What is the effect of regulatory supervision on the profitability and outreach of microfinance institutions?

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2014

Abstract

Regulatory supervision is an important part of the formal banking process. As microfinance institutions have developed and multiplied, they have become more closely regulated, which has allowed many of them to evolve into more traditional banks. But there are concerns over microfinance regulation, as complying with regulatory can be costly, particularly for smaller institutions. Using high-quality cross-sectional data from the Microfinance Information eXchange, I conduct ordinary least squares and instrumental variables regression of regulatory supervision on profitability and outreach of microfinance institutions. Controlling for the non-random assignment of regulation using instrumental variables, I find that regulation is correlated with higher average loan sizes and less lending to women, but increased profitability among for-profit microfinance institutions. The results are consistent with the hypothesis that for-profit microfinance institutions change their business model in response to regulation by cutting outreach to lending sectors that are generally more costly per dollar lent. In contrast, non-profit microfinance institutions do not adjust loan sizes or reduce lending to women in response to regulation, although their profitability does not increase either.

I. Introduction

Over the last 30 years, microfinance has rapidly expanded in developing

countries. According to Roodman (2012), microfinance is defined as the "…provision of

financial services to micro-entrepreneurs and small businesses that have traditionally

lacked access to formal banking institutions."[1] Microfinance institutions (MFIs) serve

more than 100 million clients worldwide and have achieved surprisingly high repayment

rates for non-collateralized loans (Cull et al 2011). The rapid expansion in microfinance

has brought increased regulation and supervision but there is a concern that supervision is

particularly costly for MFIs. Complying with regulation is costly for any bank, but

especially for MFIs regulation can make the difference between success and failure. Even

in the United States, the cost of complying with regulation for commercial banks is

expensive. By one estimate the cost of compliance for commercial banks in the US is

between 12 and 13 percent of banks non-interest expenditures (Elliehausen 1998). The

expectation would be that MFIs would have even higher costs (this expectation is further

elaborated in the theoretical framework section). Christen, Lyman, and Rosenberg

(2003) speculate that compliance with prudential regulations could cost a MFI five

percent of assets in the first year and one percent or more going forward. An increase in

the costs of regulation for a MFI, all other things being equal, would decrease its

profitability.

When discussing financial regulation it is important to draw a distinction between

prudential and non-prudential regulation. Regulation is prudential when "it is aimed

specifically at protecting the financial system as a whole as well as protecting the safety

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[1] Roodman (2012), p. 23

[2] Christen et al (2003), p. 3

of small deposits in individual institutions."[2] The assets of microfinance institutions are relatively small in comparison with those of formal providers of financial services like commercial banks, so they do not pose a substantial risk to the health and stability of the financial system as a whole in most countries. But, protecting the safety of the many poor depositors is an important rationale for solid financial regulation. Prudential regulation is particularly important in microfinance because the vast majority of clients do not have an easy path for self-advocacy. Non-prudential regulation involves the regulatory policies governing the day-to-day functions of banks' operations. Microfinance regulation includes both prudential and non-prudential regulation.

Increased regulation has been closely tied to the expansion of deposit services by MFIs. There is not a strong need to supervise institutions that only make loans. The institution is the one taking all of the risk, and it is their responsibility to make sure they have a program that is effective and will not lose them money. Institutions that offer savings products, on the other hand, are holding other people's money, which means that they are more tightly regulated. Some researchers have speculated that regulatory obstacles have made it difficult for microfinance organizations to offer savings products, since accepting deposits means that they would be facing strict regulation unlike anything they faced when they were simply providing loans (Christen et al 2012). The primary concern regarding regulation and supervision is its effect on profitability, and the indirect effects that a decrease in profitability has on the institution's business model. Several authors have speculated that increases in supervision affect the outreach of an institution. In other words, if the profitability of a MFI decreases because of increased supervision,

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[2] Christen et al (2003), p. 3

the institution decreases outreach in order to maintain it's profitability. Most recently, Cull et al (2011) examine 245 MFIs in 49 different countries and conclude that supervision has a negative effect on outreach. The regulatory environment for MFIs has changed significantly since then (the paper used data from 2005), and more robust findings can be expected from examining a larger data set using more extensive and up-to-date information.

The key question is whether MFIs would suffer the consequences of more costly regulation and allow a decrease in their profitability, or whether they would attempt to cut costs in some fashion. **Specifically, does an increase in microfinance regulation decrease the profitability of MFIs, and if so, do MFIs decrease their outreach to their poorer clients and to women as a way to maintain profitability in the face of costly regulation? This paper uses data from 2011 across 79 developing countries and 1,229 different institutions to examine the impact of microfinance regulation and supervision on profitability and outreach of MFIs on a cross-country basis.** MFIs that receive most of their funding from donors will be examined separately, as they may have a different cost-benefit analysis that relies less on maintaining a profitable and sustainable operation.

II. Literature Review

Existing literature on the effects of regulation of microfinance institutions is somewhat inconclusive. The reasons for this are several. First, microfinance regulation contains competing goals and different stakeholders may prioritize different goals. For example, microfinance advocates might argue that successful regulation is regulation that

creates the most new MFIs, while regulators might argue that the most important thing is making sure it is feasible to supervise all MFIs and thus to limit their number. Second, it is difficult to establish external validity for country studies since the proper regulatory framework can vary dramatically depending on the conditions in each country. Third, there simply have not been enough empirical studies done to develop an effective consensus on what the effects of microfinance regulation and supervision are.

One of the areas of microfinance regulation in which there appears to be a broad consensus (at least in academia) is interest rate caps. Most studies are strongly critical of interest rate caps, because they observe that caps tend to hurt poor people's access to credit by making it unprofitable to offer very small loans because of the high risk (which is why the interest rate is high in the first place) and the high administrative costs for administering many small loans (Helms and Reille 2004). Many of the countries that passed legislation that mandated interest rate caps experienced decreases in profitability of MFIs, a decrease in the overall number of institutions, and decreases in the outreach to women and the poor (Christen et al 2012).

Several studies on microfinance supervision in individual countries have found differing effects. A theoretical study of the potential effects of microfinance regulation in Zambia found that the considerable estimated increase in costs associated with increased regulation would severely decrease the profitability of institutions and was predicted to drive a significant proportion of institutions out of business unless they found ways to severely cut their costs (Chiumya 2006). A separate study on microfinance regulation in Peru concluded that changes in regulation had served as a facilitator for enhancing the growth and development of microfinance institutions (Carrasco 2006). Again, external

validity is difficult to achieve because of unique conditions within the countries. Further, subtle differences in regulatory policy changes make it near impossible to judge whether these studies actually contradict one another, or whether they were simply examining different policies. For this reason, within-country studies are limited in terms of their usefulness.

Several papers have attempted to look at the effect of microfinance supervision on a cross-country basis. Hartaska (2005) examines MFIs in Central and Eastern Europe and finds that regulated institutions have lower returns on assets relative to non-regulated institutions. Using a larger sample size, Hartaska and Nadolnyak (2007) find that controlling for macro-economic and institutional variables across countries, regulation has no impact on financial performance, but they do find weak evidence that regulated MFIs serve fewer poor borrowers. Mersland and Strom (2009) find that regulation does not have a significant impact on financial or social performance. The problem with all of these studies is that they are measuring regulation using a regulation dummy variable. It is difficult to explain a significant amount of variation in profitability or outreach from a single regulation variable because the variable says very little about what kind of regulation or supervision the institution faces.

Cull et al (2011) are the first authors to use additional variables to measure the exact level of supervision. Cull et al use four dummy variables ranging from the original basic regulatory dummy to a dummy for a regular reporting requirement. The authors find that when doing a cross-country analysis of 245 of the world's largest microfinance institutions, increased regulation/supervision is correlated with larger loan sizes and less lending to women, but no decrease in profitability. They advance the explanatory theory

that this is because profit-oriented MFIs absorb the cost of regulation by cutting outreach to more expensive portions of the population. The theory is supported by their work on MFIs that are supported through non-commercial means (donations, for example), who did not see a decrease in outreach, but who did experience a drop in profitability. If supervision does have a negative impact on outreach, this is an important consideration for policy makers, given that one of the primary goals of microfinance is outreach.

III. Theoretical Framework

I first examine how certain types of regulation increase the cost of doing business for commercial banks in general. This consists of an overview of the primary regulatory policies and their effects on banks. Second, I discuss the reasons why regulation affects MFIs more strongly than it does traditional banks. I focus on prudential regulation because it generally presents a more costly challenge to banks. Third, I describe the empirical specifications for the different regressions.

Regulation can increase costs for microfinance institutions in a number of ways. Minimum capital requirements specify the minimum absolute amount that owners must invest as equity in an institution seeking a license to accept deposits. Lower start-up costs lead to more banks entering a given market. Minimum capital requirements should generally be high enough to fund appropriate infrastructure and systems and to cover start-up losses (Christen et al 2012). Reserve requirements are another common regulatory tool. Reserve requirements are the reserves (as a percentage of deposits) that banks are required to maintain. This is mainly to make sure that banks are sufficiently liquid. Since banks are usually paid a below-market return on reserves (if any return at

all), this kind of a requirement should, in theory, increase the cost of deposit-raised capital. All else equal, this would raise the minimum deposit size that a bank can handle profitably. The bank then needs to increase revenues to offset costs. If there is a fixed cost per customer this could potentially squeeze out small depositors. The capital adequacy ratio (CAR) is the ratio of equity to risk-weighted assets. A higher CAR means less risk to depositors and the financial system. But, a higher CAR also means less funding from deposits, which lowers profits and provides a disincentive for banks to provide savings accounts. In the long term a higher CAR could reduce poor people's access to financial services, all else equal (Christen et al 2012).

Interest rate caps are an artificial maximum on the interest rate that banks are allowed to charge. After controlling for market conditions, the interest rate on a loan is primarily determined by the level of risk in the loan. Since the level of risk in very small loans to the very poor is often higher, this means that the interest rates charged to the poor should be comparatively high. The other reason for this is that fixed administrative costs would be higher on a per loan basis for smaller loans. When interest rate caps are set, this means that banks may no longer be able to profitably lend to the poor. Therefore, interest rate caps have the potential to hurt poor people's access to credit (Cull et al. 2011).

There are several reasons why costs associated with regulation are likely to be higher for microfinance institutions. First, regulation exhibits economies of scale, meaning that smaller banks face higher average costs per unit of volume than larger banks in complying with regulation (Elliehausen and Kurtz, 1988). Start-up costs of regulation exhibit even more significant returns to scale because they require a large

component that demands the same amount of time and expense regardless of the scale of the bank. For microfinance institutions with little to no experience with regulation, the costs are likely to be even higher. Additionally, frequent reporting to a supervisory board may be more difficult for a MFI that is involved in a large amount of very small transactions, than for a commercial bank that has fewer, larger transactions (CLR 2003). Second, costs of compliance with regulatory policies may be particularly difficult for MFIs because of the high portion of skilled labor costs involved. In developing countries, the majority of the costs associated with new banking regulations are for labor. Regulation is complex and the labor necessary is likely to be managerial or legal, including needing people to monitor employee compliance and coordinate compliance reviews as well as keeping ahead of new court decisions and regulatory changes. Skilled labor is in short supply in many MFIs and is one of the larger costs (Cull et al 2011). Large labor components to regulation mean that new regulation can be more costly for MFIs than for traditional banks. Third, the nature of microfinance means that institutions are making small loans to a large number of borrowers. Since the administrative costs per dollar lent are higher for smaller loans than for large ones, MFIs need to charge higher interest rates or higher set-up fees to cover their costs than do conventional banks. Increased costs in any form, including regulation, mean that MFIs are forced to raise either interest rates or loans sizes. On either front, increases could exclude particularly vulnerable portions of the population such as women and the very poor.

The relationships examined in this paper are first between levels of regulation/supervision and profitability, and secondly between regulation/supervision and outreach (on the level of the individual institution). The independent variable in all of the

regressions is the level of regulation/supervision. Previous studies have focused exclusively on a sole regulation dummy, but due to its uniformity a sole dummy is usually unable to explain substantial variation in MFI profitability and outreach. This paper uses a regulatory index loosely based on criteria developed by Cull et al (2011) to measure the level of supervision and regulation. This additional variation makes it easier to examine the precise level of supervision that an institution faces. Cull et al (2011) use a series of dummy variables to denote different stages of regulation/supervision but a potential problem with this approach is that separate dummy variables obscure the fact that each category is a sub-set of the previous category. Using dummy variables it is difficult to determine to what extent there is a linear (or non-linear) relationship, and there is also a strong concern regarding near perfect co-linearity, as the separate dummy variables are very related. The index used in this paper takes on a value between 0-2: 0 if there is no regulation, 1 if the institution faces a regular reporting requirement to regulatory authority, 2 if the institution faces onsite supervision.

The dependent variable for the first regression is Operational Self-Sufficiency, which is defined as operating revenue/expenses (financial expense + loan loss provision expense + operating expense). This variable is intended to measure level of profitability. The dependent variable in the second regression is average loan size relative to the income of the bottom quintile. This is calculated by dividing the average loan size for an institution by the income per capita of the respective country.

Several relevant controls are used for the regressions, both on the MFI-level and on the country level. Within the institution the following controls are used: age (using an age index ranging from 0-3), size measured in total assets (in $US), and operating

expenses/assets, the capital assets ratio (in \$US), and the number of active borrowers. On

the country level the following controls are used: inflation, real GDP growth, real interest

rate, and a measure of the corruption level. The institution is denoted by *i* and the country

is denoted by *c*. The appropriate regression equations are included below. The first

regression examines the effect of regulation/supervision on profitability. The other

regression has the same independent variable and controls but has average loan size

(relative to income per capita) as the dependent variables and the signs of the variables

are reversed.

$$Operational\ Self - Sufficiency_{it}$$

$$= \alpha - \beta_1 Regulatory\ Index_i + \beta_2 Assets_i + \beta_3 Operating\ \frac{Expenses}{Assets}_i$$

$$+ \beta_4 Age_i + \beta_5 \frac{Capital}{Assets} Ration_c + \beta_6 Number\ of\ Active\ Borrowers_c$$

$$- \beta_7 Inflation_c + \beta_8 GDP\ Growth_c + \beta_9 Real\ Interest\ Rate_c$$

$$- \beta_{10} Corruption_c$$

IV. Data

This paper uses data from 1,229 MFIs in 79 different developing countries. The

data has been collected by the Microfinance Information eXchange (MIX), a non-profit

organization that aims to promote information exchange in the microfinance industry.

Each observation includes the data for one MFI over the course of one year. The data

includes information on average loan size, assets, deposits taken, percent of female

borrowers, etc. The data set includes approximately 13,000 observations over more than ten years, although this paper only looks at 1,229 different observations since it is only looking at the year 2009. The reason this paper only considers a cross-section is because the regulatory index remains constant in most countries, meaning it would be unable to explain significant variation over time in a fixed effects model. Participation by MFIs in the MIX is voluntary, but most institutions share their information because transparency is key in terms of attracting investment. Still, it is very likely that many of the smaller institutions are not included in this dataset. It is therefore reasonable to assume that there is a certain level of self-selection within this dataset for larger, more profitable MFIs. This does not present a problem in the overall analysis. Larger, more profitable institutions are likely to be in the best position to absorb the costs of regulation and supervision. If there is evidence that even they decrease outreach to absorb regulatory costs, it is a logical assumption that smaller, less-profitable MFIs would face even larger difficulties.

The construction of regulatory variables functions as follows. Using the legal status of the institution each MFI can be classified into one of five categories: banks, rural banks, credit unions and cooperatives, non-bank financial institutions, and non-governmental organizations. The stringency of regulation/supervision within a country conveniently depends on exactly these specifications. By going to the websites of the relevant regulatory agencies for each country it is possible to discover the level of supervision for each of type of MFI. A helpful resource in this process is a collection of laws compiled by the Boston University Center for Finance, Law, and Policy's Financial Inclusion Project. The regulatory index was self-constructed using these resources

(explained in more detail in the Theoretical Framework). While there were some

countries where sufficient information could not be found, the data set is still sufficiently

large to allow for an effective regression.

Table 1: Distribution of MFIs by Region in 2009
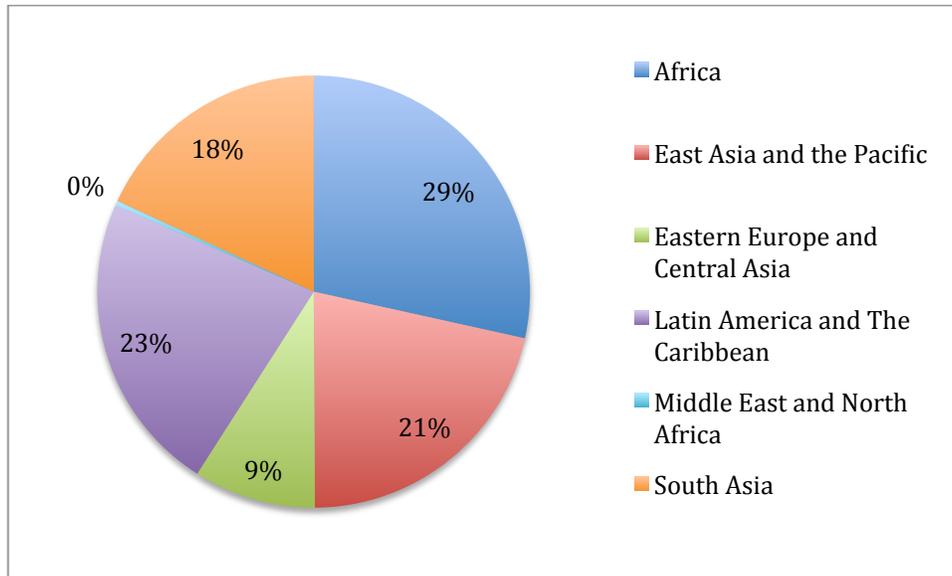
Total Number of Observations: 569

Table 1 shows the distribution of MFIs by region. The plurality of institutions

comes from Africa with 29%, followed by Latin America and the Caribbean, East Asia

and the Pacific, and South Asia. Eastern Europe and Central Asia make up 9% of the

sample, while the Middle East and North Africa only has 2 observations in this data set.

A more detailed breakdown of the countries examined in this paper can be found in the

appendix.

Table 2 shows a basic comparison of the proportion of institutions that are not

regulated, face a regular reporting requirement, and face onsite supervision. The

regulatory index was constructed here. As explained above, it is assumed that institutions that face onsite supervision also face a regular reporting requirement. In other words, if the regulatory index is a 2 (meaning onsite supervision), this really means that the institution faces a regular reporting requirement AND onsite supervision. Previous studies have found that between 80-85% of MFIs face some sort of regulation. Approximately 86% of institutions within this data set face either a regular reporting requirement or onsite supervision. It makes sense that this number would have increased as the general tendency to regulate the microfinance industry has increased in recent years.

Table 2: Distribution of Regulatory Index

Regulatory Index	Observations (out of 1229)	Percentage
No Regulation	143	11.63
Regular Reporting Requirement	551	44.83
Onsite Supervision	521	42.39

A comparison of the characteristics of institutions with different regulatory requirements strongly suggests that the assignment of supervision is non-random. In Table 2, institutions with no regulation are compared to institutions with regular reporting requirements and those with onsite supervision. Institutions with onsite supervision have higher total assets, greater average loan size, and lower proportion of women borrowers, not to mention a far higher proportion of institutions that accept deposits. The profile that emerges is that more commercially oriented MFIs tend to face onsite supervision, while more outreach oriented MFIs do not.

Table 3: Sample Comparison For-Profit Institutions, Unregulated vs. Regular Reporting Requirement vs. Onsite Supervision

Variable	No regulation	Regular Reporting Requirement	Onsite Supervision	Difference in Means (T test significance at 95 CI between all three)
NGO Dummy	.036 (.189) Obs. 55	.005 (.069) Obs. 212	0 (0) Obs. 236	Yes
Accepts Deposits Dummy	.273 (.449) Obs. 55	.472 (.500) Obs. 212	.860 (.348) Obs. 236	Yes
Total Assets ($US millions)	83.3 (163.0) Obs. 52	71.3 (191.0) Obs. 185	332.0 (2,330) Obs. 192	Yes
Operational Self-Sufficiency	1.288 (.4267) Obs. 53	1.183 (.387) Obs. 177	1.203 (.444) Obs. 186	No
Average Loan Size (relative to GNI per capita)	.226 (.371) Obs. 53	.729 (1.267) Obs. 202	2.917 (20.727) Obs. 193	Yes
% of Women Borrowers	.907 (.194) Obs. 52	.607 (.248) Obs. 185	.527 (.254) Obs. 171	Yes
Age (Index from 0-2)	1.321 (.827) Obs. 53	1.373 (.737) Obs. 209	1.378 (.827) Obs. 230	No

These statistics foreshadow some of the main regression results. Specifically, while there are no significant differences in operational self-sufficiency (which is being used as a proxy for profitability), there is significantly less outreach for supervised institutions than unsupervised ones. Because the summary statistics suggest the selection of MFIs for supervision is non-random there is a strong probability that the error term for supervision could be correlated with the dependent variables operational self-sufficiency and average loan size. It thus becomes necessary to find a set of valid instruments. Instruments should be highly correlated with the endogenous regressor (in this case the

supervisory index) but at the same time uncorrelated with the error term in the regression (exogenous). For this paper, five variables are used as instruments.

The first instrument is a country-level dummy variable indicating whether large and medium-sized banks have annual (or more frequent) onsite supervision. This variable, called *Big Bank Supervision*, was created based on survey responses from bank supervisors in over one hundred countries originally collected by Barth, Caprio, and Levine (2001) and updated in 2011. This variable is used as a measure of a country's general propensity to regulate the banking industry. The expectation in countries with a high propensity to regulate banks is that MFIs would also be more likely to face regulation and supervision. The variable is exogenous because the propensity to regulate banks existed before MFIs arrived and it is highly unlikely that the regulation of MFIs would have influenced general regulatory policies given the relatively small size of the MFIs.

Because the *Big Bank Supervision* variable is a country-level indicator, it is unable to explain sufficient variation in the assignment of supervision. Instruments that provide MFI-specific information are required. The first MFI-level instrument is a dummy variable indicating whether an MFI is organized as a non-governmental organization (NGO) or non-bank financial institution (NBFI) (to simplify the regression the dummy is *non-NGO/NBFI*). There is a fundamental difference in the charters of NGO/NBFIs and those of more commercially oriented MFIs such as banks or credit unions. NGO/NBFI MFIs usually place a larger emphasis on outreach and rely more heavily on donated funds to subsidize their operations (Cull et al 2011). Since NGO/NBFI-based MFIs were created to be less commercially oriented (although the

institutions examined here are *not* non-profit) the expectation is that there would be less need for supervision. Since charter status was determined at the creation of each MFI, most likely without consideration for the supervision the MFI would face, this variable can be viewed as exogenous.

A further institution-level instrument, a dummy variable for whether the MFI accepts retail deposits (*savings dummy*), is also used. As noted in the theoretical framework, prudential supervision is generally only relevant for MFIs that accept retail deposits from the general public. It makes sense that the savings dummy would be highly correlated with the level of supervision that an MFI encounters. Similar to non-NGO/NBFI status, the decision to accept deposits is usually made at the creation of the MFI, so the variable is exogenous.

The two final instruments are measures of rule of law within the country. They are part of a broader rule of law index that has been compiled by the World Justice Project (WJP), a non-profit institute dedicated to improving equity and the rule of law worldwide. The index created by the WJP is broken up into several factors; including several that are not relevant to this regression or that are already included (such as corruption and level of regulation). For this reason, this paper only includes two of the factors from the index as instruments. The first is a measure of limited government powers (*Rule of Law: Limited Government Powers*) that quantifies how effectively the government and its officials and agents are subject to and held accountable under the law. This measure examines the extent to which a formal separation of powers and checks and balances exist within the government. The second is a measure of order and security (*Rule of Law: Order and Security*) that quantifies how well the government is able to

protect the human rights of its citizens and control crime, civil conflict, and violence.

Both of these measures are exogenous because the regulation of MFIs could not possibly

have affected the political structure of the government. The expectation, which is

confirmed in the regression below, is that these measures of the rule of law would be

relevant to how carefully the microfinance industry is regulated.

V. Results

A regression of the regulatory index on the instrumental variables (see Table 4)

shows that all of the instruments are significant at the 1% level. The set of instruments

explains 36% of the variation in the regulatory index so they fulfill the criteria of

instrument relevance.

Table 4: Regression of the Regulatory Index on Instrumental Variables

	Regulatory Index
Big Bank Supervision Dummy	0.346
	(7.79)***
Non-NGO/NBFI Dummy	0.809
	(16.16)***
Accepts Deposits Dummy	0.181
	(3.94)***
Rule of Law Index: Limited Government Powers	-1.236
	(6.45)***
Rule of Law: Order and Security	1.976
	(11.47)***
Constant	-0.076
	(0.45)
R^2	0.36
N	1,037

*$p<0.1$; ** $p<0.05$; *** $p<0.01$
T-Stats in parentheses

Table 5: The Effect of Regulatory Supervision on MFI Operational Self-Sustainability (For-Profit MFIs)

	OLS	IV
Regulatory Index	0.101	0.136
	(3.31)***	(3.14)***
Assets	0.000	0.000
	(0.38)	(0.24)
Operating expense/ assets	-1.033	-0.990
	(5.87)***	(5.11)***
Capital/asset ratio	0.625	0.607
	(6.43)***	(5.54)***
Number of active borrowers	-0.000	-0.000
	(0.82)	(0.62)
Corruption Index	-0.102	-0.082
	(2.34)**	(1.64)
Inflation	-0.010	-0.011
	(1.27)	(1.20)
Real Interest Rate	0.002	0.002
	(0.90)	(0.78)
Real GDP Growth	0.363	0.444
	(0.95)	(1.03)
GDP Per Capita	0.000	0.000
	(1.02)	(0.76)
Constant	1.328	1.219
	(7.55)***	(5.95)***
R^2	0.23	0.23
N	300	256

*$p<0.1$; ** $p<0.05$; *** $p<0.01$
T-Stats in parentheses

Table 5 shows the results of an OLS and IV regression of MFI operational self-sustainability on the regulatory index and control variables. This regression looks only at for-profit MFIs. In both the OLS and the IV regression the regulatory index is positive and statistically significant at the 1% level. Since this relationship is clear in both the OLS and IV regression it is unlikely that there is a selection bias influencing the results.

Instead, this regression suggests that regulation could be having a positive impact on the microfinance industry within the country. Tighter regulation may have forced institutions to adopt more sustainable business practices. Alternatively, a part of this relationship could be explained if MFIs in questionable financial standing have lost their banking license. There is insufficient information in this regression to speculate further on the reasons for this correlation, although more careful exploration of this topic could be useful in further research.

The controls behave mostly as expected. Operating expense relative to assets is negative and statistically significant, as is the corruption index and inflation. The capital to assets ration is positive and statistically significant at the 1% level, which makes sense, as this is likely on of the more important factors influences profitability. As expected, larger MFIs are more self-sustainable. GDP per capita is not significant, which suggests that the country differences captured here are not purely differences in the level of development.

Table 6: The Effect of Regulatory Supervision on MFI Operational Self-Sustainability (Non-profit MFIs)

	OLS	IV
Regulatory Index	-0.017	-0.052
	(0.70)	(1.38)
Assets	-0.000	-0.000
	(1.14)	(0.95)
Operating expense/ assets	-0.740	-0.705
	(7.08)***	(6.83)***
Capital/asset ratio	0.505	0.391
	(7.59)***	(5.66)***
Number of active borrowers	0.000	0.000
	(0.99)	(0.73)
Corruption Index	-0.086	-0.044
	(3.09)***	(1.35)
Inflation	-0.001	0.008
	(0.22)	(1.47)
Real Interest Rate	0.001	0.001
	(0.38)	(0.37)
Real GDP Growth	0.316	-0.343
	(0.98)	(0.95)
GDP Per Capita	0.000	0.000
	(0.79)	(1.23)
Constant	1.323	1.249
	(11.71)***	(10.87)***
R^2	0.25	0.22
N	373	323

*$p<0.1$; ** $p<0.05$; *** $p<0.01$
T-Stats in parentheses

Table 6 shows the results of a regression of MFI operational self-sustainablity on the regulatory index and controls, but looking at non-profit institutions instead of for-profit ones. The differences are striking. While the controls still behave mostly the same as in the previous regression, the regulatory index coefficient is no longer positive or statistically significant. This suggests that there may be a fundamental difference in the

way for-profit and non-profit MFIs deal with regulatory supervision. For-profit MFIs may be better able to adapt to more rigorous regulation, or they may find ways to offset some of the regulatory costs, meaning they are able to take advantage of the benefits of a stricter regulatory environment without paying as much of the costs. Given that non-profit MFIs are less reliant on financial sustainability than for-profit MFIs, tighter regulation may not have had the same weeding out effect of the less sustainable institutions among non-profits as it does among for-profits.

Table 7: The Effect of Regulatory Supervision on MFI Average Loan Size relative to GNI per capita (For-Profit MFIs)

	OLS	IV
Regulatory Index	0.475	0.834
	(2.29)**	(3.84)***
Assets	0.000	0.000
	(1.75)*	(2.01)**
Operating expense/ assets	-2.966	-3.176
	(2.50)**	(3.29)***
Capital/asset ratio	0.945	1.687
	(1.42)	(3.04)***
Number of active borrowers	-0.000	-0.000
	(0.75)	(0.45)
Corruption Index	-0.392	-0.128
	(1.31)	(0.50)
Inflation	0.022	-0.028
	(0.39)	(0.63)
Real Interest Rate	0.038	-0.003
	(2.14)**	(0.22)
Real GDP Growth	6.296	4.777
	(2.40)**	(2.19)**
GDP Per Capita	0.000	0.000
	(0.35)	(0.10)
Constant	0.347	-0.280
	(0.29)	(0.27)
R^2	0.12	0.15
N	301	257

*$p<0.1$; ** $p<0.05$; *** $p<0.01$
T-Stats in parentheses

Table 7 shows the results from an OLS and IV regression of average loan size (relative to GNI per capita) on the regulatory index and control variables for For-Profit MFIs. The coefficient for the regulatory index is positive and statistically significant at the 1% level, which is consistent with the hypothesis that for-profit MFIs offset the cost of additional supervision by decreasing outreach. Operating expenses/Assets is negative and significant, which is expected, since the theory suggests that smaller loans are more expensive. The other controls behave as expected.

Table 8: The Effect of Regulatory Supervision on MFI Average Loan Size (Non-profit MFIs)

	OLS	IV
Regulatory Index	0.059	-0.084
	(0.50)	(0.40)
Assets	0.000	0.000
	(0.12)	(0.17)
Operating expense/ assets	-0.593	-0.241
	(1.15)	(0.42)
Capital/asset ratio	-0.227	-0.028
	(0.69)	(0.07)
Number of active borrowers	-0.000	-0.000
	(0.18)	(0.06)
Corruption Index	-0.061	-0.274
	(0.45)	(1.52)
Inflation	-0.008	-0.032
	(0.30)	(1.04)
Real Interest Rate	0.016	0.015
	(1.46)	(1.13)
Real GDP Growth	7.415	10.654
	(4.66)***	(5.35)***
GDP Per Capita	-0.000	-0.000
	(1.18)	(1.45)
Constant	-0.247	0.138
	(0.44)	(0.22)
R^2	0.08	0.10
N	373	323

*$p<0.1$; ** $p<0.05$; *** $p<0.01$
T-Stats in parentheses

Table 8 shows the results from an OLS and IV regression of average loan size (relative to GNI per capita) on the regulatory index and control variables for non-profit MFIs. The coefficient on the regulatory index is not statistically significant in either regression, suggesting that non-profit MFIs may deal with regulatory supervision differently from for-profit institutions. This supports the hypothesis that profit-seeking MFIs are forced to cut into outreach to offset regulation costs. Non-commercially oriented MFIs would not be expected to reduce outreach as they place a lesser value on the profit-motive and are likely more mission oriented. Regardless of additional costs imposed by regulation, they would be expected to continue to reach out to poorer segments of the population.

VI. Conclusion

The role of regulatory supervision in the microfinance sector has not been adequately examined within academic circles. There are insufficient empirical papers on the effect of supervision on profitability and outreach. This paper expands on the work by Cull et al (2011) by using a larger data set and different methodology to find a more definitive answer. I use high-quality cross-sectional data from the Microfinance Information eXchange to regress supervision on profitability and outreach.

Indications emerge that the assignment of regulatory supervision is non-random. In particular, supervision tends to be higher for larger, more commercially oriented institutions. Appropriate instrumental variables are naturally difficult to find because many of the characteristics that describe supervised MFIs are endogenous in profitability and outreach. This paper uses five instruments to estimate level of supervision. These

instruments are: 1) a country-level dummy indicating whether large and medium-sized banks have annual (or more frequent) onsite supervision; 2) a MFI-level dummy NGO/NBFI variable; 3) a dummy variable if the institutions accepts retail deposits; 4) a rule of law measure of government powers; 5) a rule of law measure of order and security. These variables can reasonably be expected to be exogenous and they are shown to be relevant.

Controlling for the non-random assignment of supervision using these instruments, I find that tighter regulation has a positive impact on profitability for for-profit (but not non-profit) institutions. A possible explanation is that regulation may have forced for-profit institutions to adopt more sustainable business practices, while non-profits did not need to do so since they are less reliant on financial self-sustainability. Tighter regulation has a negative effect on outreach (measured as average loan size) for for-profit institutions, which supports the hypothesis that for-profit institutions sacrifice some of the cost of supervision by decreasing outreach. This effect is not significant among non-profit MFIs, suggesting that less commercially oriented institutions have a fundamentally different business structure that does not force them to cut costs in as strict of a fashion.

These results have relevant policy interpretations. Regulatory agencies need to weigh the cost of decreased outreach with the clear benefits of supervision in terms of better protection of depositors' funds and improved stability in the MFI sector as a whole. Future research should focus on quantifying the benefits of microfinance regulation to determine whether the benefits outweigh the cost of decreased outreach (and the direct costs to MFIs).

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Appendix

Table 9: Distribution of MFIs by Region

Region	Freq.	Percent
Africa	162	28.47
East Asia and the Pacific	122	21.44
Eastern Europe and Central Asia	52	9.14
Latin America and The Caribbean	128	22.5
Middle East and North Africa	2	0.35
South Asia	103	18.1
Total	569	100

Table 10: Distribution of MFIs by Country

Country	Freq.	Percent
Afghanistan	2	0.35
Albania	2	0.35
Armenia	3	0.53
Azerbaijan	2	0.35
Bangladesh	27	4.75
Benin	12	2.11
Bolivia	12	2.11
Bosnia and Herzegovina	1	0.18
Brazil	3	0.53
Bulgaria	3	0.53
Cambodia	13	2.28
Cameroon	6	1.05
Chile	1	0.18
China, People's Republic of	12	2.11
Congo, Democratic Republic of the	7	1.23
Cote d'Ivoire (Ivory Coast)	17	2.99
Dominican Republic	4	0.7
East Timor	2	0.35
Ecuador	31	5.45
El Salvador	3	0.53
Ethiopia	3	0.53
Georgia	2	0.35
Ghana	10	1.76

Guatemala	1	0.18
Haiti	1	0.18
Honduras	10	1.76
India	22	3.87
Indonesia	14	2.46
Iraq	2	0.35
Kazakhstan	1	0.18
Kenya	14	2.46
Kosovo	1	0.18
Kyrgyzstan	2	0.35
Laos	2	0.35
Madagascar	7	1.23
Malawi	2	0.35
Mexico	22	3.87
Moldova	1	0.18
Mongolia	6	1.05
Mozambique	3	0.53
Nepal	33	5.8
Nicaragua	3	0.53
Niger	4	0.7
Nigeria	38	6.68
Pakistan	7	1.23
Papua New Guinea	2	0.35
Paraguay	4	0.7
Peru	33	5.8
Philippines	52	9.14
Romania	1	0.18
Russia	17	2.99
Rwanda	14	2.46
Senegal	9	1.58
Serbia	2	0.35
Sierra Leone	1	0.18
South Africa	1	0.18
Sri Lanka	12	2.11
Tajikistan	6	1.05
Tanzania	9	1.58
Uganda	5	0.88
Ukraine	1	0.18
Uzbekistan	1	0.18
Vietnam	25	4.39
Total	569	100