1536	1493	1493

Note: Each column corresponds to a separate regression, with the dependent variable listed atop the column. Included in all regressions are institutional-type dummies, Age_t, Age_t^2, $\ln(Assets_t)$, and $\ln(Income_{t-1})$. Significance at 1%, 5%, and 10% is denoted by **a**, **b**, and **c**, respectively. Significance in the median regression is denoted by the first letter, significance in the robust regression by the second letter, and significance using the median p-value of six OLS regressions dropping varying numbers of outliers by the third letter.

Table 5 – Institutional Determinants

Variable	*Loan-size growth*				*Borrower growth*
$Growth_t$	0.662[aaa] (0.247)	0.647[aaa] (0.27)	0.725[aaa] (0.257)	0.555[aab] (0.209)	0.295 (0.304)
$Workforce_t$	0.177 (0.109)	0.269[bcc] (0.109)	0.215[c--] (0.120)	0.210[bbb] (0.124)	-0.249[bab] (0.169)
$Manufacturing_t$	0.136 (0.187)	0.0925 (0.177)	0.259[cbc] (0.174)	0.0892 (0.167)	-0.152 (0.233)
Private $Credit_t$	-0.123[bbb] (0.0491)	-0.170[aaa] (0.0530)	-0.108[c-b] (0.0589)	-0.185[aba] (0.0486)	0.0380 (0.0818)
Regulatory $Quality_t$	-2.03[-cc] (2.03)				
Rigidity of Employment $Index_t$		-0.103[cc-] (0.0519)			
Credit Rights $Index_t$			-1.20[bbb] (0.539)		
Credit Information $Index_t$				-2.40[aaa] (0.524)	
Contract Enforcement $Time_t$					0.00707[bab] (0.00343)
Obs.	1344	1045	843	1040	1045

Note: See Note to Table 4.

Table 6 – Breaking Even or Padding Profits?

Variable	*Self-Sufficiency 25th quantile regression*			*Sustainability Dummy Logit*		
Age_t	3.33[a] (0.756)	3.52[a] (0.768)	3.35[a] (0.766)	0.181[a] (0.0391)	0.188[a] (0.0407)	0.188[a] (0.0390)
Age_t^2	-0.0884[a] (0.0262)	-0.0927[a] (0.0258)	-0.0873[a] (0.0263)	-0.00454[a] (0.00108)	-0.00469[a] (0.00111)	-0.00477[a] (0.00108)
$\ln(Assets_t)$	5.67[a] (1.02)	5.73[a] (1.11)	5.67[a] (1.04)	0.370[a] (0.0772)	0.372[a] (0.0782)	0.367[a] (0.0764)
$\ln(Income_{t-1})$	0.453 (1.93)	0.251 (1.95)		0.237[c] (0.129)	0.226[c] (0.129)	
$Income_{t-1}$			4.96e-3[c] (3.25e-3)			7.13e-4[a] (2.39e-4)
$Income_{t-1}^2$			-1.03e-6[b] (0.575e-6)			-1.33e-7[a] (0.398e-7)
$Growth_t$	1.44[a] (0.343)		1.44[a] (0.342)	0.0793[a] (0.0228)		0.0807[a] (0.0229)
$Workforce_t$	-0.441[c] (0.228)		-0.433 (0.228)	-0.0211 (0.0139)		-0.0197 (0.0140)
$Manufacturing_t$	0.112 (0.358)		0.180 (0.373)	0.0260 (0.0197)		0.0348[c] (0.0197)
Private $credit_t$	-0.0606 (0.0916)		-0.0650 (0.0950)	-0.00249 (0.00578)		-0.00544 (0.00532)
Growth median		1.61[a] (0.606)			0.0888[b] (0.0345)	
Growth $deviation_t$		1.29[a] (0.374)			0.0767[a] (0.0252)	
Workforce median		-0.370 (0.243)			-0.0188 (0.0142)	
Workforce $deviation_t$		-1.65[b] (0.916)			-0.0729 (0.0575)	
Manufacturing median		0.214 (0.371)			0.0249 (0.0205)	
Manufacturing $deviation_t$		-0.808 (0.974)			0.0113 (0.0516)	
Private credit median		-0.0445 (0.0965)			0.00162 (0.00631)	
Private credit $deviation_t$		-0.103 (0.164)			-0.0364[a] (0.0130)	
Obs.	1912	1912	1912	1912	1912	1912

Note: Each column corresponds to a separate regression, with the dependent variable and technique listed atop the column. Included in all regressions are institutional-type dummies. Significance at 1%, 5%, and 10% is denoted by **a**, **b**, and **c**, respectively. The "Median" variables are within-MFI medians (calculated using only the observations used in the regression), while the "$Deviation_t$" variables are deviations from this median in a given year.