Business Environment and Microfinance Performance

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Abstract: *Much of the literature on microfinance performance has concentrated on the effects of institution-specific practices, but there have been comparatively few attempts to analyze how the broader economic environment affects the performance of microfinance institutions (MFIs). Drawing on the work of Ahlin and Lin (2006), who find that numerous macroeconomic indicators affect MFI performance, this paper uses a demand-based model to study empirically how the broader business environment in a country affects MFI performance. Most of the results indicate that factors that are supportive of development generally are also supportive of microfinance activities. MFIs tend to perform better in terms of sustainability and outreach in countries that are business-friendly and have relatively developed credit markets. The quantitative impact of the business environment on MFI performance is also substantial, although most of the variation in MFI performance appears to be due to differences at the institution level.*

1. Introduction

In the past twenty-five years, microlending has emerged as a promising and often successful way of helping lift many of the world's poor out of poverty by providing them with loans for small-scale entrepreneurial activities. Many microfinance institutions (MFIs) have found that they are able to achieve profitability and high repayment rates by making small-principal, no-collateral loans to low-income individuals who would not otherwise have access to credit. In response to the growing success and importance of MFIs, there has been increased interest among economists and policymakers in better understanding the role that MFIs play in development. Can microfinance help lift a country out of poverty? Or do microfinance institutions usually thrive in underdeveloped environments with large unofficial economies and

few wage-earning opportunities? Determining the answers to these questions depends on understanding how MFIs interact with the macroeconomic environment.

Meanwhile, governments, NGOs, and private investors have sought to determine why some MFIs are more successful than others and to replicate the success of the top-performers through subsidies, aid, or investment. The entities that fund MFIs have focused on how management and institution-specific practices affect MFI performance both because they are likely of significant importance and because they are controllable.

However, there is an emerging body of literature on microfinance that seeks to describe the relationship between MFIs and the broader economic environment, which has both theoretical implications and practical applications. For example, Ahlin and Lin (2006) found that several macroeconomic indicators are related to MFI performance across a sampling of 47 developing countries in the years 1996-2004. Their results are significant for two reasons. First, as the authors suggest, investors or NGOs looking to evaluate MFI performance should "handicap" for the macroeconomic environment. For example, they find that GDP growth is positively related to MFI self-sufficiency; therefore, evaluators should take growth differences into account when comparing the performances of MFIs in countries with different growth rates. The second contribution of Ahlin and Lin's work is that it provides a clearer idea of how microfinance is related to the development process, which is of theoretical interest to economists. The authors find, for instance, that MFI borrower growth is negatively related to the size of the manufacturing sector and labor force participation, suggesting that the existence of ample wage earning opportunities may reduce the need for low-income individuals to take out small loans to fund microentrepreneurial activities.

2

This paper is motivated by Ahlin and Lin's results and seeks to expand on their work. Whereas Ahlin and Lin's key finding is that GDP growth affects MFI sustainability, we seek to investigate whether certain *determinants* of growth – specifically, the quality of government institutions and the development of the formal financial sector – are related to MFI performance. We focus primarily on the business environment and the development of formal credit markets. Knowing the relationship between MFI performance and the broader business environment allows us to make progress toward determining if microfinance complements broad-based development or if it is a substitute. The answer to this question is not obvious. MFI borrowers might find it difficult to conduct business in an environment characterized by red tape, excessive regulations on business, and unclear property rights, which would lead to poor MFI performance. On the other hand, a burdensome regulatory environment and weak legal system could reduce wage earning opportunities by inhibiting the development of the formal sector. Low-income individuals, whom we view as choosing between wage employment and borrowing from MFIs, would then tend to gravitate more toward MFIs. Moreover, the absence of government institutions conducive to business prosperity would push many economic activities into the informal sector, which is often the part of the economy in which microentrepreneurs thrive. Another possibility is that institution quality affects MFI performance via its influence on GDP growth.

We also examine how the development of credit markets affects MFI performance. Like before, the theoretical relationship between the two is ambiguous. High levels of domestic credit could lead to high rates of GDP growth and in turn to stronger MFI performance. However, if credit penetration is too high, formal credit markets may crowd out microfinance.

3

The primary contribution of this paper is to use a demand-based model to explain MFI performance. By framing the discussion in terms of the choices poorer individuals face in developing country labor markets, we have decided to focus on how determinants of demand for MFI services affect MFI performance. Doing so allows us to better understand how potential MFI clients interact with the broader business environment. However, it would be mistaken to expect that demand determinants related to the business environment explain most of the variation in MFI outcomes. MFIs face substantial supply constraints related to factors such as funding procurement and operating costs, and these certainly affect several dimensions of MFI performance.

To address the ambiguous relationship between microfinance activities and the broader business environment highlighted above, we test empirically the effects of government institution quality and formal credit market development on MFI performance using a sample of MFIs in developing countries that spans the years 2003-2006. We find that our broadest indicator describing the business environment is related both to the ability of MFIs to cover costs and to the rate at which MFIs grow (measured by the number of borrowers). In particular, good business environments are mostly associated with strong MFI performance, in terms of self-sufficiency and borrower growth. (What we mean by "good business environments" will become clearer in the sections that follow.) We also find that the level of domestic credit in a country (as a percentage of GDP) is positively related to MFI borrower growth, which leads us to reject the hypothesis that formal credit markets crowd out microfinance. Finally, we verify Ahlin and Lin's result that GDP growth has a positive effect on MFI profitability, and that the effect persists even when we control for determinants of growth.

4

The paper proceeds as follows. Section 2 discusses the connection to the literature on financial development and determinants of microfinance performance. Section 3 introduces our dataset and defines the key variables. Section 4 describes the estimation methodology. Section 5 reports both the baseline results and robustness tests. Section 6 provides concluding remarks.

2. Related Literature

The question of how a country's business environment affects microfinance institution (MFI) performance is related to numerous strands of research into finance in developing economies.

There have been several attempts to determine the relationship between MFI performance and the broader macroeconomic context in which MFIs operate. In the wake of the East Asian financial crisis of 1997-1998, several case studies emerged that examine how the economic downturn affected microfinance in afflicted countries. McGuire and Conroy (1998) and Patten et al. (2000) note that loan repayment rates fell slightly but remained high (97%) for the dominant provider of microfinance in Indonesia, one of the countries most adversely affected by the crisis. However, outstanding loans dropped during the crisis – which the authors argue reflected decreased demand – and did not return to the Jan. 1998 peak until June 1999.

There is also a body of literature that investigates how MFI-specific regulations affect MFI performance. Many MFIs operate outside of the regulatory frameworks that govern banks in developing countries and are therefore not allowed to attract savings in the form of deposits. Others, meanwhile, have established as formal financial intermediaries subject to banking regulations. Hartarska and Nadolnyak (2007) find that choosing to operate within the regulatory framework does not affect operational self-sufficiency or outreach. Meanwhile, Theodore and Loubiere (2002) analyze 12 Latin American MFIs and argue that the benefits of MFI regulation

exceed the costs. However, neither of the studies examines the role of the broader regulatory and institutional environment in which all firms must operate in a given country.

This paper most closely resembles the work of Ahlin and Lin (2006) in both its empirical methodology and its attention to macroeconomic determinants of MFI performance. But whereas Ahlin and Lin are concerned primarily with macroeconomic outcomes such as GDP growth, this paper will examine how some of the *ingredients* of growth – in particular, the development of a country's institutions – affect MFI performance. The approach is motivated by a well-established body of work showing that government institutions affect both growth and financial development. There have been numerous studies making the empirical case that differences in the quality of government institutions explain growth rate differences across countries (see, for example, Olson *et al*. 2000 and Assane and Grammy 2003). Mauro (1995) arrives at a similar conclusion, finding that government corruption reduces growth by leading to lower investment after examining panel data on 70 countries spanning the period 1980-1983. Excessive government regulation, many have noted, can be a bad thing. Djankov *et al*. (2002) show that higher corruption exists in countries that heavily regulate the entry of new firms into the economy. De Soto (2000) makes the case that developing countries in which the process of registering property is difficult and costly have trouble accumulating capital and achieving high growth rates.

Cross-country studies also show that good government promotes financial development. Demirguc-Kunt and Maksimovic (1998) show that firms in countries with effective legal systems rely more heavily on external financing compared to their counterparts in countries with weaker legal systems, and La Porta *et al*. (1997) demonstrate that the quality of investor protections affects debt and equity market development in a diverse sample of countries. Levine *et al*.

6

(2000) show that strong contract enforcement is associated with greater development of financial intermediaries.

However, because MFIs differ from formal financial institutions in both their mission to reach the poor and the structure of their lending programs, it is not at all clear that the institutional factors associated with financial development in the formal sector will positively affect MFI performance and outreach. Additionally, the development of formal financial intermediaries and capital markets might "crowd out" microfinance. Jain (1998) examines the relationship between formal and informal credit markets theoretically and argues for the existence of a tradeoff between the informational advantages that characterize informal credit markets and the economies of scale in formal credit markets. However, Jain does not examine the role of MFIs specifically, and the issue of whether or not MFIs and formal financial intermediaries are complements or substitutes appears to be an open question.

One final note is that there is an extensive body of research showing that financial development is itself an ingredient of growth (see, for instance, Levine et al. 2000. Green and Kirkpatrick 2002 provide an overview).

3. Data

The MFI data come from The MIX Market (www.mixmarket.org), an online database that aggregates self-reported information about individual MFIs, investors, and partners. As of April 18, 2008, the MIX Market contained data on 1,168 MFIs classified into six types: bank, cooperative/credit union, non-bank financial institution, non-profit (NGO), rural bank and "other."

The data set is an update of the MFI data used by Ahlin and Lin, and we use similar selection criteria. The MIX Market assigns each MFI a rating from one through five stars based

on the reliability and amount of data reported. Only four- and five-star MFIs have had their financial statements audited by a third-party firm, and only MFIs that meet this standard are included in the dataset. Information for MFIs rated below four stars tends to be spotty, and it is relatively difficult to assess how reliable the data are since they have not been scrutinized by outside auditors. The MIX Market also indicates what percentage of a firm's activities are devoted to microfinance, and we restrict our set to include only MFIs whose microfinance activities make up 91-100 percent of services, the highest category. Additionally, we limit the dataset to MFIs that have at least five consecutive years of data on either operational self-sufficiency or borrower growth (described below) through 2006. As in Ahlin and Lin (2006), MFIs classified as rural banks are excluded because the category is too small and lacks sufficient internal variation. Specifically, there are only six rural banks that meet all other selection criteria, and all are located in the Philippines. Also, MFIs classified as "other" are excluded because it is not clear what types of firms are considered "other" and what characteristics they might share. A further criterion is that the MFIs in our sample end their fiscal year on December 31 so that the MFI data match the annual country-level macroeconomic indicators.

The data set includes a total of 148 MFIs, which is the number of MFIs that met our selection criteria during the period of data collection, October 2007, and were located in countries where all data on the macroeconomic environment and institutional quality (described below) were available. Some MFIs in the sample, such as the Grameen Bank, are fairly large and well-known. The set also includes much smaller and newer MFIs, including several that had fewer than 1,000 borrowers at the beginning of the time period in the sample. Overall, the number of borrowers ranged from 74 to 6.9 million.

Each MFI has data from the period 2003-2006. The MFIs represent 47 countries, nearly

all from the developing world. Latin America has the highest representation, with 44 MFIs from

the region included in the sample. Over half of these are from Peru (13) and Nicaragua (11), the

two most well-represented countries overall. In addition, there are 33 MFIs from sub-Saharan

Africa, 22 from Southeast Asia, 13 from central Asia, 8 from Eastern Europe, and 7 from the

Middle East/North Africa.

We make no claims about the representativeness of our sample. One issue is that the

decision to include only those MFIs rated four stars or higher introduces a selection bias in favor

of firms that have audited financial statements, and firms with the capacity and willingness to

undergo such audits (and to report their information publicly) may systematically perform better

than others. However, the tradeoff between inclusiveness and the reliability of the data is one

that cannot be avoided. Also, while the MFIs come from a broad array of developing countries,

the sample is likely not geographically representative. For one, nearly all MFIs from India Nepal

are omitted from the dataset because most of the Indian and Nepalese MFIs ended their fiscal

years on March 31, a problem that appeared only occasionally for firms from other countries.

We collect data on two key MFI financial performance and outreach indicators. The key

financial performance indicator is operational self-sufficiency (OSS), which is defined as the

ratio of revenues to expenses, where expenses include operating expenses, the cost of capital,

and a loan loss provision expense. Revenues can include aid from third party donors. OSS thus

provides a measure of sustainability, where MFIs with an OSS score greater than one were able

to cover costs in a given year. The median of OSS is 1.21, indicating that the typical MFI had

revenue 21 percent higher than its costs. The standard deviation of OSS is 0.34. The maximum

and minimum values, 0.13 and 3.48, indicate the potential for outlier problems, which we address when we introduce the estimation model in the next section.

Our outreach indicator is borrower growth, which is calculated as the year-to-year percentage increase in the number of borrowers for a particular MFI. Borrower growth shows substantial variation. The mean value is 0.33, indicating that the average MFI grows by 33 percent each year, and the standard deviation is 0.65. Borrower growth presents outlier problems as well: the maximum value is 8.84, representing nearly a 900 percent increase in borrowers. Borrower growth can also vary substantially over time for particular MFIs. For example, CMAC-Sullana in Peru grew by 39 percent in 2003 before contracting by 6 percent in 2004.

The data set also includes the year each MFI was founded, from which we calculate the age of each MFI during a particular year. This will allow us to control for differences in MFI performance based on differences in age. The average MFI age in 2003, at the beginning of the sample period, was 9.6 years. The oldest bank in the sample is BRAC in Bangladesh, which was 34 years old in 2003.

The country-level macroeconomic data come from two sources. Annual data on GDP per capita (constant 2000 dollars), inflation, size of manufacturing sector (% GDP) come from the World Bank's World Development Indicators (WDI) online database. From GDP per capita we calculate the annual growth rate of GDP per capita. Ahlin and Lin find that each of these variables is a significant or nearly significant predictor of MFI performance, so they are included here as control variables. Additionally, we include the WDI data on domestic credit as a percentage of GDP and make the assumption that microfinance contributes negligibly to the level of domestic credit among countries in our sample.

Finally, we collect data on each country's head-count ratio, defined by the World Bank as the fraction of the population with an income of less than $1 per day. Data on the head-count ratio are not reported each year, and in most cases the head-count ratio is only reported once during the 2003-2006 period. We make the assumption that poverty levels do not change much over time, so the same head-count ratio is used for all years in the sample within the same country. In cases where two or more data points are available within the 2003-2006 period, we use a simple mean. When no data are available from 2003-2006, we use the most recent figure as long as it has been reported since 2000 – this situation applied to 20 countries in our sample. If no data are available since 2000, we omit the country, which reduced the number of countries in our sample from 62 to 47. The trouble with this approach is that we miss the effects that major income shocks such as recessions have on poverty levels. However, we consider it important to control for poverty levels in our model since the breadth of poverty may be related to an MFI's outreach potential. Moreover, any effort to find a yearly measure of poverty in developing countries is bound to encounter problems with data reliability. The average head-count ratio for the sample is 22.8 percent, indicating that most of the countries have a substantial amount of people facing acute poverty. The standard deviation is 19.7 percent, and the most impoverished country is Nigeria, with a head-count ratio of 70.1 percent.

Our focal country-level data come from the World Bank's Doing Business series (World Bank 2004-2007), which consists of annual reports describing the regulatory environment faced by businesses in nearly all of the world's countries. The World Bank collects the data by conducting annual surveys on the business environment in each country. From the Doing Business series we collect data on four indicators. The first is the number of days required to register property in a particular country, which provides a measure of red tape and the quality of

property law. Also, the number of days required to register property is likely related to the development of formal credit markets in which borrowers must provide collateral. The median number of days to register property was 49.5, although there is a long tail that contains outliers. For instance, the World Bank found that it took 683 days to register property in Haiti in 2006. Although it seems plausible that relatively developed countries would have more streamlined processes for registering property due to the presence of stronger government institutions, there is only a weak relationship between log income and the number of days to register property in the sample (see Appendix A).

The second indicator from the Doing Business series is the number of days required to formally register a business. This provides another measure of red tape and information about barriers to entry faced by firms seeking to operate in the formal sector of the economy. We therefore expect that the number of days required to register a business will affect the wage-earning opportunities faced by potential MFI clients. The data on the number of days required to register a business are qualitatively similar to the number of days required to register property. The median number of days required to register a business is 45, and since the distribution is bounded below, it is skewed toward low values. There are only a few countries in which it takes more than 100 hundred days to register a business. Even though the number of days required to register a business and the number of days required to register property both in some sense provide a measure of red tape, the two actually share a weak negative correlation for reasons that remain unknown.

We also collect data on two indices that capture credit market development. The first, the Strength of Legal Rights Index, gives each country a score ranging from 0-10, with one point being assigned for each of ten characteristics of collateral and bankruptcy laws, described in

12

Appendix B. A higher score means that rights of borrowers and lenders receive better protection

under the law. The second index is the Depth of Credit Information Index. The index ranges

from 0-6 and describes the nature of "rules affecting the scope, accessibility and quality of credit

information available through either public or private credit registries," (World Bank 2007). The

index is constructed in a way similar to the Strength of Legal Rights Index, with higher values

corresponding to deeper credit information. Details are provided in Appendix C. The

distribution of data on the two indices differs somewhat. While the distribution of data on the

Strength of Legal Rights index peaks at around its mean of 4.12, the data on the Depth of Credit

Information index are distributed fairly evenly among low, intermediate, and high values. The

mean for the Depth of Credit Information index is 2.8.

There are two issues we confronted when adding the Doing Business indicators to our

dataset. The first concerns the time of year at which the indicators were measured. For example,

the reported figures from 2004 and 2005 rely on survey data taken in January of each of those

years. It is therefore not clear whether the business environment an MFI faced in, say, July

2004, would be reflected better by the 2004 numbers or by the 2005 numbers. To address this

problem, we associate the MFI data from a given year with the simple mean of the Doing

Business data from that year and the data from the following year. For example, in 2004 it took

55 days to register property in Guatemala. In 2005, it took 69 days. We therefore use 62 as the

number of days required to register property in 2004. We make no such alterations to the 2006

data since the 2007 data are not yet available. Additionally, since the series begins in 2004, we

simply extrapolate backward in order to create data for 2003; that is, the Doing Business

indicators for 2004 are associated with 2003 MFI data. Appendix D provides an example

showing how the procedure is applied. (The backwards extrapolation is not necessary for the

13

data on the number of days to register a business since actual data are available from 2003 for most countries.)

In addition to the individual Doing Business indicators, we collect data on the Ease of Business Index, which the World Bank constructs from the Doing Business dataset and are available in the WDI database. For each of ten categories of Doing Business indicators, countries are assigned a percentile ranking. (The ten categories, which are detailed in World Bank 2007, include: starting a business, dealing with licenses, employing workers, registering property, getting credit, protecting investors, paying taxes, trading across borders, enforcing contracts, and closing a business.) Ease of Business rankings are determined based on a simple average of the ten percentile rankings. Countries with the highest rankings enjoy regulatory environments friendly to business. Because the data set mostly includes developing countries, the Business Ease rankings tend to have high numerical values. The average ranking is 105, and no country is ranked better than 34.

Appendix A summarizes the correlations among the country-level indicators to be used in the model. For the most part, the variables are only weakly correlated with one another. The most salient exception is that the Ease of Doing Business ranking, the Depth of Credit Information index, and log income all share relatively strong pair-wise correlations. Overall, correlations among the variables will not pose significant problems for the estimation model.

4. Estimation Model

In order to assure that our results can be compared to those of Ahlin and Lin, we use an estimation procedure similar to theirs. In our baseline model, we pool all MFI data and estimate the following equation for OSS_{ijkt}, the year t value of OSS for an individual MFI i of institution type k located in country j:

$$OSS_{ijkt} = \alpha + \beta_{age}(age_{it}) + \beta_{age2}(age_{it}^2) + \beta_{lny}[\ln(y_{j,t-1})] + \beta_{HCR}(HCR\_residual_{jt}) +$$

$$\beta_{man}(man\_residual_{jt}) + \beta_g(g_{jt}) + \beta_X(X_{jt}) + v_k + \varepsilon_{ijkt} \qquad (1)$$

The model includes a quadratic learning curve to control for differences in MFI performance due to differences in age. Additionally, we control for log income ($\ln(y_{j,t-1})$), the size of country j's manufacturing sector as a percentage of GDP($man\_residual_{jt}$), the head-count ratio ($HCR\_residual_{jt}$), and growth of GDP per capita (g_{jt}). We also control for systematic differences among different institution types by introducing a vector of dummy variables, v_k. Finally, the vector X_{jt} represents our measures of the business environment, including our selected Doing Business Indicators and the level of domestic credit as a percentage of GDP. One issue with the model is that both the head-count ration and the size of the manufacturing sector are related to log income: countries with higher incomes have less poverty and more developed manufacturing sectors. To address the collinearity problem, both the head-count ratio and the size of the manufacturing sector enter the model as residuals. For the head-count ratio, we use OLS regression to estimate the following equation:

$$HCR_{jt} = \beta_0 + \beta_1[\ln(y_{j,t-1})] \qquad (2)$$

We find β_0 = 100.143 and β_1 = -11.558. From this result, we calculate the residual that enters into (1):

$$HCR\_residual_{jt} = HCR_{jt} - [100.143 - 11.558\ \ln(y_{j,t-1})] \qquad (3)$$

By using a residual in the baseline estimation equation, we can investigate how MFI outcomes depend on the component of the head-count ratio that is not determined by per capita income. We follow the same procedure to calculate the residual for the size of the manufacturing sector.

15

The initial level of borrowers may be related to the extent to which an MFI has saturated the potential pool of borrowers, and as a result it may affect borrower growth over the 2003-2006 time period. Therefore, when borrower growth is used as the MFI outcome variable instead of OSS, we add to the original specification a variable that controls for the initial level of borrowers at the beginning of the time period. The estimation model for borrower growth becomes:

$$\text{BorrowerGrowth}_{ijkt} = \alpha + \beta_{borr}(\text{borr}_{i,2003}) + \beta_{age}(\text{age}_{it}) + \beta_{age2}(\text{age}_{it}^2) + \beta_{lny}[\ln(y_{j,t-1})] +$$

$$\beta_{HCR}(\text{HCR\_residual}_{jt}) + \beta_{man}(\text{man\_residual}_{jt}) + \beta_g(g_{jt}) + \beta_X(X_{jt}) + v_k + \varepsilon_{ijkt} \tag{4}$$

where $\text{borr}_{i,2003}$ denotes the number of borrowers an MFI has at the beginning of 2003.

Instead of using ordinary least squares regression to estimate the model, we use quantile regression. The quantile regression at the 50th percentile is a conditional median regression that is less sensitive to significant outliers in our set of MFI outcomes than OLS regression. We supplement the quantile regression with a weighted least-squares robust regression procedure, which assigns lower weights to outliers.

One other issue with the data is that errors are likely to be heteroskedastic: MFIs report their own data to the MIX Market, so it seems prudent to allow for the possibility that errors may be correlated within MFIs. To address the issue of heteroskedasticity and standard error correlation within MFIs, we bootstrap standard errors and confidence intervals and cluster by institution. The bootstrapping procedure draws a series of random samples with replacement from our set of observations, and since we cluster by institution, the number of draws in each bootstrap dataset is equal to the number of MFIs in the sample. The procedure is repeated 1,000 times, creating a set of parameter estimates. The bootstrap standard errors are then calculated

from the empirical distribution of parameter estimates. To calculate significance levels, we check how many of the 1,000 parameter estimates have the same sign. For example, in order for a parameter estimate to be positive and significantly different from zero at the 10 percent level, 950 (95 percent) of the 1,000 parameter estimates must be positive.

Ahlin and Lin also perform a fixed-effects regression to eliminate the influence of variation between MFIs on their estimates. Doing so allows them to capture exclusively the effects of time series variation on MFI outcomes within countries. However, we omit this extra estimation procedure because our key indicators, particularly the Doing Business indicators, generally do not vary much over time. Therefore, any effects of the Doing Business indicators on MFI performance are not likely to register in a fixed-effects estimation.

5. Results

A. Baseline Pooled Results

Tables 1 and 2 summarize the results of median regression estimation for the OSS and borrower growth variables. We discuss each of the two MFI outcome variables in turn.

Sustainability

Each of the columns in Table 1 reports the results of the regression model as the key test variables are substituted in. Several noteworthy results appear.

First, we confirm one of the main results of Ahlin and Lin (2006). In particular, we find that growth has a positive and significant effect (one percent level) on self-sufficiency. When we test a regression model that does not include any of the Doing Business indicators or domestic credit, we find that a one percentage point change in growth of GDP per capita corresponds to an

increase in OSS of 2.03 points (Table 1, column 1). Ahlin and Lin find a coefficient of 1.98,

which is very close to our result even though we use a different specification for the model and a

different set of MFI data. Our key finding with respect to the growth variable, though, is that the

magnitude of the coefficient is fairly insensitive to the inclusion of other variables in the model.

For example, when the Ease of Business ranking is included in the model, as is shown in column

3 of Table 1, we find that an increase in GDP per capita growth of one percentage point

corresponds to an increase in OSS of 2.14 percentage points. The fact that the coefficient on

growth changes only slightly indicates that the impact of growth is robust. In other words, the

fact that Ahlin and Lin omit institutional determinants of growth from their model does not

appear to bias their results.

Two of the Doing Business indicators also significantly affect OSS. The number of days

required to register property is a positive predictor of OSS and is significant at the 5 percent

level. The magnitude of the coefficient is also notable. An extra day is associated with a 0.09

percentage point increase in OSS. Another way of expressing this relationship is that an increase

in the number of days equal to the interquartile range (41 days) predicts an increase in OSS of

0.037, which is equal to 11.6 percent of the OSS interquartile range (0.319). In other words, an

MFI located in a country that is in the 25th percentile in days required to register property would

see its OSS ratio improve by 3.7 percentage points if the country moves to the 75th percentile.

Moreover, a 3.7 percentage point increase in OSS would lift an MFI in the 25th percentile of

OSS 11.6 percent of the way toward the 75th percentile of OSS. While other factors explain

most of the variation in OSS, the number of days required to register property accounts for a

substantial amount.

In addition, the Ease of Business ranking is a negative and significant predictor of OSS at the 1 percent level. A one point drop in ranking (to a higher numerical value) is associated with a 0.15 percentage point decrease in OSS. Similarly, a drop in ranking equal to the interquartile range (57 spots) is related to a decrease in OSS of 0.086, which is equal to 26.8 percent of the OSS interquartile range. Like the number of days required to register property, the Ease of Business ranking is a quantitatively meaningful predictor of OSS.

None of our other focal variables – days required to register a business, the Strength of Credit Rights Index, the Depth of Credit Information Index, and the level of domestic credit (% GDP) – have a significant relationship with OSS. However, the Depth of Credit Information Index is significant at the 5 percent level when we use the robust regression estimation methodology to estimate the model shown in column 2 of Table 1 (not reported). In that case, a one point increase in the index score (which ranges from 1-6) predicts a 1.44 percentage point increase in OSS. The availability of deeper credit information, then, is associated with better MFI performance.

Although the level of domestic credit is not significantly related to OSS, we have reported one specification of the model that includes both the Ease of Business ranking and the level of domestic credit in the same regression since the two are correlated non-trivially. The results appear in column 5 of Table 1, and it turns out that including domestic credit in the model increases the magnitude of the coefficient on the Ease of Doing Business ranking. Before, dropping one spot in the rankings corresponded to a drop in OSS of 0.15 percentage points; now, the drop in OSS is about 0.19 percentage points.

Several of the variables in the model that were not directly related to institutional quality also yielded results that merit discussion. In most specifications of the model, the head-count

ratio appears as a negative and significant predictor of OSS at the 10 percent level. The result

from Table 1, column 2 is typical. There, a one point increase in the head-count ratio residual is

associated with a 0.29 percentage point decrease in OSS. To test the baseline effect of the head-

count ratio on OSS, we estimated a version of our model that includes the head count ratio while

omitting log income and the Doing Business indicators (not reported). In this case, the head

count ratio has a negative and marginally significant ($p = 0.154$) effect on OSS: a one point

increase in the head-count ratio is related to a 0.08 percentage point decrease in OSS. (When the

robust regression procedure is used, the head-count ratio is significant at the 10 percent level.)

While MFIs target poor clients, there is no reason, *a priori*, why the fraction of acutely poor

individuals in a country should affect MFI self-sufficiency either positively or negatively. The

amount of poor potential borrowers may affect outreach, but it is not immediately clear why the

head-count ratio affects OSS.

Also, in four of the six OSS regressions, the manufacturing residual is a positive and

significant (10 percent level) predictor of OSS. In each specification, a one point increase in the

residual is associated with about a 1 percentage increase in OSS. We find similar – although not

quite significant – results (not reported) when we include the actual size of the manufacturing

sector in the model, rather than just residuals.

Finally, we find significant quadratic learning effects for MFIs: MFIs that have been

around longer tend to have higher levels of self-sufficiency, but the benefits of age are subject to

diminishing returns. For example, in the baseline specification shown in Table 1, column 1, the

learning curve peaks at 18.05 years. However, the possibility of reverse causation exists since

successful MFIs will tend to survive longer than MFIs that cannot consistently cover their costs.

The results from the OSS estimations provide insight into how MFIs and their clients interact with the broader economy. We have shown that the Ease of Business ranking is negatively related to OSS (the more difficult it is to do business, the worse MFIs perform). This result suggests that MFI clients are able to earn higher returns in business-friendly environments and undercuts the notion that the expansion of wage earning opportunities in the formal sector is inconsistent with strong microfinance performance. Indeed, the size of the manufacturing sector is positively related to OSS. We regard the relationship between manufacturing (% GDP) and OSS as spurious, though. If a business friendly environment is conducive to both MFI success and development of the manufacturing sector, OSS and the size of the manufacturing sector may be related although not causally related. The manufacturing variable may simply be picking up aspects of the business environment not accounted for by the Doing Business indicators.

Additionally, the weak evidence that the Depth of Credit Information index is positively related to OSS suggests that the development of institutions that support formal credit markets is also supportive of microfinance. And since institutions related to credit markets are an important aspect of the business environment, the positive relationship between OSS and the Depth of Credit Information Index reinforces the finding that the Ease of Business ranking is negatively related to OSS.

At a first glance, the explanation of our results that we have offered so far – that MFI clients are more successful in business friendly environments – is hard to reconcile with our finding that the number of days required to register property is positively related to OSS. Lengthy processes associated with property registration may inhibit enterprise by making it difficult for entrepreneurs to raise capital and offer collateral for loans, so we might expect that OSS would be negatively affected by cumbersome property registration procedures. However,

borrowers from MFIs generally do not own major assets and do not have to offer collateral when taking out a loan from an MFI. The number of days required to register property therefore will not directly affect borrowers' business activities. So why is there a positive relationship then? We offer one possibility, which we do not prove but rather leave as an issue for future investigation. The number of days required to register property may affect OSS because it alters the composition of the MFI borrower pool. It is possible that marginally poor individuals who have some assets are discouraged from seeking formal credit because of poor property laws and the difficulty of registering property. They may then decide to take advantage of microcredit, which does not require collateral. The 1998 MicroBanking Bulletin finds that MFIs that target the poorest clients are only able to cover 70 percent of costs on average, which may suggest that moderately poor (as opposed to acutely poor) borrowers repay their loans at higher rates. So by entering the borrower pool, these relatively high performers would help boost the performance of the MFI.

Borrower Growth

The results of the regressions with borrower growth as the dependent variable produce somewhat different results, which are discussed in the following two sub-sections.

Domestic Credit

The most salient result is that in all of the specifications that include it, the level of domestic credit is a positive and significant predictor of borrower growth. The magnitude of the coefficient varies somewhat depending on which specification is used, but in the specification shown in Table 2, column 1, a 1 percentage point increase in domestic credit is associated with a 0.144 percentage point increase in borrower growth. Therefore, an increase in domestic credit

equal to the interquartile range (34.4 percent) corresponds to an increase in borrower growth of 4.96 percentage points – which is equal to 15.4 percent of the interquartile range of borrower growth.

The positive relationship between the domestic credit level and borrower growth undercuts our hypothesis that high levels of domestic credit crowd out microfinance and reduce the potential for MFI expansion. A story involving crowding out would require a negative coefficient. If our actual coefficient were not statistically different from zero, we could conclude that credit simply does not reach the poor in developing countries – even in those with relatively high levels of domestic credit – and leave it at that. While this conclusion is not inconsistent with our result, it remains to be explained why the relationship between the level of domestic credit and borrower growth is actually positive rather than zero.

We suggest two possibilities for why the level of domestic credit positively relates to borrower growth. The first uses the same logic applied to many of the results reported above. Because credit markets facilitate business transactions and business expansion, the level of domestic credit is an important component of a country's business environment. And as we have seen, MFIs tend to perform better when the business environment is favorable. The second possibility is related to how MFIs themselves act in formal credit markets. Since the level of domestic credit provides signals about the availability of loans, MFIs operating in countries with high levels of domestic credit should have substantial opportunities to borrow. If they do in fact borrow more in countries where credit is readily available and use the funds to expand and attract new borrowers, then a high level of domestic credit should be associated with high MFI borrower growth. However, proving this explanation would require more detailed information about MFI balance sheets than is available.

Doing Business Indicators

The effects of the Doing Business indicators on borrower growth are qualitatively similar to their effects on OSS. The number of days required to register property is a positive and significant (10 percent level) predictor of borrower growth. As column 1 of Table 2 reports, an extra day required to register property corresponds to a 0.07 percentage point increase in borrower growth. An increase in the number of days to register property equal to the interquartile range (41 days), then, increases borrower growth by 2.9 percent. The magnitude of the effect is fairly small, but it is also not trivial since the effect of an extra 2.9 percentage points of borrower growth can compound over time. We also find that the number of days to register a business, the Depth of Credit Information Index and the Strength of Legal Rights Index are all insignificant predictors of borrower growth.

Additionally, we find some evidence that the Ease of Business ranking is negatively related to borrower growth. In a specification of the model that includes both domestic credit and the Ease of Business ranking, and which was estimated using quantile regression (Table 2, column 3), the Ease of Business ranking is not a significant predictor of borrower growth. However, as column 4 reports, the ranking is significant at the 5 percent level when the robust regression is used to estimate the same model. In that case, a drop of one spot in the Ease of Business rankings is associated with a 0.13 percentage point decrease in borrower growth. Although the evidence for the Ease of Business ranking is not especially strong, it does appear that it has somewhat of a negative relationship with borrower growth. (We also ran an unreported regression that included the Ease of Business ranking but not domestic credit. The coefficient on the Ease of Business ranking was negative and significant at the 1 percent level. The fact that adding domestic credit to the model reduced the significance of the ranking

suggests that the correlation between the two is responsible for much of the observed effect of the ranking on borrower growth. For that reason, we also included domestic credit in the specification in column 1 since domestic credit is also somewhat correlated with the other Doing Business indicators.)

The borrower growth results pose an apparent contradiction similar to the one we confronted when interpreting our OSS results. Why do poorer Ease of Business rankings lead to lower borrower growth while increasing the number of days required to register property leads to higher borrower growth? If both indicators measure the quality of the business environment, then they should both have the same sign. As it turns out, we can use the same reasoning as before to resolve the seeming paradox. When the business environment is relatively poor, would-be borrowers face lower returns to entrepreneurship. Instead of taking out loans from MFIs to run a small business, poor individuals may either seek wage employment or engage in subsistence activities. In such a setting, MFIs will find it difficult to expand rapidly. Consequently, we observe that the Ease of Business ranking negatively affects borrower growth. However, the number of days required to register property affects borrower growth positively because the process of property registration imposes little burden on poor individuals with few assets, and these are the individuals targeted by MFIs. Meanwhile, cumbersome processes associated with property registration depress activity in the formal sector of the economy, which drives economic activity into the less formal sectors in which MFI clients tend to operate. As a result, MFIs are able to grow their borrower pools quickly.

While some of the Doing Business indicators perform well as predictors of borrower growth, none of the other variables that describe the macroeconomic environment – GDP, GDP growth, size of the manufacturing sector, etc. – have an effect. And since the model is primarily

25

demand-based, its inability to explain most of the variation in borrower growth across MFIs indicates that borrower growth is determined primarily by supply constraints. We posit that most of the variables in our model affect how large the pool of potential microborrowers is, but it appears that the size of the potential borrower pool is not a dominant determinant of MFI growth. Instead, MFI growth is more likely to be constrained by supply-side factors, such as the MFI's ability to raise capital or the skills of MFI managers. This argument is further supported by the fact that the initial level of borrowers for an MFI does not affect borrower growth, as the results in Table 2 attest.

B. Further Tests

Inflation

In addition to the baseline model, we also test a model that includes annual inflation as a regressor. Inflation may be related to the Doing Business indicators, in that a government capable of creating a business-friendly environment is probably relatively likely to keep inflation under control. Therefore, we want to know if the key findings from our baseline model suffer from omitted variable bias. This seems possible, since Ahlin and Lin find that inflation has a negative and marginally significant effect on OSS.

The results for when OSS is the MFI outcome are shown in Table 1, column 6. As expected, inflation is negatively – although not significantly – related to OSS. Comparison with column 2 shows that the key findings are robust to the inclusion of inflation. For example, raising the number of days required to register property by one predicts an increase in OSS of 0.1 percentage points – as opposed to the increase of 0.09 percentage points found in the baseline model of column 2. In either case, the coefficient is significant at the 5 percent level. Table 2,

column 2 reports the results when borrower growth is the MFI outcome variable, and comparison with column 1 shows that the effect of including inflation in the model is immaterial.

Growth of Domestic Credit

One could make the argument that, ex ante, the appropriate analytical model is one that examines the effect of domestic credit *growth* on MFI borrower growth rather than the effect of the *level* of domestic credit on borrower growth. If domestic credit and microfinance are substitutes, then a change in the level of domestic credit should lead to a corresponding change in MFI borrower growth in the opposite direction. If they are complements, the movements should be in the same direction. Another possibility is the factors that lead to domestic credit growth are also supportive of high MFI borrower growth. For example, if there is some exogenous change in the economy or regulatory institutions that enables commercial banks to expand domestic credit quickly, it is possible that these same factors will enable MFIs to extend credit to more borrowers at a fast rate. In that case, growth of domestic credit and MFI borrower growth should be positively related.

Since there are reasonable arguments why the growth of domestic credit should be a more important determinant of MFI growth than the level of domestic credit, we use the model from the previous section to estimate the effect of the annual percentage change in domestic credit on borrower growth. The result (not reported) is that domestic credit growth is not a significant predictor of borrower growth. We conclude that formal credit and microcredit are not close substitutes; microfinance customers generally do not possess the collateral needed to access formal credit markets. This justifies our decision to regard the level of domestic credit primarily as a proxy for the business environment instead of focusing on how it directly affects the demand for microfinance.

Choice of Head-Count Ratio Poverty Line

We also explore the possibility that our results are sensitive to the choice of poverty measure. Using the head-count ratio with a $1/day poverty line shows that poverty levels are negatively related to OSS, but does the finding change much when other measures are used? Because many MFI borrowers are not acutely poor, we also estimate our model using the head-count ratio with a $2/day poverty line. Table 3 compares the results from when the $2/day cutoff is used to the results when the $1/day cutoff is used. Columns 1 and 2 use models that include the Ease of Business ranking but differ in the choice of poverty line. The $1/day poverty line is negative and significant, but the $2/day poverty line is only marginally significant ($p = 0.15$). Additionally, the magnitude (but not the significance) of the coefficient on the Ease of Business ranking is substantially affected when the $2/day poverty line is used. Before, it was -0.0015, but the model with the $2/day poverty line yields a coefficient of -0.0022. Columns 3 and 4 show how the choice of the poverty line affects the results in a model that includes the other four Doing Business indicators. Once again, the $1/day headcount ratio is negative and significant while the $2/day head-count ratio is not. The coefficient on the number of days to register property also changes.

Taken together, these results suggest that some caution is in order when examining the magnitudes of the coefficients on the Doing Business indicators. However, the significance levels of the key results involving the Doing Business indicators are not sensitive to the choice of poverty line.

6. Conclusion

In this paper we have used a demand-based model to investigate how MFIs and their clients interact with the broader business environment. Specifically, we investigate how

28

government institutions and formal credit market development affect MFI sustainability and outreach. Our results indicate that MFIs tend to enjoy higher levels of OSS and borrower growth when located in countries where the government has a relatively effective bureaucracy and creates conditions supportive of free enterprise. One exception is that time-consuming property registration processes are associated with improved MFI performance, in terms of both OSS and borrower growth. However, we conclude that this apparently contradictory result can be explained by the fact that property registration affects microcredit borrowers and formal businesses differentially: the former do not have property to register and do not have to secure loans with collateral.

The magnitude of the effects of business environment on MFI performance is moderate, so our results should be viewed with some caution. While indicators of the business environment account for a noteworthy amount of the variation in MFI outcomes, their effects are dominated by factors not accounted for in the model. A large amount of the variation in MFI performance is idiosyncratic and mostly likely partially related to institution-specific lending practices or management differences among MFIs. A model such as ours that shows how determinants of demand for MFI services affect MFI performance can only tell part of the story; supply constraints faced by MFIs also play a critical role. A related issue is that MFIs have different social objectives. Some are primarily profit-oriented, while others are more altruistically motivated and may cater to the acutely poor at the expense of profit-maximization. We have attempted to account for such differences to some extent in our model by including dummy variables that control for the four main institutional types: bank, cooperative/credit union, non-bank financial institution, and non-profit/NGO. (Clearly, MFIs designated as non-

profits do not have profit motives.) However, the four categories are likely not sufficient to capture the diversity of social objectives that exists among MFIs.

Nevertheless, the main contribution of this paper is to give a clearer view of how MFIs operate within the broader business environments of their countries. Taken as a whole, our results indicate that that a business-friendly environment is supportive of microfinance. Similarly, we reject the notion that the deepening of formal credit markets crowds out microfinance. The level of domestic credit (% GDP) has no effect on OSS and actually has a positive effect on borrower growth, indicating that even relatively deep formal credit markets are not accessible to MFI borrowers. We also find no evidence that the expansion of wage-earning opportunities in the formal sector crowds out microfinance either since we observe that the size of the manufacturing sector shares a weakly positive relationship with OSS.

Finally, we find that growth continues to have a significant and positive effect on MFI self-sufficiency even when we control for determinants of growth related to the business environment and the depth of credit markets. However, because we have only tested ingredients of growth related to government institutions and financial development, it is possible that other determinants of growth, such as human capital, are causally linked to MFI performance via economic growth. We leave this as a topic for future research.

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Table 1 – Pooled Results for OSS

Variable	Operational Self-Sufficiency					
Growth	.0203*** (.00445)	.0237*** (.00518)	.0214*** (.00478)	.0202*** (.00493)	.0197*** (.00498)	.0236*** (.00524)
Manufacturing Residual	0.00982* (.00508)	0.00825 (.00638)	.012* (.00506)	.0103* (.00514)	.0144** (.00522)	0.00757 (.00658)
Age	0.0397*** (.0125)	.0406*** (.0143)	.0452*** (.0130)	.0396*** (.0132)	0.0445*** (.0131)	.0478** (.015)
Age^2	-.0011*** (.000453)	-.00133*** (.00047)	-.00131** (.000474)	-.00108** (.000475)	-0.00127*** (.00047)	-.00153** (.000505)
Ln(income)	-0.00621 (.0337)	-0.00611 (.045)	-0.039 (.0402)	-0.00423 (.034)	-.0412 (.0405)	.000268 (.0481)
HCR Residual ($1/Day)	-.00232* (.00145)	-.00291* (.00197)	-.00339* (.00166)	-0.0023 (0.0015)	-.00294* (.00156)	-.00221 (.00207)
Coop/Credit Union	-0.0661 (.120)	-0.0573 (.111)	-0.0118 (.114)	-0.0596 (.122)	-.0114 (.109)	-0.0668 (.117)
Bank	-.0474 (.0501)	-0.0448 (.0571)	-0.0756 (.0577)	-0.0478 (.0518)	-0.0774 (.063)	-0.0534 (.0558)
Non-Profit (NGO)	-0.0114 (.048)	-0.0231 (.0601)	0.00966 (.0481)	-0.0266 (.0518)	.0159 (.0515)	-0.0467 (.0611)
Days to Register Property		.000901** (.000471)				.00104** (.000469)
Days to Register Business		-0.000637 (.000759)				-0.000676 (.000741)
Strength of Legal Rights Index		0.00214 (.0145)				0.00694 (.0143)
Depth of Credit Info		0.0144 (.013)				0.0155 (.0132)
Ease of Business Ranking			-0.00149*** (.000821)		-.00188*** (.000903)	
Domestic Credit				1.14E-04 (.00075)	-7.90E-04 (.00106)	
Inflation						-0.00377 (.0052)
Constant	.895*** (.236)	.826*** (.327)	1.230*** (.319)	.877*** (.230)	1.308*** (.335)	.739** (.352)
Obs.	481	466	465	480	464	436

All results reported in Table 1 are from quantile regression procedure. Bootstrap standard errors are reported in parentheses. We also calculate the bootstrap confidence intervals and report results at the 10 percent (*), 5 percent (**), and 1 percent (***) significance levels.

Table 2 – Pooled Results for Borrower Growth

Variable	Borrower Growth					
Growth	0.00143	.00261	0.00179	0.00186	0.00199	-0.0054
	(.00397)	(.00483)	(.00532)	(.00403)	(.00424)	(.00414)
Manufacturing Residual	0.0023	.0019	-0.00022	0.000361	-.000134	0.00521
	(.00463)	(.0051)	(.004950)	(.00357)	(.00494)	(.00496)
Initial Borrowers	5.18E-10	-3.44E-09	3.54E-08	1.42E-08	6.94E-08	4.35E-08
	(1.26e-07)	(1.10e-07)	(1.41e-07)	(1.43e-07)	(1.12e-07)	(1.48e-07)
Age	-0.00433	-.00361	-.00123	.00313	.00319	.0028
	(.0126)	(.0126)	(.012)	(.00938)	(.0123)	(.0118)
Age^2	-.000159	-.000183	-.000139	-0.000238	-.000344	-0.000261
	(.000459)	(.000461)	(.00043)	(.00033)	(.000445)	(.000405)
Ln(income)	0.0146	.0196	0.00622	-.0186	0.0234	0.0151
	(.026)	(0.03)	(.0264)	(.0214)	(0.02)	(.0191)
HCR Residual ($1/Day)	-0.00154	-.00148	-.000595	-0.0013	-.000778	-0.00116
	(.00109)	(.00129)	(.0012)	(.00109)	(.00106)	(.0012)
Coop/Credit Union	-0.0625	-0.0373	-0.0453	-.0816	-.0947	-.102
	(.0876)	(0.1)	(.0952)	(.094)	(.0952)	(.106)
Bank	-.0549	-0.0509	-.0114	-.00579	-0.0479	-.0432
	(.062)	(.0632)	(.0667)	(.0504)	(.058)	(.0609)
Non-Profit (NGO)	-0.061*	-0.0536	-0.0405	-.0217	-.0547	-0.0412
	(.0335)	(.0372)	(.0348)	(.0345)	(.0348)	(.0374)
Domestic Credit	.00144***	.00141***	.00179***	.00159***	.00218***	
	(.000706)	(.000713)	(.000752)	(.000654)	(.00061)	
Days to Register Property	.000692*	.000714*				
	(.000381)	(.000413)				
Days to Register Business	-.00109	-0.00108				
	(.000705)	(.000784)				
Strength of Legal Rights Index	-0.0202	-.0204				
	(.0125)	(.0132)				
Depth of Credit Info	.0104	.0109				
	(.0118)	(.013)				
Ease of Business Ranking			-0.000908	-.00134**		
			(.00082)	(.000674)		
Inflation		.00304				
		(.00456)				
Constant	0.261	.192	.277	.451**	0.0473	0.195
	(.199)	(.222)	(.25)	(0.2)	(.132)	(.133)
Obs.	458	429	458	458	473	474

The fourth column of results was generated using robust regression. All other columns report quantile regression results.

33

Table 3 – Head-Count Ratio Tests

Variable	Operational Self-Sufficiency			
Growth	.0214***	.019***	.0237***	.0249***
	(.00478)	(.00456)	(.00518)	(.00493)
Manufacturing Residual	.012*	.0114*	0.00825	0.00908
	(.00506)	(.004970)	(.00638)	(.00617)
Age	0.0452***	.045***	.0406***	.0389***
	(.0130)	(.0124)	(.0143)	(.0134)
Age^2	-.00131**	-.00135**	-.00133***	-.00133***
	(.000474)	(.000458)	(.00047)	(.000449)
Ln(income)	-0.0781	-.119	-0.00611	-.104
	(.053)	(.0691)	(.045)	(.0848)
HCR ($1/Day)	-.00339*		-.00291*	
	(.00166)		(.00197)	
HCR ($2/Day)		-.00299		-.00325
		(.00157)		(.00193)
Coop/Credit Union	-.0118	-.0451	-0.0573	-.0715
	(.114)	(.114)	(.111)	(.108)
Bank	-.0756	-.0716	-0.0448	-.0825
	(.0577)	(.0549)	(.0571)	(.0612)
Non-Profit (NGO)	.00966	0.0119	-0.0231	-0.0168
	(.0481)	(.0482)	(.0601)	(.06020
Days to Register Property			.000901**	0.0011**
			(.000471)	(.000478)
Days to Register Business			-0.000637	-0.000755
			(.000759)	(.000781)
Strength of Legal Rights Index			0.00214	-.00613
			(.0145)	(.0144)
Depth of Credit Info			0.0144	.0229*
			(.013)	(.0152)
Ease of Business Ranking	-.00149***	-.00218***		
	(.000821)	(.000967)		
Constant	1.569***	2.005***	.826***	1.668**
	(.419)	(.586)	(.327)	(.662)
Obs.	465	465	466	466

As in Table 1, all results are generated using the quantile regression.

Appendix A
Correlations among regressors

	Ln(y)	Growth	Man. Resid	HCR Resid	Domestic Credit
Log income (t-1)	1				
Growth	-0.0663	1			
Manufacturing Residual	0.196	0.061	1		
HCR Residual	0.0078	-0.0667	0.314	1	
Domestic Credit (%GDP)	0.185	-0.238	0.216	0.0515	1
Depth of Credit Info	0.696	-0.205	0.0577	0.0918	0.172
Strength of Legal Rights	-0.281	0.118	-0.0627	-0.208	0.0586
Days to Reg. Business	0.131	0.0121	0.137	0.232	-0.328
Days to Reg. Property	-0.187	-0.121	0.124	0.233	0.207
Business Ease Index	-0.44	-0.143	-0.0949	0.0958	-0.27

	Depth of Credit Info	Strength of Legal Rights Index	Days to Reg. Bus.	Days to Reg. Prop.	Bus. Ease Ind.
Depth of Credit Info	1				
Strength of Legal Rights	-0.269	1			
Days to Reg. Business	0.274	-0.324	1		
Days to Reg. Property	-0.122	0.205	-0.136	1	
Business Ease Index	-0.508	-0.26	0.193	0.103	1

Appendix B
Construction of the "Strength of Legal Rights" Index

Countries are assigned a score from 0-10, receiving one point each for meeting the following criteria, as listed in World Bank 2007:
1) General rather than specific description of assets is permitted in collateral agreements.
2) General rather than specific description of debt is permitted in collateral agreements.
3) Any legal or natural person may grant or take security in the property.
4) A unified registry operates that includes charges over movable property.
5) Secured creditors have priority outside of bankruptcy.
6) Secured creditors, rather than other parties such as government or workers, are paid first out of the proceeds from liquidating a bankrupt firm.
7) Secured creditors are able to seize their collateral when a debtor enters reorganization
8) Management does not stay during reorganization. An administrator is responsible for managing the business during reorganization.
9) Parties may agree on enforcement procedures by contract.
10) Creditors may both seize and sell collateral out of court with no restriction.

Appendix C
Construction of the "Depth of Credit Information" Index

Countries are assigned a score from 0-6, with one point being awarded for each of the following six dimensions of credit information, as listed in World Bank 2007:
1) Both positive and negative credit information is distributed.
2) Data on both firms and individuals are distributed.
3) Data from retailers, trade creditors or utilities as well as financial institutions are distributed.
4) More than two years of historical data are distributed.
5) Data on loans above 1 percent of income per capita are distributed.
6) By law, borrowers have the right to access their data.

Appendix D

Revising the Number of Days Required to Register Property in Guatemala

Year	Reported number of days	Revised number of days
2006	37	37
2005	69	53
2004	55	62
2003	n/a	55

In order to account for the fact that Doing Business survey data were collected in January of each year, we adjust the data as follows. The 2006 value remains as is. The adjusted 2005 value is the mean of the 2006 and 2005 values. Similarly, the adjusted 2004 value is the mean of the 2005 and 2004 values. No data is available for 2003, so the 2004 value is used.