POLICY RESEARCH WORKING PAPER   5078

Banks and Microbanks

Robert Cull
Asli Demirgüç-Kunt
Jonathan Morduch

Abstract

Using two new datasets, the authors examine whether the presence of banks affects the profitability and outreach of microfinance institutions. They find evidence that competition matters. Greater bank penetration in the overall economy is associated with microbanks pushing toward poorer markets, as reflected in smaller average loans sizes and greater outreach to women. The evidence is particularly strong for microbanks relying on commercial funding and using traditional bilateral lending contracts (rather than the group lending methods favored by microfinance nongovernmental organizations). The analysis considers plausible alternative explanations for the correlations, including relationships that run through the nature of the regulatory environment and the structure of the banking environment; but it fails to find strong support for these alternative hypotheses.

Banks and Microbanks♣

Robert Cull
World Bank

Asli Demirgüç-Kunt
World Bank

Jonathan Morduch
New York University
and Financial Access Initiative

1.   Introduction

In December 2003, bank regulators estimated that there was one ATM in Bangladesh for every 1.7 million citizens, and one deposit-taking bank branch for every 22,000 people.[1] In Bolivia, there was one ATM for every 21,000 people, and just one deposit-taking bank branch for every 65,000 people. Bangladesh and Bolivia, though, are notable as early sites in which microfinance first took root and grew rapidly. Was the lack of financial depth in the banking system a help or a hindrance to microfinance? This paper is a first attempt to gauge how the presence of formal, regulated providers of financial services in an economy affects the profitability and outreach of financial institutions targeted narrowly to the under-banked and unbanked.

Microfinance banks ("microbanks") target low-income communities, and most make loans without requiring collateral (or are far more flexible than most mainstream commercial banks about the kinds of collateral required to secure loans). They are micro not because of their institutional scale but because of the scale of typical transactions with customers. Loan sizes range from under $100 to roughly $5000, and operational scale varies from several hundred customers to several million. The most famous microbank, Grameen Bank, serves nearly 8 million customers in Bangladesh with an average loan balance of $79 in 2007.[2] If the growth of microfinance has demonstrated nothing else, large numbers of low-income borrowers can be served while achieving a remarkably high level of repayment. Billions of dollars in loans to over one hundred million borrowers are outstanding, and data from top lenders show that only 2-3 percent of those are delinquent in recent years (Cull, Demirgüç-Kunt, and Morduch, 2009b).[3]

The industrial organization of microfinance and the broader banking sector has received little attention so far, but as central banks set the stage for the rapid expansion of

---

[1] Calculation is from Beck et al (2007), Table I.

[2] Armendáriz and Morduch (2005) describe the economics of microfinance, and Cull, Demirgüç-Kunt, and Morduch (2009b) describe recent trends and data. Data on Grameen Bank loan balance are from the Mix Market, as of December 2007 (www.mixmarket.org/en/demand/demand.show.profile.asp?ett=1658, accessed November 22, 2008). Grameen Bank reports having 7.9 million customers as of July 2009 (www.grameen-info.org/index.php?option=com_content&task=view&id=453&Itemid=527, accessed September 1, 2009).

[3] These calculations are for a sample of leading microfinance institutions that serve 18 million borrowers. Loans are defined as delinquent if they are at least thirty days overdue.

"inclusive" banking, it becomes integral to understand how efforts to reach low-income and excluded populations relate to larger economic and financial contexts. The small scale of transactions means that microbanks tend to operate in niches which are little-penetrated by mainstream commercial banks, though competition is emerging, especially with the increasing commercialization of microfinance. Economic theory suggests that a more developed banking sector can both help and hinder the profitability of microbanks. The balance rests largely with the relative strengths of positive spillovers from agglomeration effects and a stronger regulatory environment versus negative spillovers that arise as competition undermines the dynamic incentives at the root of microfinance loan contracts. Determining the balance is ultimately an empirical question. Our results show that the strongest impacts on microbanks of competition from the formal financial sector are on the nature of microbanking services and markets, rather than their profitability. Competition appears to drive microbanks toward niches characterized by smaller-scale loans (suggesting poorer customers) than would otherwise be the case.

To a large extent, competition has gone under-studied due to lack of data, regarding both the reach of formal (non-microbank) providers of financial services and the performance and outreach of microfinance institutions themselves. Recent improvements in the data on both fronts enable us to undertake our analysis. We build on Beck, Demirguc-Kunt, and Martinez Peria (2007) which contains indicators of banking sector outreach for 99 countries that are constructed from aggregate data provided by bank regulators. The focus is on banks because they provide the vast majority of financial services in developing countries. As regulated institutions, their statistical information is relatively reliable and comparable across the sector.

We add measures of the number of bank branches, ATMs, and loan and deposit accounts to complement standard indicators of the depth and efficiency of financial systems, such as the ratio of private credit to GDP and net interest margins.[4] The additional variables add potentially useful information (for example, the correlation between branches per square kilometer and the ratio of private credit to GDP is 0.44:

---

[4] Recent empirical research indicates strongly that financial development as measured by these indicators has a causal effect on economic growth (Beck, Levine, and Loayza 2000; Levine 2005; Levine, Loayza, and Beck 2000; and Rajan and Zingales 1998).

strong but far from perfect). Firms report facing less severe financing obstacles in countries that score higher on the added measures of banking outreach, even when the level of private credit is controlled for in regressions (Beck, Demirguc-Kunt, and Martinez Peria, 2007). We show that the added banking outreach measures are significantly associated with the profitability and outreach of microfinance institutions whereas other measures of banking sector development and efficiency are not.

Our primary goal is to offer evidence on the effects of competition on the profitability and outreach of microfinance institutions. By combining a new dataset on the performance of microfinance providers with another on the outreach of banks, we also hope to make a contribution to the broader issue of how competition can affect access to financial services, especially among the poor.

The rest of the paper is organized as follows. Section 2 describes recent research on competition between financial institutions. In section 3 we describe our data, lay out the basic regression equation, and discuss our hypotheses. In section 4 we present the base results comparing the relationship between bank penetration measures and microfinance outcomes with that between other standard measures of financial development and microfinance performance. We then compare the characteristics of microfinance institutions in high- and low-bank penetrations areas, and discuss the exogeneity of the bank penetration measures. Section 5 builds on the base results in an attempt to identify the types of microfinance institutions that account for the basic relationships we find between bank penetration and microfinance outreach and profitability.

Relative to NGOs, commerically-oriented microbanks tend to make larger loans and serve fewer women as a share of customers. But we find that with greater bank penetration, commercially-oriented microbanks push toward deeper outreach to the poor (as proxied by smaller average loans sizes) and greater outreach to women.

Section 6 explores competing explanations and the robustness of causal claims. The first centers on selection issues by focusing on the subset of older microfinance institutions (those in existence prior to 1996). Since a substantial part of the entry of

banks in developing countries has occurred in recent years, that is, after 1995, it is plausible that this subset of institutions was most likely to be affected by competition. Stronger results for this subset can be viewed as support for the notion that competition with banks had a causal effect on microfinance outcomes. Weaker results would indicate that our base results are driven by new entrants to microfinance. This could indicate that selection effects drove microfinance institutions with particular performance profiles to locate in areas with greater bank presence, but that competition with those banks was not causally linked to outcomes. We then turn to the potential roles of banks' ownership type (foreign and state), the degree of concentration in the banking sector, and regulation and supervision for microfinance outcomes. As described below, there are plausible reasons to believe that our results for the bank penetration variables reflect aspects of banking sector structure or incentives brought about by supervision rather than competition, but the data do not support that conclusion. For readers that remain concerned that bank branch development could be endogenous to the profitability and outreach of microfinance institutions, we provide instrumental variables regressions in section 7. Concluding remarks appear in Section 8.

2.   Financial Sector Competition

There is a large literature on competition between banks, but the most relevant aspect for our purposes relates to methods for lending to small businesses. Loans to small businesses comprise a higher share of the assets of small banks than of large ones (Berger, Kashyap, and Scalise, 1995), and that share declines after large banks are involved in mergers and acquisitions (Berger, Saunders, Scalise, and Udell, 1998). There is also evidence suggesting that small firms rely on relatively deep relationships with their banks in which they are better able to convey 'soft information' about their creditworthiness, information that is not contained in financial statements. Stronger bank-borrower relationships are associated with lower interest rates on loans and reduced collateral requirements (Berger and Udell, 1995) and with greater credit availability (Petersen and Rajan, 1994, 1995).

Studies also indicate that small banks are the preferred organizational structure if a lender wishes to extend credit based on soft information. Because the loan officer is the repository of soft information, an organization must enable her to act on this information and reward her for doing so.[5] Agency problems make this more difficult in large banks, and thus the preferred organizational structure is a small, closely-held bank with few managerial layers (Berger and Udell, 2002; Berger, Miller, Petersen, Rajan, and Stein, 2005). Empirical evidence indicates that large banks are less willing to lend to informationally challenged borrowers that lack adequate financial records and that, after controlling for the endogeneity of bank-firm matching, large banks lend at a greater distance, interact more impersonally with borrowers, have shorter and less exclusive relationships, and are less effective in alleviating credit constraints (Berger, Miller, Petersen, Rajan, and Stein, 2005).

There are some indications that large banks are increasing their lending to small businesses. The distance between small firms and their lenders is increasing, bank-borrower communication is becoming more impersonal, and distant firms are no longer required to be the highest quality credits, suggesting they have better access to credit (Petersen and Rajan, 2002). While large banks devote a lower share of assets to small business loans, recent evidence suggests that their lending to small firms is roughly in proportion to their presence in a local market (Berger, Rosen, and Udell, 2007). Thus, local presence is more relevant for understanding large banks' small business lending than is the total size of the organization. Coupled with previous results on the depth of bank-borrower relationships, this also suggests that large banks are using alternative methods to reach small borrowers that do not rely on soft information such as credit scoring methods (Akhavein, Frame, and White, 2005; Berger, Frame, and Miller, 2005).

Although this is the first paper we know of on competition between microfinance institutions and other providers of financial services, there is a small literature on competition between microfinance institutions themselves. McIntosh, de Janvry, and Sadoulet (2005) (MDS), for example, study the effects of entry by new providers of

---

[5] In the microfinance context, theoretical approaches focus nearly entirely on models without information acquisition by loan officers, even though in practice much information is acquired and, as a matter of theory, information revelation may lead to superior outcomes (Armendáriz and Morduch, 2005).

microfinance on large incumbent microfinance institutions in Uganda. Entry was tilted toward areas where there was a high pre-existing level of penetration by microfinance institutions and banks, and high pre-existing utilization of the formal banks, all indications that microfinance institutions compete with banks. Although they do not test whether entry affects incumbents' profitability, they do show that repayment rates declined in areas where entry was most pronounced, which should have a negative impact on profits. On outreach, there is no evidence that loan sizes changed as a result of entry (with larger loans being a proxy for less outreach), that client dropout rates rose, or that new client enrollment declined, though MDS speculate that this is because the Ugandan microfinance market was far from saturated. There is, however, evidence that the average savings balance at incumbent microfinance institutions declined, consistent with the notion that clients deployed some of those savings with the new entrants, a further sign of competition.

MDS point out that certain clients find it easier to migrate to new entrants than others, in large part because of their ability to signal their creditworthiness. For example, borrowers with large businesses and substantial cash flows are more likely to leave incumbent lenders as new entrants arrive. In part, this is likely due to demand considerations as these borrowers are more likely to prefer more flexible financing than the group lending arrangements that are prevalent in Uganda (and elsewhere) can provide, though it also indicates that entrants are able to identify the incumbents' most promising clients. Their evidence also suggests that clients 'double-dip,' borrowing from both entrants and incumbents at the same time, an issue termed "overlapping" in Bangladesh (e.g., Chaudhury and Matin, 2002). Coupled with the decline in repayment rates, this suggests that lenders are not able to identify a borrower's total outstanding indebtedness, an information problem emphasized in McIntosh and Wydick (2005). However, repayment rates do not decline in districts with higher education levels, consistent with the notion that those borrowers better understand dynamic incentives and the consequences of non-repayment. In short, the Ugandan results suggest that borrowers with a particular profile are more likely to be poached by new entrants than others. In principle, those new entrants could be banks rather than microbanks.

3.   Data and Hypotheses

If banks provide competition for microfinance institutions, greater branch penetration should compel microfinance institutions to explore new market niches, furthering access by making smaller loans (presumably to less wealthy customers) and lending more to women. We should see that as a negative relationship between branch penetration and the average size of microfinance loans and a positive relationship between branch penetration and the share of women borrowers (smaller loans sizes and more lending to women are both proxies for the depth of outreach).

Competition should also depress microfinance profits, since microbanks would likely lose some of their better customers to commercial banks. We would thus expect a negative relationship between branch penetration and measures of microfinance profitability.

The literature also suggests that commercially-oriented microbanks focused on standard bilateral loans to individual customers (as opposed to the "group loans" with joint liability made famous by Grameen Bank) will be more affected by competition with banks than would be NGOs (non-governmental organizations) with the strongest social missions as reflected by depth of outreach.[6] We therefore test whether commercially-oriented providers of microfinance, whose client profiles are probably closer to those prized by banks that are interested in this market niche, are affected by competition to a greater extent than other providers. As emphasized in Cull, Demirgüç-Kunt, and Morduch (2009b), commercially-oriented microfinance institutions are more likely to have for-profit status and to employ an individual lending method, with larger loans, fewer women customers, lower costs per dollar lent, higher costs per borrower, and greater profitability. By contrast, non-government microfinance organizations (NGOs) are more likely to be non-profits, relying on group lending methods that entail smaller loans, more female clients, greater reliance on subsidized funding, higher costs per dollar lent, and less profitability. By identifying the types of microfinance institutions that have

---

[6] See, for example, Cull, Demirguc-Kunt, and Morduch (2009a) on the differential effects of regulation and supervision on these two groups.

the strongest relationships with our branch penetration variables, we aim to further underscore the plausibility of our results as reflecting the effects of competition.

Data

We combine data on bank penetration from 99 developed and developing countries from Beck, Demirguc-Kunt, and Martinez Peria (2007) with data from 346 leading microfinance institutions from 67 developing countries. Country coverage is not perfectly overlapping across the two data sets, and missing data for some of the control variables in our regressions further reduces the sample. We are therefore left with 342 observations from 238 microfinance institutions in 38 developing countries in our largest regressions that incorporate bank penetration variables.

The data on microfinance institutions were collected by the Microfinance Information eXchange (or the MIX), a not-for-profit private organization that aims to promote information exchange in the microfinance industry. These data include outreach and impact data, financial data, audited financial statements, and general information on specific microfinance institutions for 346 microfinance institutions in 67 developing countries.[7] These institutions are large by the standards of the microfinance industry, with nearly 18 million active microfinance borrowers and a combined total of $25.3 billion in assets (in purchasing power parity terms). Participation by microfinance institutions in the MIX is voluntary, and thus the sample is skewed toward institutions that have stressed financial objectives and profitability. We expect that these are more likely to compete with banks than are smaller, less profit-oriented microfinance institutions, and thus are well suited to the analysis we undertake below.

The microfinance data are collected for publication in the *Microbanking Bulletin* (MBB) and have been adjusted to help ensure comparability across institutions when

---

[7] This is a substantial increase over the MIX database used in Cull, Demirgüç-Kunt, and Morduch (2007), which contained information from 124 MFIs in 49 countries. That data set was a variant of the so-called MBB 9 database. In this paper, we use a variant of the MBB 10 database. There are 540 observations in our database because some MFIs report information for multiple years.

9

measuring profitability.[8] In addition to standard entries from the balance sheet and income statements, the dataset contains qualitative information on the lending style employed by the MFI (group versus individual-based lending), the range of services it offers, its profit status, ownership structure, charter status, and sources of funds. Many of these serve as important controls in the regressions that follow.

We estimate the following basic regression:

(1) *MFI Outcome$_{it}$ = α + β$_1$Bank Penetration$_{it}$*

$+ β_2$*Real Yield$_{it}$* $+ β_3$*Capital Costs/Assets$_{it}$* $+ β_4$*Labor/Costs$_{it}$*	MFI Productivity
$+ β_5$*Village Bank Lending$_{it}$* $+ β_6$*Solidarity Group Lending$_{it}$*	MFI Lending Method
$+ B_7$*Ln(age)$_{it}$* $+ B_8$*Ln(assets)$_{it}$*	Other MFI Characteristics
$+ β_9$*Inflation Rate$_{it}$* $+ β_{10}$*Real GDP Growth Rate$_{it}$* $+ β_{11}$*KKM Index of Inst. Development$_{it}$* $+ B_{12}$*Rural Population Share$_{it}$* $+ B_{13}$*Rural Population Growth$_{it}$* $+ B_{14}$*Region$_{it}$* $+ ε_i$	Country Characteristics

Where *Outcome* is a measure of the profitability or "depth of outreach" of microfinance institution *i* in year *t*. The profitability measures that we use are the Financial Self-Sufficiency (FSS) Index and return on assets (ROA). Both measures are adjusted as described above. The FSS ratio is a measure of an institution's ability to generate sufficient revenue to cover its costs.[9] Values below one indicate that it is not doing so. We prefer that ratio because it offers a more complete summary of inputs and outputs than standard financial ratios such as return on assets or equity. Our proxies for the depth of outreach of a microfinance institution are the share of its borrowers that are women

---

[8] These include adjustments for inflation, the cost of subsidized funding, current-year cash donations to cover operating expenses, donated goods and services, write-offs, loan loss reserves and provisioning, a reclassification of some long-term liabilities as equity, and the reversal of any interest income accrued on non-performing loans.

[9] The financial self-sufficiency ratio is adjusted financial revenue divided by the sum of adjusted financial expenses, adjusted net loan loss provision expenses, and adjusted operating expenses. It indicates the institution's ability to operate without ongoing subsidy, including soft loans and grants. The definition is from *MicroBanking Bulletin* (2005), p. 57.

and its average loan size relative to the average per capita income of the bottom 20% in the country. Smaller loan sizes and a higher share of lending to women are correlated with deeper outreach to the poor and excluded groups.

We estimate the models using a robust clustering method that accounts for both heteroskedasticity and correlation across multiple observations from the same microfinance institution.[10] Because observations from the same institution are likely to be correlated, OLS techniques can underestimate errors (thus overestimating significance levels). Including fixed effects for microfinance institutions was not possible because we have no more than three observations for any single institution. For most institutions, we have only one.

The key explanatory variables in our analysis are measures of bank penetration, namely the number of bank branches in a country measured per capita (which we refer to as demographic penetration) and per square kilometer (geographic penetration, hereafter). Beck, Demirguc-Kunt, and Martinez Peria (2007) offer additional measures of penetration based on the number of ATMs and the number and size of deposits and loan accounts. We feel that the branch penetration measures are a better reflection of the potential for personal contact with clients, which we speculate would be necessary to compete for the clients of microfinance institutions.

In focusing on the number of branches in a country, we cannot distinguish whether these branches belong to small or large banks, or where they are located within a country. We are therefore open to the possibility that banks might compete for a subset of clients of microfinance institutions, through either relationship lending based on soft information or the new methods based on hard information that are favored by larger banks. That said, because our analysis is restricted to developing countries with relatively under-developed banking systems, we suspect that relationship lending based on soft information would be the most likely method for banks to compete with microfinance institutions.

---

[10] We also clustered standard errors at the country level and derived similar qualitative results. We do not present those results here.

Because banks are so much larger than microfinance institutions in almost all developing countries, we contend that the decisions of banks to extend their branch networks were made independent of the presence and activities of microfinance institutions. It is therefore logical to treat the penetration variables as exogenous in our regressions, though we will return to this issue below.

In the base regressions we also replace the branch penetration variables with standard measures of financial development that have been used in the literature on financial development and growth (Levine, 2005). The measures we use are the ratios of private credit and liquid liabilities to GDP, which reflect the size of the banking sector, and the interest rate spread, that is, the difference between prevailing lending and deposit interest rates, as a proxy for banking sector efficiency.[11] To the extent that all of these measures are correlated with microfinance profitability and outreach, it would seem unlikely that our penetration measures capture the potential for banks to reach microfinance customers, as we had hoped, and thus cast doubt on the notion that we are picking up the effects of competition in our regressions. By contrast, if we find significant relationships only for the branch penetrations variables, it reinforces our case.

We then alter our base regressions by interacting the branch penetration variables with variables reflecting the degree of commercialization of each microfinance institution. As described above, commercialized microfinance institutions have a profile distinct from others, earning higher profits by making larger loans at lower cost per dollar lent (Cull, Demirguc-Kunt, and Morduch, 2009b). The variables we use are a dummy variable indicating that an institution receives the majority of its funding from commercial sources, another indicating whether the institution makes loans on an individual (as opposed to a group liability) basis, and a final dummy variable indicating whether it is chartered as a non-governmental organization.[12]

---

[11] For descriptions of standard indicators of financial development and their use see Beck, Demirgüç-Kunt, and Levine (2000).

[12] Commercial funding includes deposits and commercial borrowing which is divided by total funding. Total funding also includes donations, non-commercial borrowing (i.e., at non-market rates), and equity, which tends not to reflect true commercial investment for most microfinance institutions (Cull, Demirguc-Kunt, and Morduch, 2009b).

Most of the control variables in equation (1) are the same as those used in other studies of MFI performance and outreach (Ahlin and Lin, 2006; Cull, Demirgüç-Kunt, and Morduch, 2007). *Yield* is the real gross portfolio yield, a measure of average interest charges faced by customers. Because loan losses are not netted out of the revenues, this measure is intended to capture the ex-ante interest rate charged by the lender rather than the ex-post interest rate realized on the portfolio. In other studies, portfolio yields have been positively linked to profitability measures (Cull, Demirgüç-Kunt, and Morduch, 2007, 2009a). The ratios of *capital costs* and *labor costs* to assets are included in the regressions as measures of the productive efficiency of microfinance institutions. The same studies find that those costs measures are negatively linked to profitability.

We control for the lending methods of the microfinance institutions with dummy variables for *village bank lending* and *solidarity group lending*. Solidarity group lenders employ contracts based on joint liability. Loans are made to individuals, but the group, which has between 3 and 10 members depending on the institution and location, shoulders responsibility for a loan if a member cannot repay. Village bank lenders tend to make loans to larger groups. In some cases, each branch forms a single, large group and is given a degree of self-governance. In Uganda's village banks, for example, joint liability loans are made to groups of twenty or more. There is no extensive screening, no collateral is required, loans are smaller, and interest rates are higher than for other lenders (McIntosh, de Janvry, and Sadoulet, 2005). The omitted category in our regressions is therefore "individual lenders" (shorthand for microbanks that lend to individuals using standard bilateral contracts between the lender and a single borrower).[13]

Institution-specific characteristics are captured by controls for the *age* and size (measured by total *assets*) of microfinance institutions. Well-established microbanks might have a different profile than recent entrants, especially in terms of profitability. Similarly, larger microbanks might be better able to take advantage of scale economies that improve their profitability, though they may rely on larger loans to do so.

---

[13] In the regressions that interact the individual lending dummy with the bank penetration variables, we change the omitted category to include both the solidarity group lenders and the village banks.

The regressions also include a number of country-level controls. The *inflation rate* and *real GDP growth* summarize the macroeconomic environment. High inflation makes it difficult for borrowers and lenders to contract with one another, though the impact on lending by microfinance institutions is somewhat muted (Ahlin and Lin, 2006). Growth has a strong impact on MFI performance, in terms of financial sustainability, lower default rates, and growth in loan size (Ahlin and Lin, 2006; Ahlin, Lin, and Maio, 2008). Overall, these results suggest that the country context is an important determinant of MFI performance.

Institutional development is captured by the *KKM index*, a measure of broad institutional development created by Kaufmann, Kraay, and Maztruzzi (2007). Although group lenders use informal mechanisms to secure high levels of repayment, microfinance institutions that lend to individuals might benefit from adherence to the rule of law and well-functioning supporting institutions that help to enforce contracts such as courts, which could improve their profits and enable them to make smaller loans. The *rural population* share (in 1990) is included because forming solidarity groups might be more difficult in sparsely populated areas and contact between borrowers and individual lenders that are not located nearby is likely to be problematic. We also include *rural population growth* (since 1990), since McIntosh, de Janvry and Sadoulet (2005) found that most of the microfinance entry in Uganda in the 1990s occurred in rural areas. We therefore want to control for the possibility that rapidly growing rural areas might attract microfinance institutions with a different profitability-outreach profile. Finally, *region* is a matrix of dummy variables for each main region of the developing world, with "Latin America and the Caribbean" as the omitted category, since profitability-outreach profiles might differ along regional dimensions that are not captured by our other regressors.

Summary statistics for all of our dependent and explanatory variables, and descriptions of how they were constructed, are available in appendix A. We present the correlations between those variables in Table 1. The bi-variate relationships follow expectations based on the existing literature that uses this (or a similar) database. For example, the correlations are consistent with the notion that larger, commercially-funded

14

microfinance institutions are more profitable, make larger loans, and have lower costs per dollar of assets.

4.   Base Results

Base results for the outreach measures (average loan size and the share of women borrowers) are in Table 2; those for profitability (financial self sufficiency−FSS−index and return on assets) appear in Table 3. The results for many of the control variables are in line with previous estimates (Ahlin and Lin, 2006; Cull, Demirguc-Kunt, and Morduch, 2007, 2009a). For example, the cost and portfolio yield variables are strongly correlated with profitability in the predicted ways (negative for cost, positive for portfolio yield), and the village and solidarity group lending variables are strongly associated with smaller loans sizes and more lending to women. The rural population growth variable is strongly associated with greater lending to women, suggesting the importance of rural controls.

The key variables in our analysis are the bank branch penetration variables. If competition from banks affects microfinance institutions, spurring outreach by compelling them to pursue new market niches, we would expect a negative relationship between bank penetration and average loan size, which is true for the demographic branch penetration variable (per capita branches) in Table 2, model 2. We expect a positive relationship with the share of women borrowers, which we see for the geographic penetration variable (branches per sq. km) in model 6. We also expected bank penetration to have a dampening effect on the profits of microfinance institutions, and we find weak evidence in support of that conjecture for return on assets in Table 3, model 7, though we do not find significant results for the financial self-sufficiency index.

In three of eight possible cases in Tables 2 and 3, we find significant coefficients for the bank penetration variables. While we acknowledge that this is not overwhelming support for our main hypothesis, the base results provide some indications that competition from banks reduces the profits of microfinance institutions and compels them to expand their outreach. In contrast, standard measures of financial development (private credit/GDP, liquid liabilities/GDP, and bank interest rate spreads) are statistically

significant in only one of twelve possible cases in Tables 2 and 3. In the one significant case, higher interest rate spreads are associated with lower average loan sizes, a result that is likely driven by selection because smaller loans entail more costs and require higher spreads, and thus the result says little about the effects of competition from banks on microfinance institutions. The general lack of significance for the standard indicators of financial development makes it more plausible that our measures of bank branch penetration are reasonable proxies for the competition imposed on microfinance institutions by banks.

The validity of the base results rests on the assumption that banks' decisions to expand their branch networks are made independent of the presence and activities of microfinance institutions. Given their respective sizes, we feel this is a reasonable assumption, and the data bear this out. If we think of our analysis as summarizing an experiment in which microfinance institutions are randomly assigned bank penetration levels, we would expect that the types of microfinance institutions found in high and low-bank penetration areas would be similar. We would also hope that the characteristics other than bank penetration of the countries in which those institutions are located are similar.

In Table 4 we split the sample of microfinance institutions and the countries in which they reside into two sub-samples, based on high and low bank branch penetration. Countries with penetration levels above the sample median are defined as high penetration areas, those below are in low penetration areas. We do this separately for the demographic and geographic penetration variables. Microfinance institutions in high and low-penetration areas are not significantly different from one another, except that microbanks constituted as NGOs are more prevalent in high geographic penetration areas and institutions tend to be slightly older in high penetration areas for both geographic and demographic penetration. Regarding country characteristics, areas with low levels of demographic penetration are slightly more rural and have slightly lower scores on the KKM index of institutional development. On the whole, however, the sample characteristics for high and low penetration areas are remarkably similar, suggesting that it is appropriate to treat those variables as exogenous in our regressions.

5. Which Microfinance Institutions Are Most Affected by Competition?

Although there are some significant relationships between bank branch penetration and microfinance outcomes for the full sample, we expect that the relationships should be stronger for some institutions than for others. We hypothesized, for example, that microfinance institutions that rely heavily on commercial sources of finance would be more likely to behave like banks. Those microfinance institutions also tend to make loans to individuals rather than to groups and tend not to be non-governmental organizations (Cull, Demirguc-Kunt, and Morduch, 2009b). We therefore expect any competitive effects to be more pronounced for commercially-funded microfinance institutions that make loans to individuals and less pronounced for those institutions that are NGOs when we interact bank branch penetration with those variables.

Depth of outreach

For example, the negative relationship between bank branch penetration and average loan size is much stronger for the microfinance institutions that we hypothesize would face stronger competition from banks (Table 5). Neither the demographic nor geographic penetration variable is significant when the interaction with the commercial funding and individual lender variables are introduced (models, 2-4 and 6-8). The coefficients on those interaction terms are, however, negative, large (in absolute value), and highly significant. By contrast, for NGOs the negative relationship is much less pronounced for demographic penetration and not significantly different from zero for the geographic penetration variable (See F-statistics at bottom of table). This pattern is consistent with the idea that NGOs alter their outreach much less than commercially-funded "individual" lenders in response to competitive pressures from banks, presumably because their focus was already on making small loans.

A related pattern emerges for the share of lending to women borrowers (Table 6). When the commercial funding variable is interacted with geographic penetration in models 6 and 8, the penetration variable is no longer significant, but the interaction term is large, positive, and significant. There are also significant effects when the interactions for non-governmental organizations and individual lenders are introduced, but they are

smaller than for commercially funded institutions (See F-statistics for models 5 and 7). The lack of statistical significance of the interaction terms in those models means that we cannot reject the hypothesis that the relationship is the same for NGOs and individual lenders as it is for other microfinance institutions.

However, when all three interactions enter the regression (model 8), we cannot reject the hypothesis that the relationship between geographic penetration and the share of lending to women is zero for all lenders other than those that rely heavily on commercial funding. As in the base regressions, geographic penetration is related to lending to women but demographic penetration is not (models 1-4); the data cannot reveal why physical proximity is especially important for lending to women, though it may in part capture a correlation with population density in South Asia. The results for geographic penetration are, however, consistent with the idea that commercially-funded microfinance institutions increase outreach to women in response to competition from banks.

Profitability

The results for profitability differ from those for depth of outreach. Although there is a weak relationship between demographic penetration and profitability (as measured by the financial self-sufficiency −FSS−index) in model 4 with all three interaction terms, there are no significant negative relationships between the FSS index and either measure of branch penetration for non-governmental organizations, commercially funded institutions, or individual lenders (Table 7). We present only the results for the FSS index, noting that we found similarly insignificant relationships when using return on assets as the dependent variable. The only statistically significant relationship for the FSS index is a weak positive one for individual lenders in model 7 (see F-statistic), which likely reflects selection effects since it is inconsistent with greater competitive pressure from banks. For NGOs, the lack of significant results could reflect the fact that they do not compete directly with banks, in line with the results for the outreach measures. For commercially-funded institutions and those that make loans to individuals, this could mean that they are able to maintain their profitability even though competition forces

18

them to enter a new market niche, making smaller loans to a pool of borrowers increasingly comprised of women.

Taken together, these results support the notion that competition from banks compels commercially-funded microfinance institutions and those that make loans to individuals to increase their depth of outreach.

6.   Competing Explanations

In this section, we first re-run our models on the sub-sample of well-established institutions, since much bank penetration occurred after these institutions were already operating. For them, significant results would be more likely to reflect the effects of competition rather than selection. Second, we test whether our measures of bank branch penetration are actually proxies for other features of the banking sector, by including variables related to ownership and sector concentration. Third, we test whether the significant relationships that we find are attributable to the effects of regulation and supervision of microfinance institutions rather than competition with banks. Fourth and finally, we examine whether competition from banks lowers the repayment rates on loans for microfinance institutions.

Selection of Older Microfinance Institutions

One explanation for the significant relationships found between bank penetration and the depth of outreach of microfinance institutions hinges on selection rather than competition. That is, microfinance institutions with particular characteristics, including depth of outreach, may tend to enter markets with high (or low) bank penetration. To the extent that is so, it is inaccurate to ascribe our results to competition with banks.[14]

To address whether selection is driving our results, we re-run our models on the subset of microfinance institutions that were in existence prior to 1996. We do so because

---

[14] We note that even if selection is driving our results, the pattern suggests that those that make smaller loans and lend more to women are fitting themselves into high density markets, and thus are complementary to the banks that are already there. They are therefore making a contribution to expanded outreach, though they might not be competing directly with banks.

our bank branch penetration variables come from the end of the period, and thus reflect the rapid expansion in the banking sectors of many developing countries since the mid-1990s. The ratio of credit to the private sector divided by GDP increased substantially from 1995 to 2005 in the transition countries of Europe and Central Asia, in the Middle East and North Africa, and in South Asia, and increased somewhat in sub-Saharan Africa (Figure 1). There was no increase in East Asia and the Pacific or in Latin America, in part due the systemic financial crises there, and thus this approach is less appropriate for microfinance institutions from those regions.

We present the models with interaction terms to capture our predictions about the types of microfinance institutions that would be most affected by competition with banks. We present only the results for geographic bank branch penetration to conserve space, though the results for demographic penetration are qualitatively similar. As in the results for the full sample, demographic penetration is strongly linked to smaller loan sizes but not significantly linked to the share of lending to women for the sample of older microfinance institutions.

The results for the sub-sample of older microfinance institutions are generally similar to those for the full sample (Table 8 and Table 9). For example, there is no significant relationship between geographic penetration and average loans size for non-governmental organizations. There is, however, a significant negative relationship for individual lenders. There is also a negative relationship for commercially-funded microfinance institutions (though here it is not statistically significant, while it was in the full sample). Demographic penetration (not shown) is, however, negative, large in absolute value, and highly significant for commercially-funded institutions, as it was for the full sample. The results for average loan size are therefore very similar to those for the full sample.

The same is true for regressions on the share of women borrowers. There is a significant positive relationship between geographic penetration and the share of lending to women for non-governmental organizations and individual lenders, though we cannot reject the hypothesis that the effect is the same as for other microfinance institutions. For

20

commercially-funded institutions, the effect is somewhat stronger and we can reject the hypothesis that it is the same as for other microfinance institutions, since the coefficient on the interaction is significant, while that on the penetration variable is not (Table 8, model 7). As in the results for the full sample, older commercially-funded microfinance institutions appear more apt to increase lending to women in response to competition from banks.

Results for profitability for the sample of older microfinance institutions differ from those for the full sample (Table 9). Models 1, 3, and 4 indicate that geographic penetration is negatively related to the financial self-sufficiency index for all types of microfinance institutions. However, model 2 indicates that the result is driven by NGOs, given that the relationship is not significant for other types of microfinance institutions in that regression. Similar results do not hold when we use the return on assets as our measure of profitability, but that could be due to the limitations of that variable that we described above.

At the risk of reading too much into a single regression, Model 2 suggests that older non-governmental organizations have a permanent reduction in FSS in countries with a high degree of competition from banks. The pattern is consistent with the notion that competition from banks compels those microbanks into a new market niche, and that, as a result, the FSS of non-governmental organizations suffers over time. The results are similar to findings on the effects of prudential supervision on the outreach and profitability of microfinance institutions: commercially oriented institutions are likely to curtail outreach, making larger loans and lending less to women to maintain their profitability. Less commercially oriented institutions, such as non-governmental institutions, maintain their outreach but their profitability declines as a result of the costs of regulation and supervision (Cull, Demirguc-Kunt, and Morduch, 2009a).

The findings for the subset of older microfinance institutions therefore reinforce our findings for the full sample. Indeed, the findings for the FSS index are stronger than they were in the full sample regressions. Because much of the bank entry and expansion summarised in our indicators of branch penetration occurred after these microfinance

institutions were in existence, the sub-sample results make it more likely that the relationships we find are due to competition with banks rather than the non-random entry of microfinance institutions into particular banking environments.

Banking Sector Ownership and Concentration

A limitation of our branch penetration variables is that we do not know the identities of the banks to which those branches belong. The number of branches could be a proxy for underlying aspects of the structure and ownership of the banking sector that are driving our results. For example, foreign banks might focus on wealthier clients, and thus a high share of foreign ownership in the sector might coincide with a relatively less expansive branch network.[15] Alternatively, a high degree of state ownership in banking might imply an extensive branch network if the mandate of state-owned banks is to provide broad access to financial services.

To test for these possibilities, we include three new variables in our regressions: the share of total banking sector assets held by foreign- and state-owned banks, respectively, and concentration measured as the share of sector assets held by the three largest banks. If those variables are significant while the penetration variables are not, it might cast doubt on whether our results are due to competition or, at the least, it would help us to understand the nature of the competition that most affects microfinance institutions.

Ownership and concentration variables are, in fact, often significant in our regressions, but so too are the penetration variables. For example, greater state ownership in banking is associated with smaller loan sizes (Table 10). More surprisingly, the same is also true for our measure of banking concentration. Controlling for ownership and concentration, the branch penetration coefficients are similar to those we have reported thus far. There is a negative, significant relationship between branch penetration and average loan size for commercially funded institutions and those that make loans to

---

[15] See Clarke et al. (2003) for a discussion of the role of foreign banks in developing countries.

individuals. Those relationships are much more muted for non-governmental organizations.

Bank concentration is negatively associated with the share of lending to women, as one might expect (Table 11). Perhaps more surprisingly, the same also holds for state ownership of banks. As in our previous results, the interaction between penetration and both the commercial funding and individual lending variables is positive and significant (in all but one case in models 3, 4, 7, and 8).[16] The interaction between demographic penetration and the non-governmental organization dummy is negative and significant in model 2, though we cannot reject that there is no relationship between either measure of penetration and the share of lending to women by non-governmental organizations based on the F-tests at the bottom of the table for models 2 and 6.

Finally, there are no strong relationships between our penetration measures and profitability as measured by the FSS index in Table 12, except in model 4 which indicates that non-individual lenders have significantly lower profitability in areas with a high degree of demographic penetration. Weaker results for the profitability measures are also consistent with our main regressions. In short, the inclusion of bank ownership and concentration measures does not alter our conclusions. Bank branch penetration is associated with smaller loan sizes and more lending to women for commercially funded microfinance institutions and those that make loans to individuals. The same is not true for microfinance institutions that are non-governmental organizations.

Regulation and Supervision of Microfinance Institutions

The bank branch penetration variables might also be capturing the effects of regulation and supervision if well-developed banking sectors, as reflected in deeper bank branch networks, spur more stringent regulatory and supervisory scrutiny of financial institutions, including providers of microfinance. We doubt this could be the case because formal supervision is associated with less outreach, meaning larger loans and less lending

---

[16] We acknowledge, however, that we can only reject the hypothesis that the relationship between penetration and the share of lending to women is zero for commercially funded institutions when we use the demographic penetration measure (see F-test, model 3). In that sense, results are a bit weaker than when the bank ownership and concentration variables are not included in the regression.

to women, for commercially oriented microfinance institutions (Cull, Demirguc-Kunt, and Morduch, 2009a). This suggests that commercially oriented institutions curtail outreach to maintain profitability. Yet, in our analysis, branch penetration is strongly associated with smaller loans and more lending to women. Thus it is unlikely that the branch penetration variables are capturing the effects of supervision of microfinance providers.[17]

But to be sure about this, we include in our regressions a variable for whether an institution faces onsite supervision, meaning supervisors are physically present when reviewing their books. About half of the institutions in our sample face onsite supervision. The supervisory variable is not significant when included in our basic regressions, and the results for the branch penetration variables (and their interaction with other variables) are unchanged. The onsite supervision variable is associated positively with average loan size and negatively with lending to women, as expected, when the banking concentration and ownership variables are included in the regression. But the results for the penetration variables remain largely unchanged. Since the qualitative results of the models with onsite supervision are so similar to those we have already presented, we do not present them here.

Competition and Loan Repayment

In Uganda, competition between microfinance institutions led to lower repayment rates for incumbent providers (McIntosh, de Janvry, and Sadoulet, 2005). We would expect the same to be true for competition with banks, and we would again expect results to be stronger for the microfinance institutions most apt to compete, those that rely on commercial funding and lend to individuals.

To check this, we use the share of the portfolio that is at risk, defined as thirty or more days overdue, as the dependent variable in our regressions. We find results similar to those found elsewhere in the literature. For example, individual lenders have a higher

---

[17] It might be possible that penetration is associated with less stringent supervision if, for example, extensive branch networks reflect a laissez faire approach to expansion and other aspects of supervision, though this seems unlikely to us.

share of at risk loans, while non-governmental organizations are a bit lower. We do not, however, find any significant relationships between the branch penetration variables (or their interactions) and portfolio at risk (and thus we do not present those results in the paper). Consistent with the results for the profitability measures, this pattern could suggest that, facing competition from banks, commercially funded institutions and those that lend to individuals expand their outreach without damaging the quality of their portfolios. However, we recognize that the absence of significant results could be stem from the inadequacy of our measure as an indicator of portfolio quality.

7. Instrumental Variables Regressions

We have made a strong case that bank branch penetration is exogenous to the profitability and outreach of microfinance institutions. On a priori grounds this seems likely, based on the large size of banks relative to microfinance institutions. And indeed we have shown that the average characteristics of microfinance institutions and they countries in which they reside are very similar in high- and low-bank branch penetration environments. Moreover, our results are stronger for older microfinance institutions, whose existence predates much of the rapid expansion of banking sector in the developing world since 1995.

Another concern is that a factor omitted from our regression is responsible for both relatively high levels of branching and increased outreach by microfinance institutions. And yet, the previous section shows that our results are robust to the inclusion of a number of potential candidates. In sum, our evidence to this point suggests that the relationships between branching and the performance of microfinance institutions are causal.

Despite the foregoing, the endogeneity of financial development, especially as it relates to economic growth, has long been a concern in this literature (See Levine, 2005). As a final check of the robustness of results, we therefore follow the example of other authors by using dummy variables that identify the origin of countries' company or

commercial law as being English, French, German, or Socialist as instruments for our measures of bank branch penetration (La Porta, Lopez-de-Silanes, Shleifer, and Vishny, 1998; Beck, Demirguc-Kunt, and Levine, 2003).[18]

The pattern of results in Table 13 is similar to that in the base models. For example, demographic branch penetration is strongly negatively related to average loan size (model 2). Moreover, the OLS and IV coefficients for that variable are very similar, and thus it is not a surprise that the Hausman test indicates that it is appropriate to treat demographic penetration as exogenous in that regression. That test does indicate that geographic branch penetration is endogenous (model 1), and the IV regression produces a negative significant coefficient whereas it had been insignificant in the OLS regression (Table 2, model 1). The relationships between the branch penetration variables and average loan size are therefore stronger in the IV models than in the base regressions.

Neither branch penetration variable is significantly associated with the percentage of women borrowers in the IV regressions (models 3 and 4). However, Hausman tests indicate that it is appropriate to treat the penetration variables as exogenous, and thus the OLS results for that variable are valid. The specification tests indicate that endogeneity could be a concern in the profitability regressions. Significance levels for the demographic branch penetration variable are higher and coefficients are larger (in absolute value) in the IV regressions (models 6 and 8) than they were in the OLS regressions. The geographic branch penetration variable is insignificant in both the FSS and ROA regressions (models 5 and 7), but that was also true in the OLS regressions. Our instruments perform well in the models that include the demographic branch penetration variable in that they are relevant (partial Shea correlations of 0.29), and appear to be excludable, especially in the FSS regression (model 6). In short, the IV regressions reinforce the conclusions drawn from the OLS regressions.

---

[18] Other authors have included a dummy variable to identify countries that have Scandinavian legal origin. None of the microfinance institutions in our sample come from such a country, and thus that variable is dropped from our regressions.

8. Conclusions

Around the world, policymakers, regulators, bankers, and activists are focusing on the promise of creating more inclusive financial sectors. Until recently, microfinance institutions have filled market niches, with seemingly little interaction with the rest of the banking system. As microfinance expands in parallel with the broadening of commercial banking sectors, the prospect for interaction—and direct competition—has increased sharply.

This paper has taken a first empirical step to understand questions around the industrial organization of traditional banking and microbanking. We find evidence that competition matters. Greater bank penetration in the overall economy is associated with microbanks pushing toward poorer markets, as reflected by smaller average loans sizes and greater outreach to women—though there is no strong relationship with their profitability. The evidence is particularly strong for microbanks relying on commercial-funding and using traditional bilateral lending contracts (rather than group lending methods favored by microfinance NGOs).

We consider plausible alternative explanations for the correlations, including relationships that run through the nature of the regulatory environment, but we fail to find strong support for these alternative hypotheses. The evidence appears to be driven by direct competition and contestability.

References

Accion International. 2007. "Following Up: Replies to Remaining Compartamos IPO Webcast Questions". At <http://www.accion.org/NETCOMMUNITY/Page.aspx?pid=713&srcid=612>. Accessed December 13, 2007

Ahlin, Christian and Jocelyn Lin, 2006. "Luck or Skill? MFI Performance in Macroeconomic Context." BREAD working paper No. 132.

Ahlin, Christian, Jocelyn Lin, and Michael Maio, 2008. "Where does Microfinance Flouris? Microfinance Institution Performance in Macroeconomic Context." Michigan State University, mimeo..

Akhavein, Jalal, William Scott Frame, and Lawrence J White, 2005. "The Diffusion of Financial Innovations: An Examination of the Adoption of Small Business Credit Scoring by Large Banking Organizations." *Journal of Business*, 78(2): 577-596.

Armendáriz de Aghion, Beatriz and Jonathan Morduch, 2005. *The Economics of Microfinance*, Cambridge, MA: MIT Press.

Barr, Michael S., Anjali Kumar, and Robert E. Litan, Eds. 2007. *Building Inclusive Financial Systems: A Framework for Financial Access*, Washington, DC: Brookings Institution Press.

Beck, Thorsten, Asli Demirgüç-Kunt, and Ross Levine. 2000. "A New Database on the Structure and Development of the Financial Sector." *World Bank Economic Review* 14 (3): 597–605.

Beck, Thorsten, Asli Demirgüç-Kunt, and Ross Levine. 2003. "Law, Endowments, and Finance." *Journal of Financial Economics*, 70(2): 137-181.

Beck, Thorsten, Asli Demirgüç-Kunt, and Maria Soledad Martinez Peria, 2007. "Reaching Out: Access to and Use of Banking Services across Countries." *Journal of Financial Economics*, 85(1): 234-266.

Beck, Thorsten, Ross Levine, and Norman Loayza. 2000. "Finance and the Sources of Growth." *Journal of Financial Economics* 58 (1–2): 261–300.

Berger, Allen N., Anil K. Kashyap, and Joseph M. Scalise, 1995. "The Transformation of the U.S. Banking Industry: What a Long, Strange Trip it's Been. *Brookings Papers on Economic Activity*, 55-218.

Berger, Allen N., William Scott Frame, and Nathan H. Miller, 2005. "Credit Scoring and the Availability, Price, and Risk of Small Business Credit." *Journal of Money, Credit, and Banking*, 37(2): 191-222.

Berger, Allen N., Nathan H. Miller, Mitchell A. Petersen, Raghuram G. Rajan, Jeremy C. Stein, 2005. "Does Function Follow Form? Evidence from the Lending Practices of Large and Small Banks." *Journal of Financial Economics* 76(2): 237-269.

Berger, Allen N., Richard J. Rosen, and Gregory F. Udell, 2007. "Does Market Size Affect Competition? The Case of Small Business Lending." *Journal of Banking and Finance* 31(1): 11-33.

Berger, Allen N., Anthony Saunders, Joseph M. Scalise, and Gergory F. Udell, 1998. "The Effect of Bank Mergers and Acquisitions on Small Business Lending." *Journal of Financial Economics*, 50: 187-229.

Berger, Allen N. and Gregory F. Udell, 1995. "Relationship Lending and Lines of Credit in Small Firm Finance." *Journal of Business*, 68(): 351-382.

Berger, Allen N. and Gregory F. Udell, 2002. "Small business Credit Availability and Relationship Lending: The Importance of Organizational Structure." *Economic Journal*, 112(477): F32-F53.

Chaudhury, Iftekhar. and Imran Matin, 2002. "Dimensions and dynamics of microfinance membership overlap – a micro study from Bangladesh." *Small Enterprise Development* 13 (2): 46-55.

Clarke, George, Robert Cull., Maria Soledad Martinez Peria, and Susana Sanchez, 2003. "Foreign Bank Entry: Experience, Implications for Developing Economies, and Agenda for Further Research." *The World Bank Research Observer* 18 (1), 25-59.

Cull, Robert, Asli Demirgüç-Kunt, and Jonathan Morduch, 2007. "Financial Performance and Outreach: A Global Analysis of Leading Microbanks." *Economic Journal*, 117(517): F107-F133.

Cull, Robert, Asli Demirgüç-Kunt, and Jonathan Morduch, 2009a. "Does Regulatory Supervision Curtail Microfinance Profitability and Outreach?" World Bank policy research working paper No. 4948..

Cull, Robert, Asli Demirgüç-Kunt, and Jonathan Morduch, 2009b. "Microfinance Meets the Market." *Journal of Economic Perspectives*, 23(1): 167-192.

Kaufmann, Daniel, Aart Kraay, and Massimo Mastruzzi, 2007. "Governance Matters VI: Governance Indicators of 1996-2006." World Bank Policy Research Working Paper 4280. Washington, DC.

La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert W. Vishny, 1998. "Law and Finance." *Journal of Political Economy*, 106(6): 1113-1150.

Levine, Ross. 2005. "Finance and Growth: Theory and Evidence." In Philippe Aghion and Steven Durlauf, eds., *Handbook of Economic Growth*. Amsterdam: Elsevier Science.

Levine, Ross, Norman Loayza, and Thorsten Beck. 2000. "Financial Intermediation and Growth: Causality and Causes." *Journal of Monetary Economics* 46 (1): 31–77.

Malkin, Elisabeth (2008). "Microfinance's Success Sets off a Debate in Mexico." *New York Times*. April 5, page C1.

McIntosh, Craig, Alain de Janvry, and Elisabeth Sadoulet, 2005. "How Rising Competition among Microfinance Institutions Affects Incumbent Lenders." *Economic Journal*, 115(506): 987-1004.

McIntosh, Craig and Bruce Wydick, 2005. "Competition and Microfinance." *Journal of Development Economics*, 78(2): 271-298.

Microbanking Bulletin (2005). 'Trend lines.' Issue 10, No. 5, March.

Petersen, Mitchell A. and Raghuram G. Rajan, 1994. "The Benefits of Lending Relationships: Evidence from Small Business Data." *Journal of Finance*, 49(1): 3-37.

Petersen, Mitchell A. and Raghuram G. Rajan, 1995. "The Effect of Credit Market Competition on Lending Relationships." *Quarterly Journal of Economics*, 110(2): 407-443.

Petersen, Mitchell A. and Raghuram G. Rajan, 2002. "Does Distance Still Matter? The Information Revolution in Small Business Lending." *Journal of Finance*, 57(6): 2533-2570.

Rajan, Raghuram G., and Luigi Zingales.1998. "Financial Dependence and Growth." *American Economic Review* 88 (3): 559–86.

Rosenberg, Richard (2007). "CGAP Reflections on the Compartamos Initial Public Offering: A Case Study on Microfinance Interest Rates and Profits." CGAP Focus Note 42. Washington, DC: Consultative Group to Assist the Poor.

Table 1. Correlation matrix of variables
* represents statistical significance at the 5% level. Average loan size is the average loan size relative to the average per capita income of the bottom 20% in the country. Percent women borrowers is the share of women borrowers of a microfinance institution. The financial self-sufficiency index is a ratio which is greater than one if an institution generates sufficient revenue to cover its costs. Geographic branch penetration is the number of bank branches in a country measured per square kilometer and demographic branch penetration is the number of bank branches measured per capita. Rural population(%, 1990) is the share of rural population in 1990. Rural population growth is the annual rural population growth rate averaged over 1991 – 2000. Log of MFI age is the log of the age of the institution and Log of assets(PPP) is the log of total assets in purchasing power parity terms. Village banking lending is a dummy variable that takes the value one if village bank lenders make loans to larger groups. Solidarity group lending and individual lending are dummy variables equal to one if the loan is made to an individual, but the former assumes joint liability. KKM is the Kaufmann, Kraay, Mastruzzi index of institutional development. GDP growth rate is annual real GDP growth rate. NGO is a dummy variable equal to one if the institution is a non-governmental organization. Commercially funded is a dummy variable equal to one if the majority of funding comes from commercial sources.

Variable	Average Loan Size	Percent Women Borrowers	Financial Self-sufficiency Index	Return on Assets	Geographic Branch Penetration	Demographic Branch Penetration	Rural Population (%, 1990)	Rural Population Growth (%)	Real Yield	Capital Costs / Assets	Labor Costs / Assets	Log of MFI age
Geographic branch penetration	−0.22*	0.16*	−0.05	−0.05								
Demographic branch penetration	−0.23*	−0.02	0.01	−0.01	0.53*							
Rural population (%, 1990)	0.06	−0.02	−0.07	−0.14*	0.00	−0.41*						
Rural population growth (%)	0.09	0.10	−0.18*	−0.14*	−0.11*	−0.53*	0.62*					
Real yield	−0.23	0.23*	0.15*	0.09	0.03	0.01	−0.15*	−0.05				
Capital costs / assets	−0.14*	0.24*	−0.34*	−0.31*	−0.12*	−0.07	−0.10	0.01	0.55*			
Labor costs / assets	−0.23*	0.30*	−0.31*	−0.32*	−0.02	−0.02	−0.14*	−0.03	0.65*	0.72*		
Log of MFI age	0.02	−0.02	0.15*	0.05	0.10	0.13*	−0.09	0.00	0.10	−0.13*	−0.05	
Log of assets(PPP)	0.21*	−0.05	0.13*	0.15*	−0.12*	−0.09	0.14*	0.14*	−0.16*	−0.20*	−0.27*	0.29*
Village banking lending	−0.19*	0.21*	−0.06	−0.12*	0.01	−0.06	0.06	0.20*	0.27*	0.31*	0.31*	−0.04
Solidarity group lending	−0.21*	0.23*	−0.23*	−0.13*	0.10	−0.13*	0.29*	0.18*	0.04	0.08	0.15*	−0.13*
Inflation	0.16*	0.03	−0.17*	−0.12*	−0.24*	−0.16*	−0.08	−0.08	−0.42*	0.03	−0.07	−0.14*
KKM	0.08	0.11	0.03	0.10	−0.01	0.36*	−0.43*	−0.26*	0.14*	0.16*	0.15*	0.14*
GDP growth rate	−0.07	0.13*	0.07	0.05	0.08	0.08	−0.11*	−0.18*	0.20*	0.12*	0.08	−0.06
NGO	−0.27*	0.28*	−0.26*	−0.18*	0.19*	0.10	−0.14*	0.01	0.28*	0.36*	0.43*	0.04
Commercially funded	0.20*	−0.10	0.36*	0.28*	0.03	0.00	−0.04	0.06	0.00	−0.25*	−0.27*	0.34*
Individual lending	0.32*	−0.39*	0.19*	0.11	−0.09	0.16*	−0.30*	−0.27*	−0.18*	−0.21*	−0.27*	0.18*

Table 1. Correlation matrix of variables(Continued)

Variable	Log of assets (PPP)	Village Banking Lending	Solidarity Group Lending	Inflation	KKM	GDP Growth Rate	NGO	Commercially Funded
Geographic branch penetration								
Demographic branch penetration								
Rural population (%, 1990)								
Rural population growth (%)								
Real Yield								
Capital costs / Assets								
Labor costs / Assets								
Log of MFI age								
Log of assets(PPP)								
Village banking lending	−0.10							
Solidarity group lending	0.00	−0.17*						
Inflation	0.07	−0.15*	−0.02					
KKM	0.09	0.02	−0.15*	0.19*				
GDP growth rate	−0.11*	−0.01	0.05	−0.13*	0.05			
NGO	−0.23*	0.24*	0.11*	−0.07	0.11*	0.16*		
Commercially funded	0.35*	−0.08	−0.26*	0.07	0.16*	−0.05	−0.34*	
Individual lending	0.06	−0.32*	−0.81*	0.09	0.11*	−0.04	−0.28*	0.32*

Table 2. The effect of variables representing the development of the banking sector on the outreach of MFIs
Standard errors are in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% level respectively. All models estimated via ordinary least squares. Standard errors allow for clustering at the firm level. Average loan size is the average loan size relative to the average per capita income of the bottom 20% in the country. Percent women borrowers is the share of women borrowers of a microfinance institution. Geographic branch penetration is the number of bank branches in a country measured per square kilometer and demographic branch penetration is the number of bank branches measured per capita. Private credit / GDP and Liquid liabilities / GDP are the ratios of private credit and liquid liabilities to GDP, respectively, where GDP is gross domestic product. Interest rate spread is the difference between prevailing lending and deposit interest rates. Rural population(%, 1990) is the share of rural population in 1990. Rural population growth is the annual growth rate of the rural population averaged over 1991 – 2000. Log of MFI age is the log of the age of the institution and Log of Assets(PPP) is the log of total assets in purchasing power parity terms. Village banking lending is a dummy variable that takes the value one if village bank lenders make loans to larger groups. Solidarity group lending and individual lending are dummy variables equal to one if the loan is made to an individual, but the former assumes joint liability. Individual lending dummy is the omitted category. KKM is the Kaufmann, Kraay, Mastruzzi index of institutional development. GDP growth rate is annual real GDP growth rate. Europe and Central Asia, Africa, South Asia, East Asia and Pacific, Middle East and North Africa are dummy variables that take the value one if the country is located in Europe and Central Asia, Sub-Saharan Africa, South Asia, East Asia and Pacific, Middle East and North Africa, respectively. The omitted category is Latin America and the Caribbean.

	Average loan size					Percent women borrowers				
	Geographic branch penetration	Demographic branch penetration	Private credit / GDP	Liquid liabilities / GDP	Interest rate spread	Geographic branch penetration	Demographic branch penetration	Private credit / GDP	Liquid liabilities / GDP	Interest rate spread
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Financial variable	-0.0150	-0.2523***	2.9349	-0.1686	-0.0097**	0.0062**	-0.0039	0.1693	0.0438	0.0000
	(0.0152)	(0.0867)	(2.7283)	(2.5680)	(0.0044)	(0.0028)	(0.0073)	(0.1121)	(0.1720)	(0.0010)
Rural population (%, 1990)	0.0232	0.0253	0.0418**	0.0379***	0.0462***	-0.0033	-0.0046**	-0.0029	-0.0032*	-0.0046**
	(0.0167)	(0.0173)	(0.0162)	(0.0137)	(0.0147)	(0.0023)	(0.0023)	(0.0018)	(0.0019)	(0.0019)
Rural population growth(%)	0.2240	-0.1867	0.4353	0.2505	0.2832	0.1156***	0.0914***	0.0766***	0.0696***	0.0841***
	(0.2843)	(0.3570)	(0.2691)	(0.2577)	(0.2008)	(0.0300)	(0.0307)	(0.0225)	(0.0258)	(0.0222)
Real yield	-3.5341	-4.9849*	-2.1574	-2.7632	-5.1647***	0.3443*	0.2892	0.3368*	0.3146*	0.2651
	(2.4658)	(2.5850)	(1.9501)	(1.9294)	(1.9311)	(0.1830)	(0.1961)	(0.1790)	(0.1788)	(0.1916)
Capital costs / Assets	1.9106	3.1687	3.5858	2.0044	4.3792	-0.0453	-0.0011	0.0942	0.0268	0.2172
	(3.6242)	(3.6680)	(4.0054)	(3.7447)	(3.1772)	(0.3950)	(0.3987)	(0.4214)	(0.4239)	(0.4146)
Labor costs / Assets	-2.8711	-2.4450	-4.3684	-2.7299	1.9518	0.3987	0.4444	0.3277	0.4073	0.4267
	(3.5729)	(3.6153)	(3.3775)	(3.2720)	(2.6149)	(0.4192)	(0.4262)	(0.4357)	(0.4294)	(0.4321)
Log of MFI age	-0.2047	-0.2177	-0.3773	-0.3501	-0.2622	-0.0079	-0.0019	-0.0154	-0.0125	0.0031
	(0.3503)	(0.3445)	(0.3178)	(0.3209)	(0.2498)	(0.0312)	(0.0319)	(0.0296)	(0.0297)	(0.0291)
Log of assets (PPP)	0.2061*	0.1949*	0.1948**	0.2050**	0.3341***	-0.0015	-0.0001	0.0004	0.0005	0.0103
	(0.1128)	(0.1000)	(0.0957)	(0.0967)	(0.0916)	(0.0094)	(0.0090)	(0.0080)	(0.0083)	(0.0093)
Village banking lending	-1.8629***	-1.9012***	-1.7956***	-1.7782***	-1.8206***	0.1344**	0.1306**	0.1570***	0.1565***	0.2618***
	(0.4704)	(0.4779)	(0.4477)	(0.4380)	(0.4421)	(0.0579)	(0.0601)	(0.0545)	(0.0546)	(0.0503)
Solidarity group lending	-1.8530***	-1.8351***	-1.6293***	-1.6818***	-1.3243***	0.1495***	0.1492***	0.1517***	0.1486***	0.1848***
	(0.6623)	(0.6439)	(0.5839)	(0.5761)	(0.4719)	(0.0379)	(0.0393)	(0.0384)	(0.0383)	(0.0380)
Inflation	0.0103	-0.0219	0.0570	0.0347	-0.0282	0.0082***	0.0054	0.0083***	0.0075***	0.0058**
	(0.0600)	(0.0616)	(0.0546)	(0.0547)	(0.0300)	(0.0031)	(0.0035)	(0.0028)	(0.0028)	(0.0029)
KKM	0.8161	1.8219**	0.8233	0.9582*	1.3059**	0.1095	0.1571*	0.0490	0.0537	-0.0105
	(0.5441)	(0.7045)	(0.5499)	(0.5259)	(0.5442)	(0.0737)	(0.0850)	(0.0638)	(0.0652)	(0.0644)
GDP growth rate	0.0782**	0.0740**	0.1069***	0.0859***	0.0794**	0.0034	0.0033	0.0035	0.0028	-0.0015
	(0.0320)	(0.0353)	(0.0316)	(0.0322)	(0.0328)	(0.0052)	(0.0052)	(0.0049)	(0.0050)	(0.0045)
Europe and Central Asia	-1.0524	-1.3520*	-0.7518	-1.2830**	-0.4534	0.2010***	0.2098***	0.1712***	0.1452**	0.1935***
	(0.7403)	(0.8020)	(0.7078)	(0.6330)	(0.6283)	(0.0674)	(0.0676)	(0.0647)	(0.0661)	(0.0574)
Africa	0.0430	-0.4430	-1.0358	-0.8421	-2.1487**	0.0208	0.1023	0.0220	0.0263	0.0226
	(1.4977)	(1.4898)	(1.2321)	(1.2991)	(0.8740)	(0.1144)	(0.1132)	(0.0823)	(0.0830)	(0.0789)
South Asia	-2.1799*	-1.9576*	-3.2028***	-2.9087**	-4.4006***	0.0736	0.2632**	0.1668	0.1744	0.5184***
	(1.1888)	(1.0884)	(1.1149)	(1.2948)	(0.9337)	(0.1335)	(0.1168)	(0.1079)	(0.1088)	(0.0764)
East Asia and Pacific	-1.0764	-0.9012	-1.8434**	-1.4575*	-1.8526***	0.1139	0.2305***	0.1301*	0.1442**	0.1974***
	(0.6539)	(0.5622)	(0.8455)	(0.8677)	(0.5560)	(0.0854)	(0.0774)	(0.0699)	(0.0714)	(0.0648)
Middle-East and North Africa	-1.1429	-0.2959	-3.7747***	-3.1310	-2.1339**	-0.2397	0.0427	0.1945**	0.2025**	0.2139***
	(1.0181)	(1.3213)	(1.0874)	(1.9032)	(0.9813)	(0.2155)	(0.1301)	(0.0790)	(0.0975)	(0.0815)
Constant	0.7766	3.4574*	-1.1985	0.0938	-1.7975	0.4170**	0.5257***	0.3707**	0.4261***	0.2461
	(1.8167)	(2.0190)	(2.2955)	(2.1190)	(1.8813)	(0.1729)	(0.1763)	(0.1612)	(0.1616)	(0.1918)
Observations	342	342	375	375	324	285	285	333	333	287
Number of firms	238	238	264	264	227	206	206	241	241	206
Adjusted R^2	0.1899	0.2242	0.1999	0.1934	0.2584	0.2346	0.2083	0.1893	0.1861	0.3400

Table 3. The effect of variables representing the development of the banking sector on the performance of MFIs

Standard errors are in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% level respectively. All models estimated via ordinary least squares. Standard errors allow for clustering at the firm level. The financial self-sufficiency index is a ratio which is greater than one if the institution generates sufficient revenue to cover its costs. Geographic branch penetration is the number of bank branches in a country measured per square kilometer and demographic branch penetration is the number of bank branches measured per capita. Private credit / GDP and Liquid liabilities / GDP are the ratios of private credit and liquid liabilities to GDP, respectively, where GDP is gross domestic product. Interest rate spread is the difference between prevailing lending and deposit interest rates. Rural population(%, 1990) is the share of rural population in 1990. Rural population growth is the annual growth rate of the rural population averaged over 1991 – 2000. Log of MFI age is the log of the age of the institution and Log of Assets(PPP) is the log of total assets in purchasing power parity terms. Village banking lending is a dummy variable that takes the value one if village bank lenders make loans to larger groups. Solidarity group lending and individual lending are dummy variables equal to one if the loan is made to an individual, but the former assumes joint liability. Individual lending dummy is the omitted category. KKM is the Kaufmann, Kraay, Mastruzzi index of institutional development. GDP growth rate is annual real GDP growth rate. Europe and Central Asia, Africa, South Asia, East Asia and Pacific, Middle East and North Africa are dummy variables that take the value one if the country is located in Europe and Central Asia, Sub-Saharan Africa, South Asia, East Asia and Pacific, Middle East and North Africa, respectively. The omitted category is Latin America and the Caribbean.

	Financial self-sufficiency index					Return on assets				
	Geographic branch penetration	Demographic branch penetration	Private credit / GDP	Liquid liabilities / GDP	Interest rate spread	Geographic branch penetration	Demographic branch penetration	Private credit / GDP	Liquid liabilities / GDP	Interest rate spread
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Financial variable	0.0006	-0.0042	0.0991	-0.1782	-0.0006	0.0007	-0.0028*	0.0134	-0.0880	-0.0002
	(0.0023)	(0.0055)	(0.1151)	(0.1824)	(0.0005)	(0.0008)	(0.0016)	(0.0439)	(0.0614)	(0.0001)
Rural population (%, 1990)	0.0017	0.0016	0.0010	0.0011	-0.0008	0.0001	-0.0001	0.0006	0.0006	-0.0004
	(0.0019)	(0.0019)	(0.0017)	(0.0017)	(0.0017)	(0.0006)	(0.0005)	(0.0007)	(0.0007)	(0.0004)
Rural population growth(%)	-0.0427	-0.0512	-0.0727***	-0.0886***	-0.0592**	-0.0038	-0.0099	-0.0120	-0.0178*	-0.0013
	(0.0359)	(0.0367)	(0.0269)	(0.0294)	(0.0289)	(0.0134)	(0.0132)	(0.0090)	(0.0092)	(0.0082)
Real yield	1.3197***	1.2856***	1.2121***	1.1824***	1.1168***	0.4646***	0.4388***	0.4343***	0.4251***	0.3545***
	(0.2172)	(0.2171)	(0.2116)		(0.2353)	(0.0732)	(0.0847)	(0.0816)	(0.0816)	(0.0884)
Capital costs / Assets	-2.2591***	-2.2187***	-2.2234***	-2.2808***	-2.2727***	-0.7675***	-0.7366***	-0.7871***	-0.8010***	-0.7158***
	(0.3537)	(0.3528)	(0.3222)	(0.3262)	(0.3717)	(0.1355)	(0.1351)	(0.1291)	(0.1266)	(0.1447)
Labor costs / Assets	-2.1278***	-2.1126***	-2.0294***	-1.9515***	-1.8692***	-0.9483***	-0.9361***	-0.8556***	-0.8356***	-0.5747***
	(0.3611)	(0.3600)	(0.3636)	(0.3505)	(0.3489)	(0.2636)	(0.2589)	(0.2547)	(0.2495)	(0.1441)
Log of MFI age	-0.0043	-0.0039	0.0023	0.0057	0.0122	-0.0211*	-0.0207*	-0.0232**	-0.0221**	-0.0112
	(0.0260)	(0.0256)	(0.0236)	(0.0232)	(0.0254)	(0.0125)	(0.0123)	(0.0107)	(0.0105)	(0.0071)
Log of assets (PPP)	0.0091	0.0087	0.0183**	0.0195**	0.0104	0.0055**	0.0051**	0.0086***	0.0091***	0.0071**
	(0.0092)	(0.0093)	(0.0082)	(0.0084)	(0.0094)	(0.0025)	(0.0026)	(0.0026)	(0.0027)	(0.0033)
Village banking lending	0.0909*	0.0906*	0.1166**	0.1196**	0.1226**	0.0229	0.0230	0.0276	0.0291	0.0234
	(0.0498)	(0.0495)	(0.0459)	(0.0467)	(0.0494)	(0.0200)	(0.0198)	(0.0179)	(0.0180)	(0.0173)
Solidarity group lending	-0.0435	-0.0435	-0.0295	-0.0341	-0.0385	0.0080	0.0080	0.0096	0.0082	0.0004
	(0.0365)	(0.0367)	(0.0344)	(0.0347)	(0.0348)	(0.0105)	(0.0106)	(0.0101)	(0.0099)	(0.0103)
Inflation	-0.0000	-0.0008	-0.0024	-0.0036	-0.0025	-0.0007	-0.0013	-0.0003	-0.0007	-0.0007
	(0.0041)	(0.0039)	(0.0032)	(0.0032)	(0.0037)	(0.0014)	(0.0014)	(0.0011)	(0.0011)	(0.0015)
KKM	-0.0587	-0.0354	-0.0760	-0.0574	-0.1197**	-0.0018	0.0151	-0.0020	0.0051	-0.0217
	(0.0612)	(0.0631)	(0.0507)	(0.0525)	(0.0489)	(0.0245)	(0.0276)	(0.0199)	(0.0209)	(0.0152)
GDP growth rate	0.0203**	0.0205**	0.0240***	0.0205**	0.0227***	0.0051	0.0053	0.0075**	0.0061*	0.0053*
	(0.0097)	(0.0095)	(0.0086)	(0.0088)	(0.0080)	(0.0039)	(0.0038)	(0.0034)	(0.0035)	(0.0029)
Europe and Central Asia	-0.0865	-0.0905	-0.1064	-0.1336*	-0.0897	-0.0185	-0.0211	-0.0351	-0.0428*	-0.0005
	(0.0718)	(0.0716)	(0.0720)	(0.0691)	(0.0737)	(0.0258)	(0.0256)	(0.0259)	(0.0246)	(0.0242)
Africa	0.0082	0.0077	0.0990	0.1055	0.1440*	0.0005	0.0027	-0.0260	-0.0236	-0.0090
	(0.1027)	(0.0976)	(0.0772)	(0.0774)	(0.0811)	(0.0366)	(0.0328)	(0.0271)	(0.0267)	(0.0210)
South Asia	-0.3743***	-0.3492***	-0.3387***	-0.2838***	-0.1189	-0.1677**	-0.1457**	-0.1731***	-0.1499**	-0.0363
	(0.1178)	(0.1088)	(0.0989)	(0.1064)	(0.0746)	(0.0709)	(0.0587)	(0.0664)	(0.0649)	(0.0238)
East Asia and Pacific	-0.0557	-0.0358	-0.0780	-0.0397	-0.0469	-0.0495*	-0.0318	-0.0549**	-0.0405*	-0.0279
	(0.0816)	(0.0664)	(0.0601)	(0.0628)	(0.0573)	(0.0258)	(0.0211)	(0.0215)	(0.0210)	(0.0178)
Middle-East and North Africa	-0.1849	-0.1383	-0.0087	0.0868	0.0024	-0.0576	-0.0176	-0.0250	0.0165	-0.0021
	(0.1397)	(0.1202)	(0.0847)	(0.1049)	(0.0782)	(0.0488)	(0.0397)	(0.0273)	(0.0338)	(0.0202)
Constant	0.8505***	0.9115***	0.7060***	0.7990***	0.9268***	-0.0159	0.0290	-0.0939*	-0.0626	-0.0589
	(0.2005)	(0.2066)	(0.1803)	(0.1806)	(0.1983)	(0.0558)	(0.0658)	(0.0543)	(0.0532)	(0.0561)
Observations	298	298	352	352	301	299	299	353	353	302
Number of firms	213	213	251	251	215	213	213	251	251	215
Adjusted R²	0.4564	0.4576	0.4551	0.4558	0.3796	0.3772	0.3798	0.4101	0.4126	0.4738

Table 4. Comparison of MFI characteristics by level of branch penetration
Standard errors are in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% level respectively. The sample is split into low and high branch penetration at the median. Geographic branch penetration is the number of bank branches in a country measured per square kilometer and demographic branch penetration is the number of bank branches measured per capita. NGO is a dummy variable equal to one if the institution is a non-governmental organization. Commercially funded is a dummy variable equal to one if the majority of funding comes from commercial sources. Village banking lending is a dummy variable that takes the value one if village bank lenders make loans to larger groups. Solidarity group lending and individual lending are dummy variables equal to one if the loan is made to an individual, but the former assumes joint liability. Log of MFI age is the log of the age of the institution and Log of Assets(PPP) is the log of total assets in purchasing power parity terms. Rural population is the share of rural population in 1990. Rural population growth is the annual growth rate of the rural population averaged over 1991 – 2000. KKM is the Kaufmann, Kraay, Mastruzzi index of institutional development. GDP growth rate is annual real GDP growth rate.

	Geographic branch penetration			Demographic branch penetration		
	Low	High	Difference	Low	High	Difference
NGO	0.400	0.600	-0.2000**	0.454	0.553	-0.0991
			(0.0673)			(0.0697)
Commercially funded	0.567	0.565	0.0026	0.534	0.620	-0.0858
			(0.0729)			(0.0741)
Individual lending	0.374	0.330	0.0439	0.331	0.388	-0.0575
			(0.0655)			(0.0674)
Village banking lending	0.130	0.190	-0.0596	0.154	0.165	-0.0109
			(0.0505)			(0.0514)
Solidarity group lending	0.530	0.550	-0.0196	0.569	0.494	0.0751
			(0.0684)			(0.0698)
Capital costs / Assets	0.089	0.076	0.0132	0.086	0.079	0.0076
			(0.0082)			(0.0083)
Labor costs / Assets	0.104	0.093	0.0112	0.099	0.098	0.0013
			(0.0095)			(0.0099)
Log of MFI age	1.926	2.150	-0.2240*	1.945	2.161	-0.2157*
			(0.1045)			(0.1084)
Log of assets(PPP)	16.181	15.982	0.1986	16.231	15.870	0.3608
			(0.3341)			(0.3585)
Rural population (%, 1990)	55.189	47.926	7.2632	59.658	43.458	16.2000*
			(6.7826)			(6.3387)
Rural population growth (%)	0.806	0.314	0.4920	0.952	0.168	0.7840
			(0.4586)			(0.4472)
Real Yield	0.243	0.209	0.0339	0.221	0.230	-0.0093
			(0.0468)			(0.0471)
Inflation	9.422	9.057	0.3655	9.320	9.159	0.1603
			(3.2719)			(3.2723)
KKM	-0.429	-0.244	-0.1845	-0.621	-0.052	-0.5696***
			(0.1665)			(0.1402)
GDP growth rate	3.914	5.047	-1.1335	4.088	4.873	-0.7846
			(1.2189)			(1.2265)

Table 5. The effect of bank branch penetration on the average loan size by type of MFI

Standard errors are in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% level respectively. P-values from corresponding F-tests are in square brackets at the bottom of the table. All models estimated via ordinary least squares. Standard errors allow for clustering at the firm level. Average loan size is the average loan size relative to the average per capita income of the bottom 20% in the country. Geographic branch penetration is the number of bank branches in a country measured per square kilometer and demographic branch penetration is the number of bank branches measured per capita. NGO is a dummy variable equal to one if the institution is a non-governmental organization. Commercially funded is a dummy variable equal to one if the majority of funding comes from commercial sources. Individual lending is a dummy variable equal to one if the loan is made to an individual. Though we do not present the coefficients to conserve space, all models include all of the controls that appear in the base results in Tables 2 and 3. These are real portfolio yield, capital costs/assets, labor costs/assets, village banking dummy, solidarity group lending dummy, log of MFI age, log of total assets, inflation rate, real GDP growth rate, KKM index of institutional development, rural population share, rural population growth rate, and regional dummies.

	Dependent Variable: Average Loan Size							
	Demographic branch penetration				Geographic branch penetration			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Branch penetration	-0.3159***	-0.1236	-0.0210	0.0198	-0.0542*	0.0080	0.0139	0.0021
	(0.1035)	(0.0844)	(0.0732)	(0.0785)	(0.0302)	(0.0252)	(0.0133)	(0.0495)
NGO	-1.7448**			-0.9679	-1.3409**			-0.7602
	(0.8524)			(0.7856)	(0.5960)			(0.6564)
NGO × Branch Penetration	0.1355			0.1064	0.0514*			0.0535
	(0.1003)			(0.0924)	(0.0309)			(0.0449)
Commercially Funded		2.6670***		1.5876**		1.2898*		0.8688
		(0.8890)		(0.7051)		(0.7021)		(0.6247)
Commercially funded × Branch penetration		-0.4588***		-0.3265***		-0.0644*		-0.0777***
		(0.1418)		(0.0966)		(0.0347)		(0.0299)
Individual lending			5.9576***	5.8488***			3.1030***	3.1366***
			(1.6384)	(1.7232)			(0.9234)	(1.0615)
Individual lending × Branch penetration			-0.5856***	-0.5983***			-0.0837**	-0.1240**
			(0.1831)	(0.1923)			(0.0411)	(0.0550)
Observations	342	299	342	299	342	299	342	299
Number of firms	238	223	238	223	238	223	238	223
Adjusted R²	0.2347	0.2590	0.3156	0.3447	0.1990	0.1922	0.2199	0.2288

Branch penetration + Interaction term

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
NGO	-0.1804*			0.1262	-0.0028			0.0556**
	[0.0598]			[0.2207]	[0.8356]			[0.0245]
Commercially funded		-0.5824***		-0.3067***		-0.0564**		-0.0756
		[0.0001]		[0.0055]		[0.0206]		[0.1669]
Individual lending			-0.6066***	-0.5785***			-0.0698*	-0.1219*
			[0.0002]	[0.0006]			[0.0783]	[0.0594]

Table 6. The effect of branch penetration on the percent women borrowers by type of MFI

Standard errors are in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% level respectively. P-values from corresponding F-tests are in square brackets at the bottom of the table. All models estimated via ordinary least squares. Standard errors allow for clustering at the firm level. Percent women borrowers is the share of women borrowers of a microfinance institution. Geographic branch penetration is the number of bank branches in a country measured per square kilometer and demographic branch penetration is the number of bank branches measured per capita. NGO is a dummy variable equal to one if the institution is a non-governmental organization. Commercially funded is a dummy variable equal to one if the majority of funding comes from commercial sources. Individual lending is a dummy variable equal to one if the loan is made to an individual. Though we do not present the coefficients to conserve space, all models include all of the controls that appear in the base results in Tables 2 and 3. These are real portfolio yield, capital costs/assets, labor costs/assets, village banking dummy, solidarity group lending dummy, log of MFI age, log of total assets, inflation rate, real GDP growth rate, KKM index of institutional development, rural population share, rural population growth rate, and regional dummies.

	Dependent Variable: Percent Women Borrowers							
	Demographic branch penetration				Geographic branch penetration			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Branch penetration	-0.0047	-0.0073	-0.0010	-0.0031	0.0056*	0.0020	0.0058*	-0.0034
	(0.0097)	(0.0093)	(0.0083)	(0.0127)	(0.0032)	(0.0035)	(0.0033)	(0.0063)
NGO	0.0841			0.0368	0.0844			0.0141
	(0.0663)			(0.0707)	(0.0535)			(0.0584)
NGO × Branch penetration	0.0020			0.0094	0.0004			0.0038
	(0.0095)			(0.0105)	(0.0031)			(0.0049)
Commercially funded		-0.0976		-0.0757		-0.1756***		-0.1398**
		(0.0670)		(0.0725)		(0.0576)		(0.0618)
Commercially funded × Branch penetration		0.0109		0.0132		0.0143***		0.0142***
		(0.0126)		(0.0126)		(0.0041)		(0.0040)
Individual lending			-0.1862***	-0.0847			-0.2348***	-0.2053***
			(0.0712)	(0.0793)			(0.0526)	(0.0533)
Individual lending × Branch penetration			-0.0073	-0.0210*			0.0007	0.0043
			(0.0103)	(0.0117)			(0.0037)	(0.0031)
Observations	285	246	285	246	285	246	285	246
Number of firms	206	188	206	188	206	188	206	188
Adjusted R^2	0.2181	0.2084	0.2511	0.2653	0.2421	0.2906	0.2741	0.3195
Branch penetration + Interaction term								
NGO	-0.0027			0.0063	0.0060**			0.0004
	[0.7446]			[0.5588]	[0.0380]			[0.9018]
Commercially funded		0.0036		0.0101		0.0163***		0.0108*
		[0.7588]		[0.4912]		[0.0000]		[0.0566]
Individual lending			-0.0083	-0.0241**			0.0065**	0.0009
			[0.3674]	[0.0405]			[0.0290]	[0.8729]

Table 7. The effect of bank branch penetration on the financial self-sufficiency index by type of MFI

Standard errors are in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% level respectively. P-values from corresponding F-tests are in square brackets at the bottom of the table. All models estimated via ordinary least squares. Standard errors allow for clustering at the firm level. The financial self-sufficiency index is a ratio which is greater than one if the institution generates sufficient revenue to cover its costs. Geographic branch penetration is the number of bank branches in a country measured per square kilometer and demographic branch penetration is the number of bank branches measured per capita. NGO is a dummy variable equal to one if the institution is a non-governmental organization. Commercially funded is a dummy variable equal to one if the majority of funding comes from commercial sources. Individual lending is a dummy variable equal to one if the loan is made to an individual. Though we do not present the coefficients to conserve space, all models include all of the controls that appear in the base results in Tables 2 and 3. These are real portfolio yield, capital costs/assets, labor costs/assets, village banking dummy, solidarity group lending dummy, log of MFI age, log of total assets, inflation rate, real GDP growth rate, KKM index of institutional development, rural population share, rural population growth rate, and regional dummies.

	Dependent Variable: Financial Self-sufficiency Index							
	Demographic branch penetration				Geographic branch penetration			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Branch penetration	-0.0044	-0.0064	-0.0098	-0.0137*	0.0006	0.0004	-0.0011	-0.0042
	(0.0073)	(0.0063)	(0.0064)	(0.0075)	(0.0032)	(0.0020)	(0.0031)	(0.0054)
NGO	-0.0227			-0.0378	-0.0201			-0.0208
	(0.0531)			(0.0517)	(0.0373)			(0.0390)
NGO × Branch Penetration	0.0002			0.0055	-0.0000			0.0030
	(0.0073)			(0.0083)	(0.0022)			(0.0048)
Commercially Funded		0.0069		-0.0012		0.1164**		0.0956*
		(0.0609)		(0.0588)		(0.0573)		(0.0561)
Commercially funded × Branch penetration		0.0129		0.0151*		-0.0066		-0.0035
		(0.0087)		(0.0089)		(0.0053)		(0.0052)
Individual lending			-0.0772	-0.0745			-0.0355	-0.0567
			(0.0519)	(0.0493)			(0.0385)	(0.0383)
Individual lending × Branch penetration			0.0132*	0.0108			0.0052*	0.0057*
			(0.0074)	(0.0076)			(0.0027)	(0.0029)
Observations	298	264	298	264	298	264	298	264
Number of firms	213	200	213	200	213	200	213	200
Adjusted R^2	0.4544	0.4702	0.4492	0.4610	0.4531	0.4700	0.4488	0.4587
Branch penetration + Interaction term								
NGO	-0.0042			-0.0082	0.0006			-0.0012
	[0.4505]			[0.2979]	[0.7978]			[0.6817]
Commercially funded		0.0065		0.0014		-0.0062		-0.0077
		[0.3388]		[0.8661]		[0.2723]		[0.2700]
Individual lending			0.0034	-0.0029			0.0041*	0.0015
			[0.5860]	[0.7413]			[0.0601]	[0.7597]

Table 8. The effect of geographic branch penetration on the outreach indicators by type of MFI, "old" MFIs only

Standard errors are in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% level respectively. P-values from corresponding F-tests are in square brackets at the bottom of the table. All models estimated via ordinary least squares. Standard errors allow for clustering at the firm level. The sample includes only those MFIs that were in existence prior to 1996. Average loan size is the average loan size relative to the average per capita income of the bottom 20% in the country. Percent women borrowers is the share of women borrowers of a microfinance institution. Geographic branch penetration is the number of bank branches in a country measured per square kilometer. NGO is a dummy variable equal to one if the institution is a non-governmental organization. Commercially funded is a dummy variable equal to one if the majority of funding comes from commercial sources. Individual lending is a dummy variable equal to one if the loan is made to an individual. Though we do not present the coefficients to conserve space, all models include all of the controls that appear in the base results in Tables 2 and 3. These are real portfolio yield, capital costs/assets, labor costs/assets, village banking dummy, solidarity group lending dummy, log of MFI age, log of total assets, inflation rate, real GDP growth rate, KKM index of institutional development, rural population share, rural population growth rate, and regional dummies.

	Sample: Microfinance institutions in existence prior to 1996							
	Average loan size				Percent women borrowers			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Geographic branch Penetration	-0.0386	-0.1028	-0.0338	-0.0109	0.0188***	0.0219*	0.0125	0.0165***
	(0.0320)	(0.0734)	(0.0750)	(0.0305)	(0.0068)	(0.0121)	(0.0075)	(0.0060)
NGO		-1.9842				0.1602*		
		(1.2365)				(0.0914)		
NGO × Branch Penetration		0.0976				-0.0058		
		(0.0735)				(0.0078)		
Commercially Funded			1.0464				-0.3198***	
			(2.1584)				(0.0891)	
Commercially funded × Branch penetration			-0.0180				0.0120**	
			(0.0975)				(0.0046)	
Individual lending				2.7400**				-0.2689***
				(1.1344)				(0.0849)
Individual lending × Branch penetration				-0.1610*				0.0008
				(0.0889)				(0.0048)
Observations	169	169	146	169	138	138	116	138
Number of firms	120	120	112	120	102	102	92	102
Adjusted R²	0.2911	0.3089	0.2793	0.3354	0.3322	0.3430	0.4287	0.3823
Branch penetration + Interaction term								
NGO		-0.0052				0.0161**		
		[0.8819]				[0.0240]		
Commercially funded			-0.0518				0.0245***	
			[0.2794]				[0.0000]	
Individual lending				-0.1719*				0.0173**
				[0.0541]				[0.0345]

Table 9. The effect of geographic branch penetration on the performance indicators by type of MFI, "old" MFIs only

Standard errors are in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% level respectively. P-values from corresponding F-tests are in square brackets at the bottom of the table. All models estimated via ordinary least squares. Standard errors allow for clustering at the firm level. The sample includes only those MFIs that were in existence prior to 1996. The financial self-sufficiency index is a ratio which is greater than one if the institution generates sufficient revenue to cover its costs. Geographic branch penetration is the number of bank branches in a country measured per square kilometer. NGO is a dummy variable equal to one if the institution is a non-governmental organization. Commercially funded is a dummy variable equal to one if the majority of funding comes from commercial sources. Individual lending is a dummy variable equal to one if the loan is made to an individual. Though we do not present the coefficients to conserve space, all models include all of the controls that appear in the base results in Tables 2 and 3. These are real portfolio yield, capital costs/assets, labor costs/assets, village banking dummy, solidarity group lending dummy, log of MFI age, log of total assets, inflation rate, real GDP growth rate, KKM index of institutional development, rural population share, rural population growth rate, and regional dummies.

	Sample: Microfinance institutions in existence prior to 1996							
	Financial self-sufficiency index				Return on assets			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Geographic branch	-0.0217**	-0.0136	-0.0259**	-0.0236**	-0.0011	0.0002	-0.0030	-0.0022
Penetration	(0.0101)	(0.0101)	(0.0104)	(0.0108)	(0.0040)	(0.0047)	(0.0039)	(0.0038)
NGO		0.0136				0.0334		
		(0.0509)				(0.0267)		
NGO × Branch		-0.0124**				-0.0031		
Penetration		(0.0057)				(0.0022)		
Commercially			0.0088				-0.0490	
Funded			(0.0768)				(0.0572)	
Commercially funded ×			0.0109				0.0066	
Branch penetration			(0.0076)				(0.0055)	
Individual lending				-0.1146**				-0.0634*
				(0.0527)				(0.0322)
Individual lending ×				0.0033				-0.0018
Branch penetration				(0.0069)				(0.0022)
Observations	157	157	137	157	158	158	137	158
Number of firms	114	114	106	114	114	114	106	114
Adjusted R^2	0.5751	0.5880	0.5746	0.5685	0.4288	0.4256	0.4405	0.4455
Branch penetration + Interaction term								
NGO		-0.0260***				-0.0029		
		[0.0072]				[0.3968]		
Commercially funded			-0.0150				0.0036	
			[0.1838]				[0.5596]	
Individual lending				-0.0203**				-0.0040
				[0.0184]				[0.2986]

Table 10. The effect of bank branch penetration on the average loan size by type of MFI, controlling for banking sector ownership and concentration

Standard errors are in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% level respectively. P-values from corresponding F-tests are in square brackets at the bottom of the table. All models estimated via ordinary least squares. Standard errors allow for clustering at the firm level. Average loan size is the average loan size relative to the average per capita income of the bottom 20% in the country. Geographic branch penetration is the number of bank branches in a country measured per square kilometer and demographic branch penetration is the number of bank branches measured per capita. NGO is a dummy variable equal to one if the institution is a non-governmental organization. Commercially funded is a dummy variable equal to one if the majority of funding comes from commercial sources. Individual lending is a dummy variable equal to one if the loan is made to an individual. State ownership and foreign ownership are the shares of total banking sector assets held by state- and foreign-owned banks, respectively. Bank concentration is the share of sector assets held by the three largest banks. Though we do not present the coefficients to conserve space, all models include all of the controls that appear in the base results in Tables 2 and 3. These are real portfolio yield, capital costs/assets, labor costs/assets, village banking dummy, solidarity group lending dummy, log of MFI age, log of total assets, inflation rate, real GDP growth rate, KKM index of institutional development, rural population share, rural population growth rate, and regional dummies.

	Dependent Variable: Average Loan size							
	Demographic branch penetration				Geographic branch penetration			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Branch penetration	-0.2934***	-0.3965***	-0.2746**	-0.1107	-0.0730**	-0.1075***	-0.0789*	-0.0427
	(0.0854)	(0.0962)	(0.1181)	(0.0917)	(0.0354)	(0.0386)	(0.0417)	(0.0287)
NGO		-2.2070*				-1.1176		
		(1.2267)				(0.7823)		
NGO × Branch Penetration		0.2662**				0.0509		
		(0.1208)				(0.0325)		
Commercially Funded			1.0886				1.2210	
			(1.5018)				(1.2328)	
Commercially funded × Branch penetration			-0.1850				-0.1018	
			(0.1724)				(0.0776)	
Individual lending				5.5122***				3.4630***
				(1.7418)				(1.0538)
Individual lending × Branch penetration				-0.4458***				-0.0733**
				(0.1640)				(0.0339)
State ownership	-9.4546***	-8.9381**	-9.8883***	-8.5083***	-10.6893***	-9.5624**	-11.6878***	-11.3162***
	(3.2855)	(3.5255)	(3.7317)	(2.9726)	(3.9922)	(4.2163)	(4.4215)	(3.9679)
Foreign ownership	1.6877	2.2486	1.7950	0.7531	0.8921	1.1400	0.8036	0.5798
	(1.5539)	(1.7024)	(1.7596)	(1.2960)	(1.4993)	(1.5513)	(1.6788)	(1.4140)
Bank concentration	-9.2244***	-9.4244***	-9.8555***	-8.2848***	-9.1859***	-9.1362***	-10.5158***	-9.1972***
	(2.7966)	(2.7806)	(3.4489)	(2.4676)	(3.1299)	(3.1287)	(3.6183)	(3.0159)
Observations	234	234	205	234	234	234	205	234
Number of firms	177	177	167	177	177	177	167	177
Adjusted R^2	29	29	28	29	29	29	28	29

Branch penetration + Interaction term

NGO		-0.1303				-0.0566		
		[0.2752]				[0.1103]		
Commercially funded			-0.4596***				-0.1807**	
			[0.0010]				[0.0204]	
Individual lending				-0.5565***				-0.1160***
				[0.0001]				[0.0078]

Table 11. The effect of bank branch penetration on the percent women borrowers by type of MFI, controlling for banking sector ownership and concentration

Standard errors are in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% level respectively. P-values from corresponding F-tests are in square brackets at the bottom of the table. All models estimated via ordinary least squares. Standard errors allow for clustering at the firm level. Percent women borrowers is the share of women borrowers of a microfinance institution. Geographic branch penetration is the number of bank branches in a country measured per square kilometer and demographic branch penetration is the number of bank branches measured per capita. NGO is a dummy variable equal to one if the institution is a non-governmental organization. Commercially funded is a dummy variable equal to one if the majority of funding comes from commercial sources. Individual lending is a dummy variable equal to one if the loan is made to an individual. State ownership and foreign ownership are the shares of total banking sector assets held by state- and foreign-owned banks, respectively. Bank concentration is the share of sector assets held by the three largest banks. Though we do not present the coefficients to conserve space, all models include all of the controls that appear in the base results in Tables 2 and 3. These are real portfolio yield, capital costs/assets, labor costs/assets, village banking dummy, solidarity group lending dummy, log of MFI age, log of total assets, inflation rate, real GDP growth rate, KKM index of institutional development, rural population share, rural population growth rate, and regional dummies.

	Dependent Variable: Percent Women Borrowers							
	Demographic branch penetration				Geographic branch penetration			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Branch penetration	0.0027	0.0093	-0.0095	-0.0000	-0.0019	0.0010	-0.0035	-0.0029
	(0.0075)	(0.0081)	(0.0105)	(0.0086)	(0.0031)	(0.0037)	(0.0035)	(0.0030)
NGO		0.2370***				0.1632**		
		(0.0834)				(0.0630)		
NGO × Branch penetration		-0.0194**				-0.0046		
		(0.0094)				(0.0033)		
Commercially funded			-0.1541*				-0.0974	
			(0.0890)				(0.0832)	
Commercially funded × Branch penetration			0.0286**				0.0117*	
			(0.0134)				(0.0061)	
Individual lending				-0.1923**				-0.1902***
				(0.0753)				(0.0529)
Individual lending × Branch penetration				0.0054				0.0041**
				(0.0095)				(0.0019)
State ownership	-0.4768**	-0.6187**	-0.6062**	-0.4538**	-0.5707**	-0.7483**	-0.5378*	-0.4972**
	(0.2385)	(0.2644)	(0.2631)	(0.2168)	(0.2595)	(0.3007)	(0.2918)	(0.2454)
Foreign ownership	-0.2181	-0.2903	-0.0176	-0.2241	-0.2316	-0.2599	-0.0518	-0.2435
	(0.1777)	(0.1847)	(0.2016)	(0.1702)	(0.1679)	(0.1742)	(0.2104)	(0.1621)
Bank concentration	-0.4224**	-0.4225**	-0.6111***	-0.4078**	-0.4592**	-0.5015**	-0.5108**	-0.4264**
	(0.1876)	(0.1879)	(0.2314)	(0.1835)	(0.1933)	(0.1927)	(0.2284)	(0.1899)
Observations	193	193	166	193	193	193	166	193
Number of firms	147	147	135	147	147	147	135	147
Adjusted R^2	27	27	26	27	27	27	26	27
Branch penetration + Interaction term								
NGO		-0.0101				-0.0036		
		[0.2768]				[0.2847]		
Commercially funded			0.0191*				0.0082	
			[0.0888]				[0.1845]	
Individual lending				0.0054				0.0012
				[0.5761]				[0.6993]

Table 12. The effect of bank branch penetration on the financial self-sufficiency index by type of MFI, controlling for banking sector ownership and concentration

Standard errors are in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% level respectively. P-values from corresponding F-tests are in square brackets at the bottom of the table. All models estimated via ordinary least squares. Standard errors allow for clustering at the firm level. The financial self-sufficiency index is a ratio which is greater than one if the institution generates sufficient revenue to cover its costs. Geographic branch penetration is the number of bank branches in a country measured per square kilometer and demographic branch penetration is the number of bank branches measured per capita. NGO is a dummy variable equal to one if the institution is a non-governmental organization. Commercially funded is a dummy variable equal to one if the majority of funding comes from commercial sources. Individual lending is a dummy variable equal to one if the loan is made to an individual. State ownership and foreign ownership are the shares of total banking sector assets held by state- and foreign-owned banks, respectively. Bank concentration is the share of sector assets held by the three largest banks. Though we do not present the coefficients to conserve space, all models include all of the controls that appear in the base results in Tables 2 and 3. These are real portfolio yield, capital costs/assets, labor costs/assets, village banking dummy, solidarity group lending dummy, log of MFI age, log of total assets, inflation rate, real GDP growth rate, KKM index of institutional development, rural population share, rural population growth rate, and regional dummies.

	Dependent Variable: Financial Self-sufficiency Index							
	Demographic branch penetration				Geographic branch penetration			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Branch penetration	-0.0067	-0.0082	-0.0064	-0.0113**	0.0027	0.0022	0.0032	0.0016
	(0.0047)	(0.0054)	(0.0058)	(0.0057)	(0.0024)	(0.0031)	(0.0019)	(0.0025)
NGO		-0.0291				-0.0167		
		(0.0715)				(0.0489)		
NGO × Branch penetration		0.0038				0.0007		
		(0.0079)				(0.0021)		
Commercially funded			0.0009				0.0478	
			(0.0683)				(0.0609)	
Commercially funded × Branch penetration			0.0076				-0.0010	
			(0.0090)				(0.0057)	
Individual lending				-0.1349**				-0.1203***
				(0.0613)				(0.0415)
Individual lending × Branch penetration				0.0083				0.0040**
				(0.0078)				(0.0015)
State ownership	-0.2296	-0.2251	-0.1522	-0.2750	-0.0905	-0.0734	0.0297	-0.0865
	(0.1550)	(0.1575)	(0.1684)	(0.1752)	(0.1565)	(0.1639)	(0.1693)	(0.1677)
Foreign ownership	-0.2792**	-0.2713**	-0.2264	-0.2923**	-0.2567**	-0.2527*	-0.2084	-0.2840**
	(0.1369)	(0.1329)	(0.1557)	(0.1466)	(0.1298)	(0.1294)	(0.1425)	(0.1373)
Bank concentration	0.1545	0.1514	0.2093	0.1044	0.2278	0.2284*	0.2998**	0.2028
	(0.1332)	(0.1314)	(0.1336)	(0.1423)	(0.1379)	(0.1368)	(0.1403)	(0.1456)
Observations	171	171	162	171	171	171	162	171
Number of firms	29	29	28	29	29	29	28	29
Adjusted R^2	0.4951	0.4907	0.5064	0.4860	0.4936	0.4890	0.5072	0.4867

Branch penetration + Interaction term

NGO		-0.0044				0.0029		
		[0.5300]				[0.2312]		
Commercially funded			0.0012				0.0022	
			[0.8441]				[0.7119]	
Individual lending				-0.0030				0.0056**
				[0.6605]				[0.0264]

Table 13. The effect of variables representing the development of the banking sector on the outreach and performance of MFIs, instrumental variables regressions
Standard errors are in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% level respectively. All models estimated via two-stage least squares(IV). Standard errors allow for clustering at the firm level. Average loan size is the average loan size relative to the average per capita income of the bottom 20% in the country. Percent women borrowers is the share of women borrowers of a microfinance institution. The financial self-sufficiency index is a ratio which is greater than one if the institution generates sufficient revenue to cover its costs. Geographic branch penetration is the number of bank branches in a country measured per square kilometer and demographic branch penetration is the number of bank branches measured per capita. Branch penetration variables were instrumented using dummy variables representing the legal origin of the country. Legal origin variables are dummy variables that take on the value one if the legal origin is either French, German, Socialist or English, respectively. Private credit / GDP and Liquid liabilities / GDP are the ratios of private credit and liquid liabilities to GDP, respectively, where GDP is gross domestic product. Interest rate spread is the difference between prevailing lending and deposit interest rates. Rural population(%, 1990) is the share of rural population in 1990. Rural population growth is the annual growth rate of the rural population averaged over 1991 – 2000. Log of MFI age is the log of the age of the institution and Log of Assets(PPP) is the log of total assets in purchasing power parity terms. Village banking lending is a dummy variable that takes the value one if village bank lenders make loans to larger groups. Solidarity group lending and individual lending are dummy variables equal to one if the loan is made to an individual, but the former assumes joint liability. Individual lending dummy is the omitted category. KKM is the Kaufmann, Kraay, Mastruzzi index of institutional development. GDP growth rate is annual real GDP growth rate. Europe and Central Asia, Africa, South Asia, East Asia and Pacific, Middle East and North Africa are dummy variables that take the value one if the country is located in Europe and Central Asia, Sub-Saharan Africa, South Asia, East Asia and Pacific, Middle East and North Africa, respectively. The excludability test is based on an OLS regression in which the instruments replace the branch penetration variable. The hope is that the instruments are insignificant, and thus can be viewed as excludable.

	Average loan size		Percent women borrowers		Financial self-sufficiency index		Return on assets	
	Geographic Branch Penetration	Demographic Branch Penetration	Geographic Branch Penetration	Demographic Branch Penetration	Geographic Branch Penetration	Demographic Branch Penetration	Geographic Branch Penetration	Demographic Branch Penetration
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Financial variable	-0.3145**	-0.2875**	-0.0034	0.0044	-0.0088	-0.0221**	-0.0054	-0.0088**
	(0.1482)	(0.1154)	(0.0106)	(0.0132)	(0.0083)	(0.0093)	(0.0034)	(0.0036)
Observations	342	342	285	285	298	298	299	299
Number of firms	238	238	206	206	213	213	213	213
Adjusted R-squared	-0.2342	0.2235	0.1692	0.2027	0.4175	0.4320	0.2740	0.3615
Hausman test								
Chi-sq p-value	0.0051	0.7513	0.3198	0.434	0.1474	0.0201	0.0268	0.0661
Shea Partial R-squared	0.0443	0.2604	0.0417	0.2445	0.0952	0.2905	0.0955	0.2902
Excludability								
Instruments				French + German + Socialist				
P-value	0.2133		0.6651		0.3145		0.0767	

Private Credit from Deposit Money Banks/GDP

Legend:
- East Asia & Pacific
- Europe & Central Asia
- Latin America & Caribbean
- Middle East & North Africa
- South Asia
- Sub-Saharan Africa
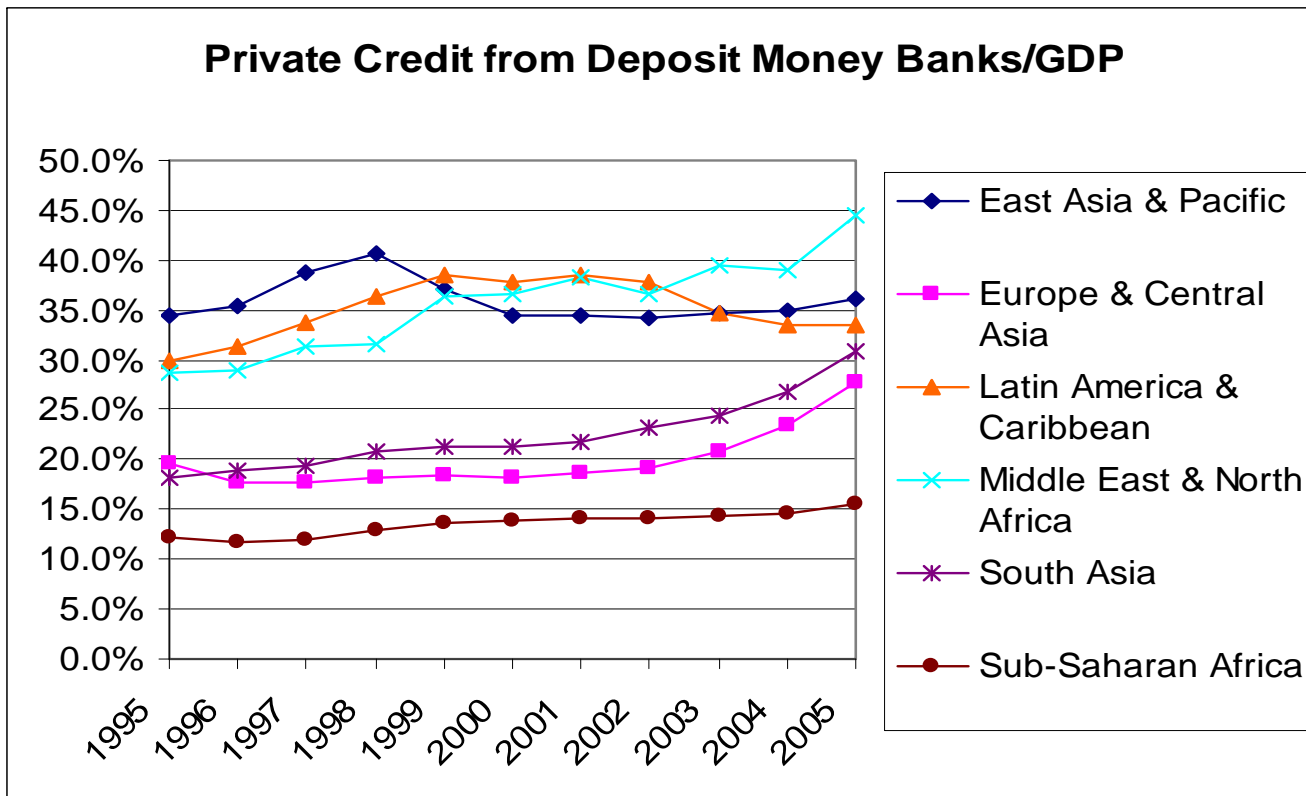
Figure 1

Appendix A. Variable Description and Summary Statistics

Variable Name	Definition	Mean	Median	Min	Max
Average loan size	Average loan size relative to the average per capita income of bottom 20%	2.05	1.18	0	37.78
Women borrowers(%)	Share of women borrowers	0.68	0.72	0	1
Financial self-sufficiency index	Ratio greater than one if institution generates sufficient revenue to cover its cost	1.04	1.04	-0.6	2.62
Return on assets	Adjusted return on assets	-0.02	0.01	-1.66	0.41
Geographic branch penetration	Number of bank branches measured per square kilometer	7.86	3.15	0.13	79.18
Demographic branch penetration	Number of bank branches per capita	5.29	4.17	0.41	23.36
Private credit / GDP	Ratio of private credit to GDP, averaged over 1991 - 2000	0.23	0.21	0.03	1.23
Liquid liabilities / GDP	Ratio of liquid liabilities to GDP, averaged over 1991 - 2000	0.32	0.27	0.07	1.05
Interest rate spread	Difference between lending rate and deposit rate	21.49	10.06	2.48	183.65
Rural population (%, 1990)	Rural population as a % of total population in 1990	55.86	51.2	16	94.6
Rural population growth	Annual rural population growth, averaged over 1991 - 2000	0.77	0.86	-3.79	3.36
Real yield	Real portfolio yield	0.23	0.21	-0.13	0.98
Capital costs / assets		0.08	0.06	0	0.39
Labor costs / assets		0.1	0.08	0.01	0.46
Log of MFI age	Log of the age of the MFI	2.07	2.08	0	3.87
Log of assets(PPP)	Log of assets in purchasing power parity terms	16.23	16.32	4.29	26.25
Village banking lending	Dummy equal to one if the MFI does village style lending	0.15	0	0	1
Solidarity group lending	Dummy equal to one if the MFI lends to individual but assumes joint liability	0.59	1	0	1
Individual lending	Dummy equal to one if the MFI lends to individual	0.79	1	0	1
Inflation		8.09	6.01	-4.57	51.46
KKM	Governance Index (Kaufmann et al)	-0.51	-0.48	-1.59	1.25
GDP growth rate		5.33	5.05	-7.72	17.85
Europe and Central Asia		0.2	0	0	1
Sub-Saharan Africa		0.21	0	0	1
South Asia		0.08	0	0	1
East Asia and Pacific		0.17	0	0	1
Middle-East and North Africa		0.07	0	0	1
Latin America and Caribbean		0.28	0	0	1