Microfinance Institutions: Does Capital Structure Matter?

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Abstract

Microfinance Institutions (MFIs) have risen to the forefront as invaluable institutions in the development process. Nevertheless, capital constraints have hindered the expansion of microfinance programs such that the demand for financial services still far exceeds the currently available supply. Moreover, it is observed that microfinance organizations have had various degrees of sustainability. Thus, the question of how best to fund these programs is a key issue. Recognizing the potential of microfinance in the development process, this paper examines the existing sources of funding for MFIs by geographic region, and explores how changes in capital structure could facilitate future growth and improve the efficiency and financial sustainability of MFIs. Using panel data, I establish a link between capital structure and key measures of MFI success. Notably, I find causal evidence supporting the assertion that an increased use of grants by large MFIs decreases operational self-sufficiency. (JEL F3, G21, G32, O1)

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1 Introduction

Microfinance Institutions (MFIs) provide financial services to low-income households in developing countries around the world. In the minds of many, microfinance and micro-credit are synonymous. However, microfinance refers to an array of financial services that include credit, savings, and insurance while micro-credit is the provision of credit which is usually used as capital for small business development. MFIs can operate as Non-Governmental Organizations (NGOs), credit unions, non-bank financial intermediaries or commercial banks. To cushion themselves from perceived risks due to the target client's lack of collateral as a guarantee against default, MFIs are known to charge very high (30% - 60%) nominal interest rates.[1] The loans are short-term, the average loan size is very small, and only a few programs require borrowers to put up collateral. (e.g., Loans can be as small as $75, repaid over 1 year). Globally, there are more than 67 million households served by microfinance programs.[2] Through MFIs, many would-be entrepreneurs with few assets have been able to escape positions as poorly paid wage laborers or farmers. MFIs have expanded the frontiers of institutional finance and have brought the poor, especially poor women, into the formal financial system by enabling them to access credit in order to fight poverty.

> *"While the full [microfinance] promise is as yet unmet* ***(profits remain hard to squeeze out and the very poor are tough to reach)****, there are a growing number of success stories and, world wide, nearly 70 million low-income individuals are served by microfinance institutions."*[3]

Despite the successes of many MFIs, millions of low-income individuals in developing countries still do not have access to financial services. High operating costs and capital constraints within the MFI industry have prevented MFIs from meeting the enormous demand. Additionally, Dehejia, Montgomery, and Morduch (2005) show that the demand for credit by the poor is NOT inelastic. The high interest rates charged may be limiting the ability of MFIs to serve poorer potential clients. Donor agencies, local governments, and others are promoting competition and stressing financial sustainability as ways to maximize the breadth of outreach (Armendáriz de Aghion &

[1] Dehejia, Montgomery, and Morduch (2005).
[2] Armendáriz de Aghion and Morduch (2005), p. 3.
[3] Armendáriz de Aghion and Morduch (2004), p. 135.

Morduch, 2004). Thus, institutional structure and capital flows to MFIs have become much more salient issues. Focusing on funding sources, this paper investigates the relationship between capital structure, MFI sustainability, efficiency, and outreach to identify opportunities for increasing the sustainability and growth of MFIs.

The remainder of the paper proceeds as follows: Section 2 describes the evolution of microfinance funding sources. Section 3 discusses the optimal capital structure literature. Section 4 analyzes the relationship between funding sources, sustainability, efficiency, and outreach. Section 5 concludes.

2 Evolution of MFI Funding Sources

Existing research places the evolution of MFI funding sources within the context of an institutional life cycle theory of MFI development (de Sousa-Shields, 2004). According to this framework of analysis, most MFIs start out as NGOs with a social vision, funding operations with grants and concessional loans from donors and international financial institutions that effectively serve as the primary sources of risk capital for the microfinance sector. Thus, the literature on microfinance devotes considerable attention to this process of "NGO transformation" as a life cycle model outlining the evolution of a microfinance institution (Helms, 2006).[4]

Generally, the life cycle theory posits that the sources of financing are linked to the stages of MFI development. Donor grants and "soft loans" comprise the majority of the funding in the formative stages of the organization.[5] As the MFI matures, private debt capital becomes available but the debt structures have restrictive covenants and/or guarantees. In the last stage of MFI

[4] An alternative model, based on changing market share, though well-developed in the finance literature, appears less relevant for microfinance. The microfinance market is not yet a mature market and remains dynamic both in terms of the range of customers and the evolution of instruments. Consequently, the concept of market share is illusive. Market share is also less useful conceptually since it fails to capture a defining set of characteristics for MFIs that emerged from diverse informal arrangements and pre-existing institutions. Moreover, the market share approach does not allow for changes in financial performance that may be associated with growth in the size of the individual MFI, even if the growth in the market outpaces the growth of an individual institution.

[5] Soft loans are loans with subsidized interests rates obtained from multilateral banks (e.g., the World Bank, the Inter-American Development Bank), government aid agencies (e.g., United States Agency for International Development, UK Department for International Development), foundations (e.g., the Ford Foundation), and apex organizations (e.g., Women's World Banking ACCION).

evolution, traditional equity financing becomes available (Fehr & Hishigsuren, 2004).

A growing number of MFIs have formalized and sought to fund growth through public deposits and thus became willing to accept banking regulation and the concomitant standards of transparency and prudential management. As institutions have expanded, many MFIs gradually made the transition to include commercial funding that spanned the range of risk and liquidity profiles and thus could be adjusted to match the capital structure requirements at different stages of the institutional life cycle. Some observers view these changes as a general shift toward capital structures more typical of commercial financial institutions. Farrington and Abrams (2002) provide evidence that supports the life cycle theory, noting an increase in competition in MFIs as they increase in number and documenting a spread in regulation facilitating a change in the capital structure of the industry. They discuss several key trends that have emerged: i) the tendency towards increased leveraging of capital. (For example, non-profit foundations now have an average leverage of 4.5 times the value of their equity compared to about 1.3 times their equity.) ii) the rise in the practice of accepting public deposits, and iii) a shift away from subsidized donor money toward commercial funding.

Many MFIs also look to deposit financing and commercial debt as essential elements of funding future growth in the microfinance sector (de Sousa-Shields & Frankiewicz, 2004). Commercial debt financing is an important tool in MFI funding and management; both short-term as well as longer-term debt financing. Access to these sources of funding requires transition to a regulated entity, a transition that can be challenging and expensive in the short run because of the management, capital, and technical requirements for a regulated entity. In some cases, MFIs receive grants and subsidized loans from development agencies to finance the transition into deposit-taking institutions, providing an example of how development assistance - the "risk capital" of MFIs - can reappear at later stages in the life cycle of these institutions. Funds from development agencies or NGOs may also be deployed as financial instruments designed to improve access for newly regulated entities. These instruments, such as guarantees for capital market issuances or bank loans, have newly regulated MFIs to prove creditworthiness and borrow at cheaper rates (Counts, 2005). Thus,

the analytical framework of a life cycle funding pattern can be altered by the ongoing supply of non-commercial funds attracted to MFIs by the social objectives of a sector that aims to serve poor populations.

Funding patterns also may be influenced by other, local factors that shape institutional development. In some countries, a significant number of MFIs grew out of credit unions that traditionally focused on mobilizing savings from members. Although some of these institutions choose to become regulated entities, others are more likely to choose a savings bank model rather than a model that is based on commercial banking.

Despite the support for the life cycle approach, there is also evidence that countervailing factors shape the funding sources and instruments available to MFIs. These factors show through in considerable regional variation in MFI funding patterns; regional variations that have been influenced by historical factors, including traditional patterns of savings and lending, and variations in regulatory environments. Whereas MFIs in several Latin American countries have made progress in the transition to regulation and market funding (Jansson, 2003; Conger, 2003), unregulated and NGO structures still predominate in the Middle East, North Africa, Eastern Europe, and Central Asia. Such institutions face limitations in financing options, with no license for taking public deposits and no shareholder structure for attracting equity other than donations.

In South Asia, the challenge of this transformation is evident in the requirements faced by MFIs in India. According to the Reserve Bank of India's (RBI) regulations, unless a MFI is registered as a non-banking finance company (NBFC) and obtains an investment grade rating, it is not allowed to accept fixed deposits. Hence, such MFIs are unable to access deposits even from their own members and borrowers. To register as an NBFC in India, an entity has to meet a minimum capital requirement stipulated by the RBI, which acts as a hurdle for several NGOs in the microfinance sector.[6] Thus, the overall regulatory environment plays a role in national and regional variations in funding patterns, since some countries benefit from a more balanced and informed regulatory

[6]Crisil Study - Securitization of Microfinance Assets: A Winning Proposition. The Financial Express. 12/12/04.

structure that facilitates the transfer to a regulated entity while still assuring essential prudential oversight. Additionally, Banerjee, Munshi, and Duflo (2003) have shown that the maturity of the capital markets within a country can affect the allocation of funding and/or resources.

In recent years, there has been increasing internal and external pressure for the MFIs to decrease dependence on subsidized or grant funding. For example, ACCION International, an organization designed to support MFIs, helps MFIs obtain equity financing, debt financing, and other commercial funding instruments. By enabling MFIs to link directly with investors and commercial banks, ACCION strives to help them become independent of donor funds.[7] Over the past decade, ACCION has been highly influential in encouraging donors to subsidize start-up costs *only* and pushing for MFIs to have a commercial focus (Armendáriz de Aghion & Morduch, 2004).

Since donor funds are limited in amount, reliance on donor funding limits the ability of MFIs to expand to meet rising demand for services. There is also a question as to whether reliance on donor funds allows MFIs to avoid pressures to operate efficiently. Commercially-funded MFIs respond to the profit incentive, working to increase revenues and decrease expenses so that they can have revenues sufficient to cover all operating expenses. MFIs with access to donor funds may not respond to these pressures to operate efficiently or may deliberately choose outreach over efficiency by serving poorer or rural clients with higher delivery costs (Armendáriz de Aghion & Morduch, 2005). Concerns over the dangers of excessive subsidization in microfinance have been prevalent since the 1980s and as a result, the goal of serving the poor has been twinned with the goal of long-term financial self-sufficiency for some time (Morduch, 2005).

Despite keen interest in possible links between funding sources and operational sustainability

[7]The ACCION Gateway Fund, LLC invests in microfinance institutions with a proven track record of financial viability. ACCION International has sponsored the creation of ACCION Investments, an investment company with $19.5 million in committed capital, designed to make equity and quasi-equity investments in Latin America, the Caribbean and Africa. The AfriCap Microfinance Fund, an investment fund co-founded by ACCION and Calmeadow, a Canadian microfinance institution, is dedicated to financing commercial microfinance institutions in Africa. The Latin America Bridge Fund, established in 1984, is the first-ever loan guarantee fund for MFIs. By providing standby letters of credit, the Bridge Fund enables ACCION's Latin American partner programs to borrow from local banks. ACCION's Financial Services Department helps partner programs obtain emergency funding packages during periods of macroeconomic upheavals and liquidity crises. In addition, the Financial Services Department works with international financial organizations and private investors to secure funding for microfinance institutions.

and in studies of relative profitability of individual institutions, there have been no systematic studies for a large group of MFIs that provide robust evidence of how variations in funding or institutional structure affect MFI performance. This paper aims to analyze the factors that influence the success of MFIs. Rather than accept the idea that financial sustainability, efficiency, and outreach are directly related to particular stages of a life cycle pattern of funding, this paper will explore the role that individual funding instruments play in determining the success of microfinance institutions.

Due to data limitations, the empirical analysis focuses on larger (total assets size greater than US$1 million) MFIs. Consequently, one could conjecture that some MFIs were able to become part of the sample due to receiving a particular type of funding at an earlier stage; enabling them to survive and grow in asset size. Thus, the results and subsequent conclusions of the paper will be most relevant for larger MFIs.

3 Optimal Capital Structure

While there is a considerable amount of literature with respect to the optimal capital structure of corporate firms, the application of the Modigliani-Miller (MM) theorem and other corporate finance theorems to lending institutions is less straight-forward.[8] The basic MM principles are applicable to lending institutions, but only after accounting for the fundamental differences in how lenders and corporations operate (Cohen, 2003). With the application of MM to a corporate firm, one can point to an optimal capital structure in terms of the firm's value. However, the relationship between the levered and unlevered betas, the manner in which revenues are generated, and the nature of

[8]See Modigliani and Miller (1958). Modigliani and Miller showed that financing decisions do not matter in a world without taxes, transaction costs, or other market imperfections. Their theorem states that a firm cannot change the total value of its securities by merely splitting its cash flows into different streams. A firm's value is determined by its real assets. Thus, capital structure is irrelevant as long as the firm's decisions are taken as given. However, capital structure does matter in practice due to issues related to taxes, the costs of bankruptcy, the costs of writing and enforcing debt contracts, and the fact that investment and financing decisions cannot always be completely separated. These issues can create situations in which there is an optimal capital structure for a firm.

regulation for a lending institution are different from that of a corporate firm.[9] Consequently, there appears to be no well-defined theoretical notion of an optimal capital structure for a lending institution. As an added level of complexity, an MFI is a unique type of lending institution with risk and return characteristics different from standard lending operations.[10] MFIs also have a mission of reducing poverty, not just maximizing firm value.

Since MFIs have an economic development goal and consequently have grants and other funding sources not typically available to most lending institutions, it is also useful to link MFI capital structure issues to the grant versus concessional loan debate in the foreign aid literature. The question of foreign aid composition has been well studied (For example, see Gupta et al. (2003), Schmidt (1964), and Singer (1961)). Thus, as with issues pertaining to the composition of foreign aid, I take an empirical approach to examining MFI capital structures in order to identify those with the strongest record of performance.

4 Econometric Analysis

4.1 Data

To investigate the optimal capital structure for MFIs, I utilize panel data on MFIs in Africa, East Asia, Eastern Europe, Latin America, the Middle East and South Asia for the years 2003 and 2006. The MFI data are collected from individual institutions as reported to MIX Market.[11] [12] I use data from all of the MFIs with over $US 1.3 million in total assets, at least a level three diamond disclosure rating on MIX Market, and audited financial statements that are in English, French, or

[9] *Beta* - a measure of the systematic risk of a security; the tendency of a security's returns to correlate with swings in the broad market. *Levered Beta* - beta reflecting a capital structure that includes debt.

[10] Whereas the loans of most U.S. lending institutions are characterized by large markets, large loan sizes, long maturities, and proven loan performances, microfinance receivables are highly granular, uncollateralized, and short term. While most microloans are uncollateralized, MFIs have used social sanctions and denial of future credit as a substitute for the traditional form of collateral. Additionally, with their regular repayment schedules, MFIs are envisaged as being able to screen out undisciplined borrowers as well as allowing the institution to get hold of cash flows before they are consumed or diverted. Depending on the geographic region, maturities of microloans vary between 3 and 12 months and their average loan size ranges from $50 to $1,000. Due to the small size of the individual loans, the loan servicing process is labor intensive creating high transaction costs.

[11] www.mixmarket.org.

[12] MIX market defines an MFI as "an organization that offers financial services to the very poor."

Spanish.[13] The analysis concentrates on outreach, efficiency, and financial sustainability. Given that the MFI data are collected from MIX Market, I utilize the MIX Market definitions of financial and operational sustainability:[14]

- Operational self-sufficiency measure is defined as: $\frac{\text{total financial revenue}}{\text{financial expense + operating expense + loan loss provision expense}}$.
- Operational sustainability is defined as having an operational self-sufficiency level of 100% or more.
- Financial sustainability is defined as having an operational sustainability level of 110% or more.

Additional data on country macroeconomic variables (Foreign direct investment, GDP, GDP growth, and inflation) were collected from the World Bank key development data and statistics web site.[15]

While I focus on the largest MFIs in terms of total assets, there is substantial variation in the types of institutions contained in the data set. Tables 1 and 2 provide descriptive and summary statistics for the sample. When these general statistics are broken down by region, we observe some interesting regional differences (See Figures 1 - 4). Africa has the highest percent of unsustainable MFIs (37.70.%), the highest percent of portfolio at risk (7.02%), and the lowest average return on assets (0.43%). The East Asia and Pacific region has the lowest percent of unsustainable MFIs (6.56%). The Eastern Europe and Central Asia region has the highest return on assets (5.25%), the lowest percent of portfolio at risk (3.16%), and the highest average cost per borrower (US$273.27). South Asia has the lowest average cost per borrower (US$36.31). With respect to capital structure, there do not seem to be any regional patterns in the raw data.

[13] MIX Market classifies MFIs according to the level of information disclosure provided. Level 1 indicates general information provided. Level 2 indicates level 1 information and outreach and impact data provided. Level 3 indicates level 1-2 information and financial data provided. Level 4 indicates level 1-3 information and audited financial statements provided. Level 5 indicates level 1-4 information and adjusted data provided.

[14] While I utilize the definitions from our primary data source, we later test the sensitivity of our results to these definitions with an ordered probit model.

[15] http://web.worldbank.org.

[†] Return on Assets = (Net Operating Income, less Taxes)/(Period Average Assets).

[††] Portfolio at Risk Ratio = (Portfolio at Risk Greater Than 30 Days)/(Gross Loan Portfolio). The Portfolio at Risk Greater Than 30 Days is the value of all loans outstanding that have one or more installments of principal past due more than 30 days. This includes the entire unpaid principal balance, including both the past due and future installments, but not accrued interest. It does not include loans that have been restructured or rescheduled.

Table 1: Microfinance Institution - Descriptive Statistics

	Percent of Sample
Lending Methodology	
Individual	37.25
Individual/Village	0.44
Individual/Solidarity	45.90
Individual/Solidarity/Village	2.66
Solidarity	7.10
Village	6.65
Charter Type	
Bank	10.20
Co-Operative/Credit Union	14.91
NGO	33.44
Non-Bank	35.01
Rural Bank	3.92
Regulated	65.31
Non-Profit	61.68
Accepts Deposits	64.22

Table 2: MFI Summary Statistics

Variable		Mean Value	Std. Dev.	Min.	Max.
Debt Relative to Assets	2003	30.77	25.80	0.00	100.00
	2006	1.66	4.82	0.00	55.21
	Total Sample	19.53	24.87	0.00	100.00
Deposits Relative to Assets	2003	21.86	27.87	0.00	100.00
	2006	31.45	28.37	0.00	88.66
	Total Sample	24.19	28.25	0.00	100.00
Grants as a Percent of Assets	2003	13.61	28.54	0.00	232.28
	2006	6.13	14.11	0.00	104.10
	Total Sample	11.14	24.95	0.00	232.28
Retained Earnings as a Percent of Assets	2003	7.43	20.44	-173.97	113.02
	2006	7.74	15.14	-86.90	66.51
	Total Sample	7.56	18.42	-173.97	113.02
Share Capital as a Percent of Assets	2003	15.41	21.23	0.00	101.34
	2006	20.81	45.56	0.00	337.94.00
	Total Sample	17.48	32.80	0.00	337.94
Assets (U.S. dollars)	2003	31,700,000	223,000,000	1,302,192	3,870,000,000
	2006	74,100,000	340,000,000	4,467,000	5,500,000,000
	Total Sample	52,500,000	287,000,000	1,302,000	5,500,000,000
Return on Assets (%)†	2003	2.80	8.51	-65.63	23.10
	2006	3.55	7.55	-77.88	23.18
	Total Sample	3.20	8.02	-77.88	23.18
Portfolio at Risk (%)††	2003	5.08	6.06	0.00	32.89
	2006	4.74	7.94	0.00	84.24
	Total Sample	4.91	7.09	0.00	84.24
Percent Financially Sustainable	2003	59.87	49.10	0.00	100.00
	2006	70.25	45.80	0.00	100.00
	Total Sample	64.88	47.78	0.00	100.00
Percent Operationally Sustainable	2003	75.92	42.83	0.00	100.00
	2006	87.46	33.18	0.00	100.00
	Total Sample	81.49	38.87	0.00	100.00
Percent Unsustainable	2003	24.08	42.83	0.00	100.00
	2006	12.54	33.18	0.00	100.00
	Total Sample	18.51	38.87	0.00	100.00
Percent With No Credit Rating	2003	69.28	46.20	0.00	100.00
	2006	76.72	42.33	0.00	100.00
	Total Sample	72.84	44.51	0.00	100.00
Savers	2003	133,419	1,777,003	0	29,900,000
	2006	146,399	1,832,162	0	30,900,000
	Total Sample	139,920	1,803,264	0	30,900,000
Active Borrowers	2003	63,127	334,425	145	3,493,129
	2006	147,346	716,212	729	6,908,704
	Total Sample	104,106	555,209	145	6,908,704
Borrowers Below the Poverty Line (%)	2003	48.89	36.75	0.00	100.00
	2006	49.00	42.51	0.00	76.00
	Total Sample	48.90	36.66	0.00	100.00
Average Cost Per Borrower (U.S. dollars)	2003	135.09	140.24	4.00	872.00
	2006	178.26	152.10	3.00	879.00
	Total Sample	159.35	148.44	3.00	879.00

Figure 1: MFI Sustainability

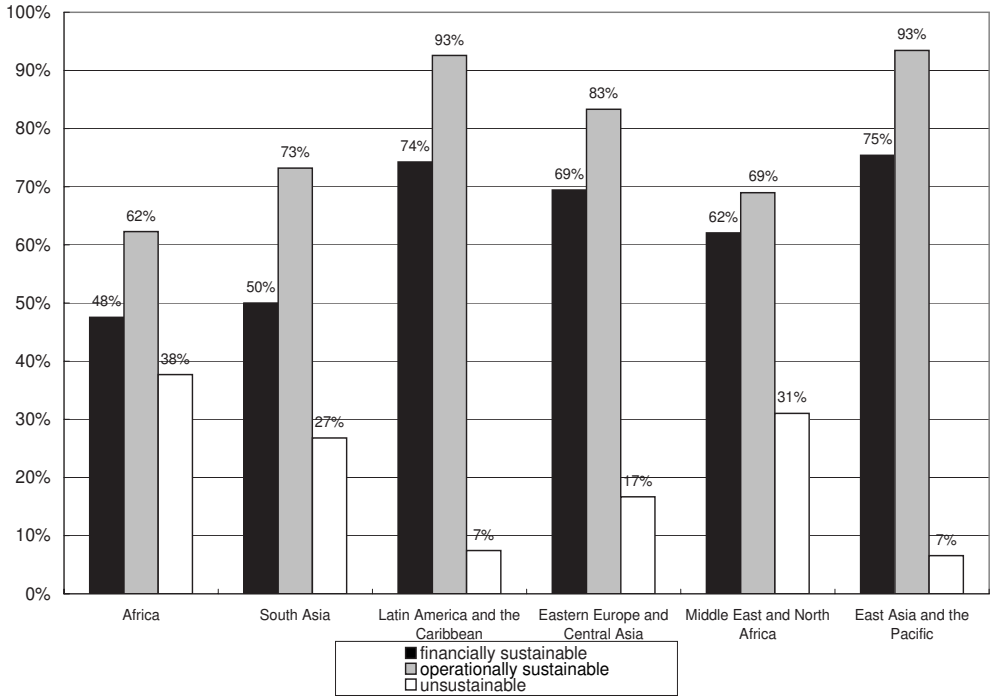

Figure 2: MFI Average MFI Cost Per Borrower

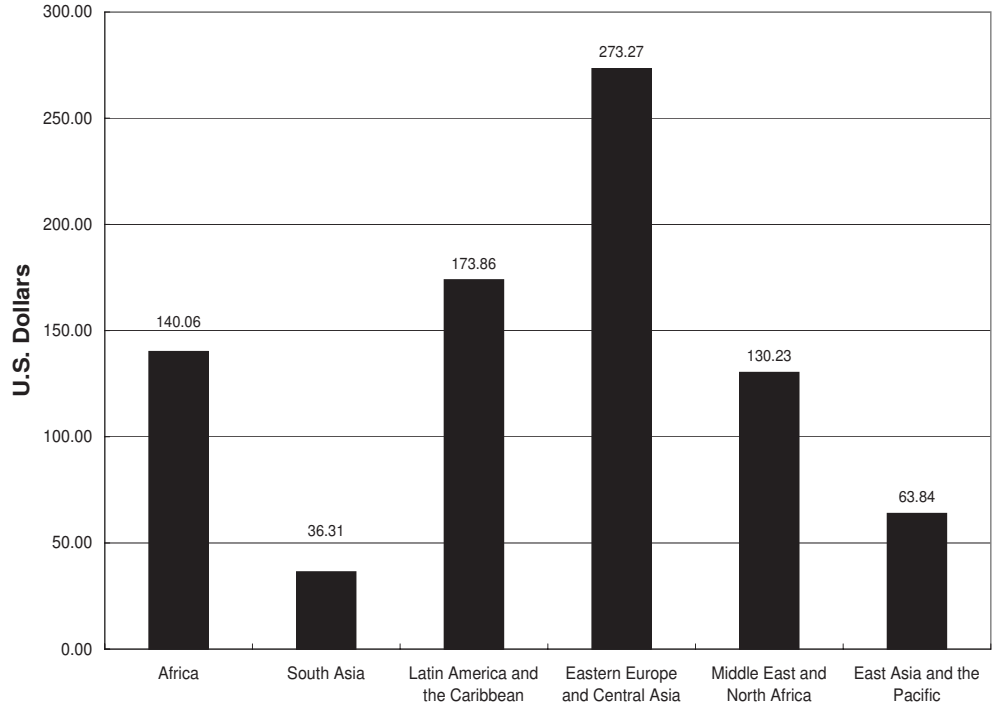

Figure 3: MFI Profitability

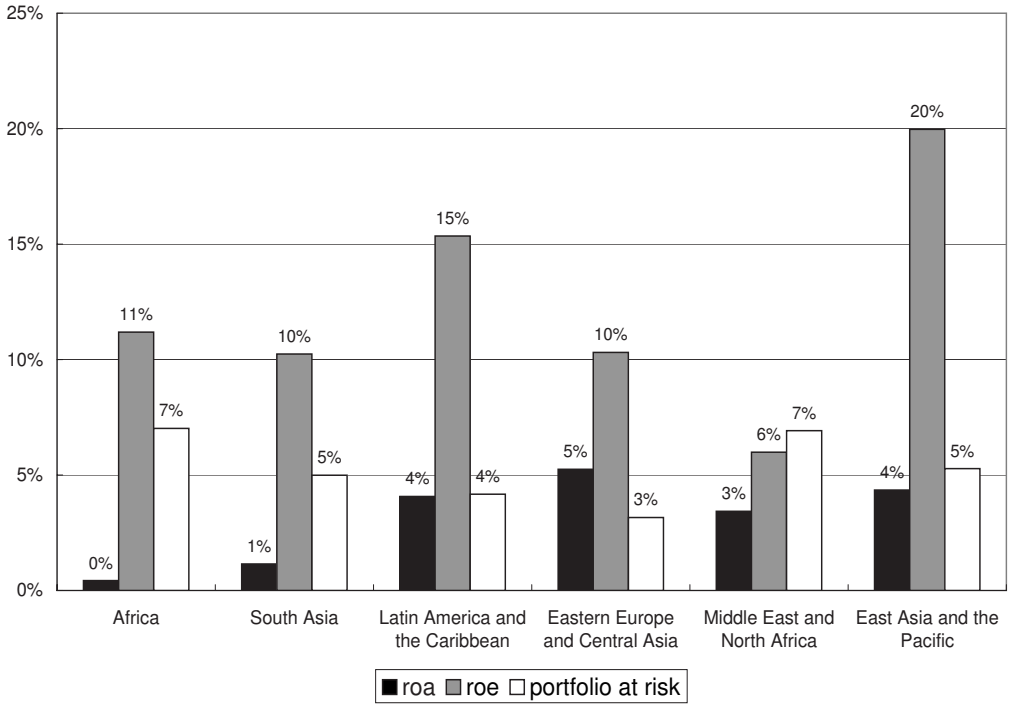

Figure 4: MFI Funding Sources

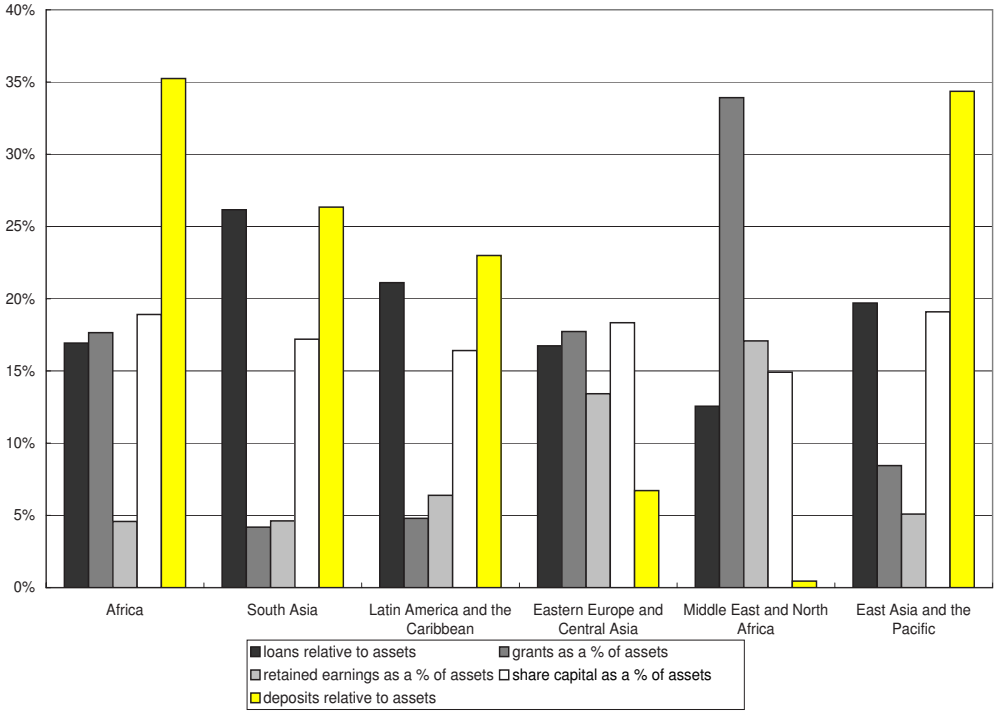

Table 3: Life Cycle Theory Models

Dependent Variable	Operational Self-Sufficiency Regression	Financial Sustainability Probit
Young Stage Dummy	14.91	0.41
	(5.28)	(0.18)
Mature Stage Dummy	55.32	0.70
	(39.66)	(0.18)
Intercept	106.84	-0.12
	(4.66)	(0.16)
Observations: 578	R^2: 0.0019	LL: -363.77

4.2 Capital Structure and Sustainability

4.2.1 Operational Self-Sufficiency and Financial Sustainability

As a first step, I use the data to test the life cycle theory of MFI financing (discussed in Section 2) where stages in the life cycle are defined by the number of years that the MFI has been operating (See de Sousa-Shields and Frankiewicz (2004)). I divide the sample into three groups corresponding to the de Sousa-Shields and Frankiewicz (2004) life cycle stages (new, young, and mature) and create dummy variables for each of these three life cycle stages in order to analyze the relationship between life cycle stage and sustainability. For the life cycle definitions, I use standard benchmarks for new (0-4 years), young (5-8 years), and mature ($>$ 8 years) MFIs. With these benchmarks, 56.8% of the sample is mature, 29.0% of the sample is young, and 14.1% of the sample is new. From the regression results presented in Table 3, one initially observes that the life cycle stage variables are significantly related to both operational self-sufficiency and financial sustainability.[16] [17] However, the R^2 in the OLS regression is very low indicating that this model specification has limited explanatory power.

[16] Standard errors are adjusted to account for the fact that there can be multiple observations for a specific MFI.

[17] These results **are** sensitive to the definitions of each life cycle stage. If the MFIs are grouped based on like characteristics, we would define: new MFIs as MFIs that were established after 1983; young MFIs as MFIs established between 1974 and 1983; and mature MFIs as MFIs established prior to 1974. Using these classifications, 5.4% of the sample would be mature, 6.4% of the sample would be young, and 88.2% new. With these alternative definitions, the life cycle stage variables would NOT be significantly related to either operational self-sufficiency or financial sustainability. If the MFIs are divided into three equal life cycle groups based upon asset size, the life cycle stage variables are not significantly related to operational self-sufficiency but are related to financial sustainability.

The results shown in Table 3 indicate that age of the MFI is related to operational self-sufficiency. However, if other independent variables are added to the simple regression models, the stage dummy variables are not at all significant.[18] The descriptive statistics in the previous subsection lead us to a more comprehensive model specification to test further the link between sustainability, MFI capital structure, and various MFI characteristics. The first specification, Equation 1, is a regression model designed to examine the relationship between the level of operational self-sufficiency and various MFI characteristics. The independent variables include: MFI capital structure variables (e.g., debt relative to assets,[19] grants as a percent of assets, shareholder capital as a percent of assets), MFI characteristics variables (e.g., a dummy variable for whether or not the MFI is classified as a bank, a dummy variable for whether or not the MFI accepts deposits, the MFI age,[20] log of assets, log of number of borrowers, log of number of savers, region dummy variables, percent of the portfolio at risk), and country level macroeconomic indicators (e.g., foreign direct investment, GDP, and inflation).[21] The second specification, Equation 2, is a probit model in which the dependent variable is whether or not an MFI is financially sustainable and the independent variables are: MFI capital structure variables, MFI characteristic variables, and country level macroeconomic indicators. (A detailed description of all of the variables used can be found in Appendix A.)

$$OPSELFSUFF_i = \beta_0 + \sum_{i=1}^{4} \beta_i X + \sum_{j=5}^{19} \beta_j Y + \sum_{k=20}^{24} \beta_k Z + \epsilon \quad (1)$$

where X represents MFI capital structure variables, Y represents MFI characteristic variables, and Z represents country level macroeconomic indicators.

$$FINSUSTAINABLEDUMMY_i = \beta_0 + \sum_{i=1}^{4} \beta_i X + \sum_{j=5}^{19} \beta_j Y + \sum_{k=20}^{24} \beta_k Z + \epsilon \quad (2)$$

[18] When the variables debt relative to assets, grants as a percent of assets, share capital as a percent of assets, deposits relative to assets, accepts deposits dummy, bank dummy, NGO dummy, log of assets, log of borrowers, log of savers, portfolio at risk, and year 2006 dummy are added to the regression model, the young stage dummy and the mature stage dummy are NOT significant with t-statistics of 0.69 and -0.25 respectively. When these variables are added to the probit model, the young stage dummy and the mature stage dummy are NOT significant with z-statistics of 1.08 and 0.62 respectively.

[19] Soft loans are not included in debt since MIX Market adjusts the operational self-sufficiency measure to account for soft loans.

[20] I also test the model using a non-linear transformation of the age variable (i.e., age-squared) and find consistent results.

[21] I include these macroeconomic variables since there is preliminary evidence (See Ahlin and Lin (2006)) that macroeconomic factors could have an affect on MFI performance.

where X represents MFI capital structure variables, Y represents MFI characteristic variables, and Z represents country level macroeconomic indicators.

Table 4 shows the results of Equation 1 and Table 5 shows the results of Equation 2.[22] [23] In Table 4, in each version of the main regression we see that log of assets is significant at the 1% level and positively related to operational self-sufficiency. This indicates that larger institutions, as measured by assets, have increased self-sufficiency likely associated with delivery of services to a larger group of clients or with extending credit in the form of larger loans to clients. Grants as a percent of assets is significant at the 1% level and negatively related to operational self-sufficiency in each version of the main regression. From this result, we see that source of funding is important. Subsidized funding rather than having a positive impact on operational self-sufficiency has a negative effect. Share capital as a percent of assets also is significant at the 1% level and negatively related to operational self-sufficiency in each version of the main regression. Debt relative to assets is negative and significant only in Version A of Equation 1. The bank dummy variable and the NGO dummy variable are the only MFI characteristic variables that are significant with respect to the relationship with operational self-sufficiency. However, the bank dummy variable is not significant in any of the other versions and the significance of the NGO dummy variable disappears in version D of Equation 1. The regional dummy variable for Latin America is negative and significant in versions B, C, and D. The regional dummy variable for Africa is negative and significant in version B and C. The country level macroeconomic indicator variables are not significant in any versions of the regression.[24] [25]

Given the discussion above, there could be a concern that operational self-sufficiency is actually affected by the type of borrower not the number of borrowers. Perhaps, servicing lower income clients is more costly and hence drives down operational self-sufficiency. For a smaller sample

[22] For Tables 4 and 5, standard errors are in parentheses and are adjusted to account for the fact that there can be multiple observations for a specific MFI.

[23] Only key coefficients are presented. However, the full set of results are available upon request.

[24] I check for the existence of multicollinearity between the macroeconomic indicator variables using the Variance Inflation Factor (VIF). $\text{VIF}_j < 5 \quad \forall j$, suggesting there is no evidence of multicollinearity.

[25] When I compare the samples used in versions C and D, a Chow test F-statistic of 1.78 indicates acceptance of the hypothesis of structural stability between the two samples.

of the MFIs, there are data on the percent of clients below the poverty line.[26] I do not include this variable in the main model specification since there are data for less than 20% of the MFIs in the sample. The small sample size decreases the power of the test. Yet, we still can use this small sample data to give some confirmation that adding the percent of clients below the poverty line variable does not significantly alter our results in Table 4. When added to Equation 1, the percent of clients below the poverty line variable is not significant.[27] Notably, in the small sample specification, grants as a percent of assets still is significant at the 5% level and negatively related to operational self-sufficiency.

In Table 5, we see that log of assets is significant and positively related to financial sustainability in all of the versions of the probit. Grants as a percent of assets and share capital as a percent of assets are significant and negatively related to financial sustainability in each version of the probit. The NGO dummy variable is positive and significantly related to financial sustainability in three versions of the probit. While, percent of the portfolio at risk is negatively related to financial sustainability and significant in two versions of the probit model. The country level macroeconomic indicator variables were not at all significant in any of the versions of the probit model.[28]

I find strong empirical support for the notion that asset size is significantly and positively related to sustainability.[29] Also, there are capital structure variables that are strongly associated with sustainability. Grants as a percent of assets and share capital as a percent of assets are negatively and significantly related to sustainability. The fact that grants relative to assets is negatively related to sustainability is a particularly meaningful result given that it is consistent

[26] MIX Market defines "below the poverty line" as living on less than US$2/day.

[27] The variable has a coefficient of -0.09 with a standard error of 0.27.

[28] As a robustness check, I test the sensitivity of the results to the definitions of operational and financial sustainability by utilizing an ordered probit model. With this specification, the dependent variable is a categorical variable in which Y = 0 if the MFI is unsustainable, Y = 1 if the MFI is only operationally sustainable, and Y = 2 if the MFI is financially sustainable. The independent variables are MFI capital structure variables, MFI characteristic variables, and country level macroeconomic indicators. The coefficients of the ordered probit regression are consistent with the results in Table 5.

[29] As a robustness check, I regress the MFI capital structure variables on the log of assets and find no significant relationship between the capital structure variables and size of assets. The capital structure variables had the following t-statistics: debt relative to assets (0.20); deposits relative to assets (1.11); grants as a percent of assets (-0.32); share capital as a percent of assets (-.061); and retained earnings as a percent of assets (-0.15).

with a growing view that MFIs should rely less on grants, soft loans, and other types of donor funds. The significant and negative relationship of share capital as a percent of assets also supports the view that only commercially funded MFIs respond to the profit incentive by working to increase revenues and decrease expenses.[30]

[30]Osterloh and Barrett (2007) show that financial service association (FSA) microfinance models, that harness local equity capital by selling shares (which confer membership that includes access to loans and savings services), do not demonstrate sound screening and lending practices.

***Significant at the 1% level.

**Significant at the 5% level.

*Significant at the 10% level.

Table 4: Key Coefficients of Operational Self-Sufficiency Regression

Dependent Variable: Operational Self Sufficiency	A	B	C	D
Debt Relative to Assets	-38.2661***	-16.8833	-17.4556	-19.9679
	(11.9580)	(11.5859)	(11.3194)	(12.9372)
Deposits Relative to Assets	-11.5114	-3.7300	-2.4325	-9.7764
	(16.1011)	(16.7348)	(14.9118)	(15.7440)
Grants as a Percent of Assets	-47.5749***	-37.4076***	-42.3754***	-39.8227***
	(10.3606)	(10.6936)	(11.1397)	(11.5344)
Share Capital as a Percent of Assets	-67.8213***	-58.7338***	-54.2136***	-39.4255***
	(12.8449)	(11.1436)	(11.7386)	(12.0337)
Log of Assets	8.2477***	8.2474***	9.1975***	10.5853***
	(2.6653)	(3.2053)	(3.3512)	(3.7222)
Portfolio at Risk	-0.3822	-0.3402	0.2070	0.1003
	(0.3648)	(0.4799)	(0.5366)	(0.5567)
Accepts Deposits	-1.1247	5.5885	7.3241	5.4664
	(7.3298)	(6.6505)	(6.7391)	(7.0311)
Bank Dummy	-11.0858**	-9.1565	-5.5957	-7.0846
	(5.4300)	(6.8071)	(7.0679)	(7.4814)
NGO Dummy	16.6131***	19.5487***	20.8006***	3.0257
	(5.8262)	(6.0469)	(6.8724)	(8.7142)
MFI Age	-0.2550	-0.2424	-0.2270	-0.1545
	(0.2148)	(0.2278)	(0.2173)	(0.2644)
Log of Number of Borrowers	1.1165	1.5842	0.4012	0.7033
	(2.3626)	(2.6717)	(2.7326)	(3.4442)
Log of Number of Savers	-0.5787	-0.6127	-1.3350	-1.6083
	(0.8743)	(0.9241)	(0.8645)	(0.9014)
Year 2006 Dummy	-14.6971*	-4.4138	1.7017	-5.6377
	(7.8472)	(8.6043)	(8.0652)	(9.9304)
Regulated Dummy			-2.4614	-7.4997
			(5.6626)	(6.8819)
No Credit Rating Dummy			-9.2922*	-8.9929
			(5.4612)	(6.1748)
Non-Profit Dummy				11.4704
				(6.9615)
Group Lending Dummy				-2.3459
				(5.9362)
Securitization Dummy				-16.1163
				(16.6468)
Region Control Variables	–	Yes	Yes	Yes
Macroeconomic Indicator Control Variables	–	Yes	Yes	Yes
Observations:	184	174	161	128
R^2:	0.3888	0.4390	0.4514	0.4064

Table 5: Financial Sustainability Probit - Marginal Effects of Key Variables

Dependent Variable: Financial Sustainability	A	B	C	D
Debt Relative to Assets	-0.3626*	-0.1614	-0.3179	-0.6641**
	(0.2185)	(0.2419)	(0.2535)	(0.2890)
Deposits Relative to Assets	0.1685	0.1527	-0.0808	-0.3081
	(0.3097)	(0.3346)	(0.3659)	(0.4214)
Grants as a Percent of Assets	-0.5613***	-0.5807**	-0.9282***	-0.6843**
	(0.1963)	(0.2719)	(0.2999)	(0.3400)
Share Capital as a Percent of Assets	-0.6934***	-0.7899***	-0.9033***	-0.5784**
	(0.2172)	(0.2363)	(0.2730)	(0.2684)
Log of Assets	0.1249***	0.1160*	0.1750***	0.1198**
	(0.0502)	(0.0606)	(0.0652)	(0.0597)
Portfolio at Risk	-0.0226***	-0.0211***	-0.0083	-0.0118
	(0.0075)	(0.0085)	(0.0093)	(0.0121)
Accepts Deposits	-0.1213	-0.0853	-0.0076	0.0330
	(0.1187)	(0.1405)	(0.1511)	(0.1506)
Bank Dummy	-0.0341	0.0383	0.0146	0.0896
	(0.1261)	(0.1544)	(0.1763)	(0.1235)
NGO Dummy	0.1775**	0.2368**	0.3070**	-0.0427
	(0.0876)	(0.1017)	(0.1150)	(0.1597)
MFI Age	0.0058	0.0032	-0.0006	0.0104
	(0.0051)	(0.0061)	(0.0069)	(0.0077)
Log of Number of Borrowers	0.0110	0.0318	0.0143	0.0789
	(0.0399)	(0.0493)	(0.0543)	(0.0566)
Log of Number of Savers	-0.0066	0.0015	0.0026	-0.0078
	(0.0146)	(0.0155)	(0.0164)	(0.0171)
Year 2006 Dummy	-0.2483	-0.2525	-0.2639	-0.6029**
	(0.1590)	(0.1934)	(0.2071)	(0.2540)
Regulated Dummy			-0.1627	-0.1918*
			(0.1093)	(0.1018)
No Credit Rating Dummy			-0.2541	-0.3207***
			(0.1056)	(0.1069)
Non-Profit Dummy				0.2783*
				(0.1473)
Group Lending Dummy				-0.2138**
				(0.0895)
Securitization Dummy				0.1633
				(0.1362)
Region Control Variables	–	Yes	Yes	Yes
Macroeconomic Indicator Control Variables	–	Yes	Yes	Yes
Observations:	184	174	161	128
Log Likelihood:	-90.21	-79.93	-68.22	-48.77

4.2.2 Robustness Checks

Fixed Effects

Since regional differences with respect to MFI sustainability and profitability are reflected in the raw data, I perform a region fixed effects regression to control for any cultural, political, or environmental differences by region that may affect operational self-sufficiency. The results of the fixed effects regression are consistent with the previous results in that log of assets is positively and significantly (at the 1% level) associated with increased operational self-sufficiency. Also, grants as a percent of assets and share capital as a percent of assets are significant at the 1% level and negatively related to operational self-sufficiency. Log of the number of savers is the only other significant variable and it is weakly significant at the 10% level (See Table 9 in Appendix B). I also perform a country fixed effects regression to control for specific country factors, like government stability, that could affect operational self-sufficiency. These results, also presented in Table 9, show that the only significant variables are grants as a percent of assets and share capital as a percent of assets, both of which are negatively related to operational self-sufficiency. They are significant at the 1% level and 10% level respectively. I also perform an MFI fixed effects regression. However, with so few degrees of freedom, none of the coefficients are significant in the MFI fixed effects regression.

Random Effects

While a fixed effect model can account for regional, country or MFI differences, a random effects model may be better suited to the data. A random effects model could control for the potential correlation that could exist between regressors and for unobservable individual MFI effects. As with our original model, grants as a percent of assets and share capital as a percent of assets are negatively related to operational self-sufficiency and are significant at the 1% level. Debt relative to assets is also significant at the 1% level. Log of assets is positively related to operational self-sufficiency and significant at the 1% level. The NGO dummy variable and the no credit rating variable are significant at the 5% level. MFI age and log of the number of savers are significant

at the 10% level. None of the other variables are significant. The results from this random effects model are aligned with our original model specification and reinforce the view that capital structure is a key issue with respect to operational self-sufficiency. However, a Hausman specification test suggests that a fixed effect specification is the more appropriate model.

Other Performance Measures

In this section, I focus on operational self-sufficiency since it is typically used as the standard measure of MFI performance. However, as with general lending institutions, there are other metrics by which performance and institutional health are measured. For my sample of MFIs, I also analyze the relationship between debt-to-equity ratio and the capital structure variables as well as return on assets (roa) and the capital structure variables.[31] Both the regression using debt-to-equity as the dependent variable and using roa as the dependent variable generate results consistent with Table 4 (See Table 10 in Appendix B[32]).

[31]Both debt-to-equity and roa are standard measures for the long-term health of an institution. Debt-to-equity ratios are used to provide an indication of the long-term solvency of a firm. ROA is used to measure how effectively a firm's assets are being used to generate profits.

[32]Standard errors are in parentheses and are adjusted to account for the fact that there can be multiple observations for a specific MFI.

4.2.3 Instrumental Variables Two Stage Least Squares Regression

While the previous analyses have enabled me to draw a clear link between grants as a percent of assets and MFI operational self-sufficiency, I have not yet established a causal relationship between these two variables. If grants and operational self-sufficiency are in fact jointly determined by some unobserved variable, then an instrumental variables (IV) two stage least squares approach can break the simultaneity circle.

Regression and correlation results demonstrate that the country level macroeconomic indicators are not correlated with operational self-sufficiency.[33] However, intuitively it makes sense that macroeconomic variables like GDP growth affect investment in a country and thus the amount of money that flows to businesses in the form of grants. A regression of the macroeconomic indicators on the grants as a percent of assets variable indicates that the GDP growth lagged variable and the inflation lagged variable can be used as appropriate instruments for grants as a percent of assets.[34] I next perform a two stage least squares regression using both lagged GDP growth and lagged inflation as instruments for MFI grants as a percent of assets (See Table 6). In the first stage, lagged GDP growth is significant at the 5% level and lagged inflation is significant at the 1% level. In the second stage, grants as a percent of assets is negative and significant at the 5% level indicating that having grants as a larger percent of assets decreases the operational self-sufficiency of MFIs.[35]

Tables 4 and 5 also indicated a significant and negative link between share capital as a percent of assets and MFI operational self-sufficiency. Since the question of causality for this variable still remains, I use an instrumental variables (IV) two stage least squares approach to analyze the relationship between operational self-sufficiency and share capital as a percent of assets. I find

[33] I regress the macroeconomic indicator variables on the operational self-sufficiency measure and find no significant variables. Also, the VIFs indicate that the insignificant t-ratios are not due to multicollinearity.

[34] The regression had an F-statistic of 9.66 and t-statistics of 4.07 and 1.92 for lagged country inflation and lagged GDP growth, respectively.

[35] Given I used more than one instrument for grants as a percent of assets, I perform a formal overidentification test to assure that my instruments are not direct determinants of operational self-sufficiency. The Hansen test has a p-value of 0.3251.

country GDP growth to be a suitable instrument for MFI share capital as a percent of assets. In the first stage, country GDP growth is significant at the 1% level. In the second stage, share capital as a percent of assets is negative but not significant. (See Table 11 in Appendix B)

Table 6: Instrumental Variables Two Stage Least Squares Regression

	First Stage	Second Stage
Grants as a Percent of Assets		-64.1069**
		(26.5567)
Debt Relative to Assets	-0.6135***	-40.0746**
	(0.0903)	(19.6224)
Deposits Relative to Assets	-0.3438***	-3.53
	(0.1372)	(16.0654)
Share Capital as a Percent of Assets	-0.5959***	-70.7850***
	(0.0899)	(20.9311)
Log of Assets	-0.0013	6.0562**
	(0.0192)	(2.5386)
Portfolio at Risk	0.0116***	0.2350
	(0.0042)	(0.4394)
Accepts Deposits	0.1105*	1.2023
	(0.0581)	(8.5969)
Bank Dummy	-0.0459	-3.7460
	(0.0675)	(6.2610)
NGO Dummy	0.0254	3.1468
	(0.0650)	(6.4079)
MFI Age	-0.0031	-0.2960
	(0.0020)	(0.2330)
Log of Number of Borrowers	0.0138	2.6478
	(0.0180)	(2.2458)
Log of Number of Savers	-0.0114	-1.7387*
	(0.0070)	(0.9761)
Year 2006 Dummy	-0.3272***	-10.7838
	(0.0736)	(9.9846)
Regulated Dummy	-0.0430	-1.9562
	(0.0523)	(4.8727)
No Credit Rating Dummy	-0.0528	-7.9270*
	(0.0428)	(4.7619)
Non-Profit Dummy	-0.0106	13.5915**
	(0.0650)	(6.6988)
MFI Country GDP Growth - *lagged*	0.0143**	
	(0.0070)	
MFI Country Inflation - *lagged*	0.0152***	
	(0.0038)	
Intercept	0.3090	39.0602
	(0.2585)	(37.5046)
Observations:	154	154
R^2:	0.5012	0.3418

4.3 Capital Structure and Efficiency

One of the primary findings in Tables 4, 5, and 6 is that grants as a percent of assets is negatively related to operational self-sufficiency and financial sustainability. While we have addressed the concern that grants as a percent of assets was serving as a proxy for servicing more costly, lower-income borrowers, it is still important to test the connection between capital structure and cost per borrower. I use the following model to test the link between cost per borrower, MFI capital structure, and MFI characteristics:

$$COSTBORROWER_i = \beta_0 + \sum_{i=1}^{4} \beta_i X + \sum_{j=5}^{19} \beta_j Y + \sum_{k=20}^{24} \beta_k Z + \epsilon \quad (3)$$

where X represents MFI capital structure variables, Y represents MFI characteristic variables, and Z represents country level macroeconomic indicators.

Table 7 shows the results of Equation 3.[36] There are three significant variables in this regression. Grants as a percent of assets is positively related to cost per borrower and is significant at the 10% level. Log of assets is positively related to cost per borrower and log of the number of borrowers is negatively related to cost per borrower. Both of these variables are significant at the 1% level. This supports the idea that reliance on donor funds eliminates the motivation for MFIs to operate efficiently and provides evidence that MFIs are not currently realizing efficiencies due to economies of scale. There is also evidence that grants as a percent of assets is positively and significantly linked to an MFI having a greater portfolio at risk ratio (See Table 12 in Appendix B[37]).

[36] Standard errors are in parentheses and are adjusted to account for the fact that there can be multiple observations for a specific MFI.

[37] Standard errors are in parentheses and are adjusted to account for the fact that there can be multiple observations for a specific MFI.

Table 7: Average Cost Per MFI Borrower Regression - Key Coefficients

Dependent Variable: Cost Per Borrower	Coefficient
Debt Relative to Assets	24.56
	(40.18)
Deposits Relative to Assets	8.04
	(55.07)
Grants as a Percent of Assets	47.83*
	(26.37)
Share Capital as a Percent of Assets	57.01
	(38.16)
Log of Assets	59.50***
	(15.75)
Portfolio at Risk	-1.93
	(2.43)
Accepts Deposits Dummy	-16.25
	(21.74)
Bank Dummy	37.70
	(34.07)
NGO Dummy	-10.14
	(28.41)
MFI Age	0.17
	(0.68)
Log of Number of Borrowers	-78.47***
	(15.20)
Log of Number of Savers	2.27
	(2.32)
Year 2006 Dummy	20.43
	(28.81)
Regulated Dummy	18.46
	(18.97)
No Credit Rating Dummy	-6.11
	(16.03)
Non-Profit Dummy	-11.72
	(28.03)
Group Lending Dummy	9.50
	(16.20)
Securitization Dummy	-0.49
	(55.57)
Region Control Variables	Yes
Macroeconomic Indicator Control Variables	Yes
Observations: 113	R^2: 0.7023

4.4 Capital Structure and Outreach

When attempting to identify changes in capital structure that could improve MFI sustainability, it is important not to do so in a vacuum. If, for instance, grants negatively affected sustainability but enabled MFIs to expand their outreach such that they can loan to more poor people, then that effect should be considered when developing normative implications from the analysis. With this in mind, I look at the relationship between the identified independent variables and the number of MFI borrowers.

$$BORROWERS_i = \beta_0 + \sum_{i=1}^{4} \beta_i X + \sum_{j=5}^{19} \beta_j Y + \sum_{k=20}^{24} \beta_k Z + \epsilon \quad (4)$$

where X represents MFI capital structure variables, Y represents MFI characteristic variables, and Z represents country level macroeconomic indicators. The dependent variable is the log of the number of MFI borrowers.

From Column 1 in Table 8, we see that the log of assets is positively related to number of borrowers but there is no significant relationship between any of the capital structure variables and the number of borrowers of an MFI.[38] I also am able to analyze the relationship between an MFI receiving donor funds and loaning money to the more desperately poor. Using "percent of clients below the poverty line" as the dependent variable in Equation 4, I can test, in a smaller sample of the data, whether there is a link between grants as a percent of assets and the type of MFI outreach.[39] While Column 1 of Table 8 indicates that capital structure variables are not at all associated with increased outreach in general, Column 2 of Table 8 demonstrates that capital structure is not linked to increased outreach to the very poor.

[38] Standard errors are in parentheses and are adjusted to account for the fact that there can be multiple observations for a specific MFI.

[39] MIX Market defines "below the poverty line" as living on less than US$2/day.

Table 8: Capital Structure and Outreach Regressions - Key Coefficients

Dependent Variable	Log of Number of Borrowers	Percent of Very Poor Borrowers
Debt Relative to Assets	0.44	-113.53
	(0.64)	(95.40)
Deposits Relative to Assets	0.52	-349.01
	(0.64)	(215.03)
Grants as a Percent of Assets	0.37	-106.54
	(0.36)	(101.56)
Share Capital as a Percent of Assets	0.10	1.10
	(0.42)	(86.89)
Log of Assets	0.67***	-11.58
	(0.13)	(26.58)
Portfolio at Risk	-0.02	2.62
	(0.02)	(7.12)
Operational Self-Sufficiency	0.00	-1.17
	(0.00)	(0.71)
Accepts Deposits Dummy	-0.44	155.76*
	(0.29)	(72.35)
Bank Dummy	-0.08	-43.35
	(0.38)	(70.25)
NGO Dummy	0.62**	14.54
	(0.31)	(24.64)
MFI Age	0.00	5.87
	(0.01)	(5.14)
Log of Number of Savers	0.01	1.04
	(0.03)	(4.13)
Year 2006 Dummy	0.41	-30.94
	(0.37)	(39.16)
Regulated Dummy	-0.03	-43.08
	(0.26)	(41.24)
No Credit Rating Dummy	0.08	-18.82
	(0.21)	(31.26)
Non-Profit Dummy	-0.12	–
	(0.31)	
Group Lending Dummy	0.35**	–
	(0.18)	
Securitization Dummy	0.60	–
	(0.72)	
Region Control Variables	Yes	Yes
Macroeconomic Indicator Control Variables	Yes	–
Observations	128	28
R^2	0.7279	0.7764

5 Conclusion

While most information on the capital structure of MFIs is highly fragmented, this paper attempts to synthesize the information to better understand the link between capital structure and MFI performance. The life cycle theory is the most popular explanation of the link between capital structure, sustainability, efficiency, and outreach. However, it does not seem to tell the entire story with respect to MFI financing. The life cycle model has little explanatory power while other economic and financial variables explain a great deal.

Various factors other than life cycle stage seem to be associated with MFI performance. My results indicate that the size of an MFI's assets and an MFI's capital structure are associated with performance. I find that for MFIs, asset size does matter both in terms of sustainability and outreach. Grants as a percent of assets is significant and negatively related to sustainability but is positively related to MFI cost per borrower. Using an IV analysis, I also find causal evidence to support the assertion that the use of grants drives down operational self-sufficiency. This reinforces the view that the **long-term** use of grants may be related to inefficient operations due to lack of competitive pressures associated with attracting market funding. Notably, the results do not indicate that grants are related to greater or more costly outreach. Thus, grants could hinder the development of MFIs into competitive, efficient, sustainable operations.

Even development and donor organizations such as the International Finance Corporation realize that only by weaning off donor dependency and adopting a commercial orientation can these MFIs truly attract the capital and savings base they need to scale up their microloan portfolios, increase sustainability, lower lending rates, increase outreach, and start meeting the demand. To address the capital constraint issues of most MFIs, "smart subsidies" and/or innovative financing instruments (e.g., See Byström (2008)) will be required for larger MFIs.[40] As MFI transparency improves and innovative financing is used, transaction costs should begin to decline so that even more new financial tools can increase the liquidity in the MFI funding market.

[40] Morduch (2005) defines "smart subsidies" as "well-designed subsidies that can potentially 'crowd in' donor funds. Particular emphasis is put on subsidies that are (1) transparent, (2) rule-bound, and (3) time-limited."

Appendix

A Description of Variables Used in Analysis

- Debt Relative to Assets - Amount of debt with respect to the value of total assets.
- Deposits Relative to Assets - Amount of deposits with respect to the value of total assets
- Grants as a Percent of Assets - Amount of grants received as a percent of total assets.
- Share Capital as a Percent of Assets - Value of shareholders' capital as a percent of total assets.
- Log of Assets - The natural logarithm of the total MFI asset value. (US$s)
- Portfolio at Risk - The portfolio at risk greater than 30 days / gross loan portfolio. The percent of the portfolio at risk greater than 30 days is the value of all loans outstanding that have one or more installments of principal past due more than 30 days. This includes the entire unpaid principal balance, including both the past due and future installments, but not accrued interest. It does not include loans that have been restructured or rescheduled.
- Accepts Deposits Dummy Variable - A dummy variable which indicates whether or not the MFI accepts deposits. This variable is given a value of 1 if the MFI accepts deposits. The variable is set to 0 otherwise.
- Bank Dummy Variable - A dummy variable which indicates whether or not the MFI is classified as a bank. This variable is given a value of 1 if the MFI is classified as a bank. The variable is set to 0 otherwise.
- NGO Dummy Variable - A dummy variable which indicates whether or not the MFI is classified as an NGO. This variable is given a value of 1 if the MFI is classified as an NGO. The variable is set to 0 otherwise.
- MFI Age - The age of the MFI.
- Log of Number of Borrowers - The natural logarithm of the total number of MFI borrowers.
- Percent of Clients Below the Poverty Line - Percent of the population living on less than US$2/day.
- Log of Number of Savers - The natural logarithm of the total number of MFI customers with savings accounts.
- Year 2006 Dummy Variable - A dummy variable which indicates if the year was 2006. The variable is given a value of 1 if the year was 2006 and 0 otherwise.
- Regulated Dummy Variable - A dummy variable which indicates whether or not the MFI is regulated. This variable is given a value of 1 if the MFI is regulated. The variable is set to 0 otherwise. MFIs themselves to report whether or not they are regulated then MIX Market adjusts this answer to reflect regulation in a financial sense, entry restrictions, and/or monitoring.

- No Credit Rating Dummy - A dummy variable which indicates whether or not the MFI has a credit rating. This variable is given a value of 1 if the MFI has not credit rating. The variable is set to 0 otherwise.
- Non-Profit Dummy - A dummy variable which indicates whether or not the MFI is classified as a non-profit organization. This variable is given a value of 1 if the MFI is a non-profit organization. The variable is set to 0 otherwise.
- Group Lending Dummy - A dummy variable which indicates whether or not the MFI has group lending practices. This variable is given a value of 1 if the MFI has group lending practices. The variable is set to 0 otherwise.
- Securitization Dummy - A dummy variable which indicates whether or not the MFI has ever securitized any assets. This variable is given a value of 1 if the MFI has securitized any assets. The variable is set to 0 otherwise. This can indicate of a high level of financial sophistication.
- African MFI Dummy - A dummy variable which indicates if the MFI is located in Africa (not including North Africa). This variable is given a value of 1 if the MFI is in Africa and 0 otherwise.
- South Asian MFI Dummy - A dummy variable which indicates if the MFI is located in South Asia. This variable is given a value of 1 if the MFI is in South Asia and 0 otherwise.
- Latin American MFI Dummy - A dummy variable which indicates if the MFI is located in Latin America or the Caribbean. This variable is given a value of 1 if the MFI is in Latin America or the Caribbean and 0 otherwise.
- East Asian MFI Dummy - A dummy variable which indicates if the MFI is located in East Asia or the Pacific. This variable is given a value of 1 if the MFI is in East Asia or the Pacific and 0 otherwise.
- Eastern Europe and Central Asia MFI Dummy - A dummy variable which indicates if the MFI is located in Eastern Europe or Central Asia. This variable is given a value of 1 if the MFI is in Eastern Europe or Central Asia and 0 otherwise.
- log of FDI *(lagged one year)* - The natural logarithm of the total amount of foreign direct investment (FDI) in the country in which the MFI is located. (US$s)
- FDI Growth *(lagged one year)* - The growth rate of FDI for the country in which the MFI is located.
- log of GDP *(lagged one year)* - The natural logarithm of the total GDP in the country in which the MFI is located. (US$s)
- GDP Growth *(lagged one year)* - The growth rate of GDP for the country in which the MFI is located.
- Inflation *(lagged one year)* - The inflation of the country in which the MFI is located.

B Supplemental Tables

This section contains the results from the robustness check regressions described in Sections 4.2 and 4.3.

Table 9: Fixed Effects Operational Self-Sufficiency Regressions - Key Coefficients

Type of Fixed Effects	Region	Country	MFI
Debt Relative to Assets	-17.13	-12.06	-33.43
	(12.69)	(14.87)	(27.45)
Deposits Relative to Assets	6.33	14.20	6.97
	(17.29)	(20.73)	(34.21)
Grants as a Percent of Assets	-42.25***	-36.59***	-73.11
	(10.38)	(12.74)	(162.03)
Share Capital as a Percent of Assets	-54.86***	-41.72***	-82.04
	(11.96)	(15.11)	(51.34)
Log of Assets	9.21***	7.24*	20.48
	(3.05)	(4.38)	(22.77)
Portfolio at Risk	0.44	-0.12	-2.68
	(0.52)	(0.59)	(3.25)
Accepts Deposits Dummy	2.49	7.91	-7.56
	(7.61)	(9.98)	(20.74)
Bank Dummy	-6.70	-5.18	
	(8.52)	(11.01)	
NGO Dummy	9.30	7.72	
	(7.98)	(14.41)	
MFI Age	-0.33	0.11	-12.14
	(0.27)	(0.49)	(8.02)
Log of Number of Borrowers	0.77	1.86	13.69
	(2.46)	(3.83)	(9.56)
Log of Number of Savers	-1.64*	-1.67	-2.86
	(0.91)	(1.29)	(3.67)
Year 2006 Dummy	2.16	20.63	
	(9.69)	(64.66)	
Regulated Dummy	-4.59	-3.48	
	(6.46)	(8.67)	
No Credit Rating	-6.78	-6.76	
	(5.27)	(6.93)	
Non-Profit Dummy	9.38	11.10	
	(8.02)	(10.96)	
Securitization Dummy	-16.44	-25.44	
	(21.93)	(26.91)	
Macroeconomic Indicator Control Variables	Yes	Yes	–
Observations	150	150	205
Overall R^2	0.3706	0.0296	0.0126

Table 10: Performance Measure Regressions - Key Coefficients

Dependent Variable	Debt to Equity	Return on Assets
Debt Relative to Assets	–	-7.10**
		(3.63)
Deposits Relative to Assets	372.45***	-4.58
	(147.45)	(4.46)
Grants as a Percent of Assets	-109.71	-17.36***
	(92.53)	(4.49)
Share Capital as a Percent of Assets	-263.63**	-12.68***
	(133.70)	(4.60)
Log of Assets	77.55*	1.20**
	(46.95)	(0.62)
Portfolio at Risk	17.71	0.11
	(11.96)	(0.14)
Accepts Deposits Dummy	-4.41	-1.43
	(70.67)	(1.55)
Bank Dummy	-79.91	0.65
	(93.53)	(1.44)
NGO Dummy	-162.54	3.54**
	(124.81)	(1.61)
MFI Age	5.22	-0.02
	(3.59)	(0.05)
Log of Number of Borrows	-46.60	0.76
	(35.07)	(0.62)
Log of Number of Savers	7.71	-0.38*
	(7.25)	(0.21)
Year 2006 Dummy	-48.78	-0.42
	(71.99)	(2.73)
Regulated Dummy	-233.63	-1.65
	(150.46)	(1.50)
No Credit Rating Dummy	-25.16	-2.63**
	(52.53)	(1.35)
Non-Profit Dummy	-58.95	
	(70.35)	
Group Lending Dummy	-64.39	-0.05
	(51.16)	(1.51)
Securitization Dummy	143.16	-3.96
	(351.16)	(3.77)
Region Control Variables	Yes	Yes
Macroeconomic Indicator Control Variables	Yes	Yes
Observations	108	127
R^2	0.6106	0.5219

Table 11: IV 2SLS Regression for Share Capital

	First Stage	Second Stage
Share Capital as a Percent of Assets		-47.6769
		(50.2162)
Debt Relative to Assets	-0.4235***	-19.7466
	(0.0764)	(23.7080)
Deposits Relative to Assets	-0.2502**	7.0464
	(0.1148)	(18.5393)
Grants as a Percent of Assets	-0.3710***	-33.3523*
	(0.0584)	(20.6944)
Log of Assets	0.0121	5.9631***
	(0.0157)	(2.4519)
Portfolio at Risk	0.0018	0.0621
	(0.0034)	(0.4855)
Accepts Deposits	0.0090	-2.8619
	(0.0480)	(7.0902)
Bank Dummy	0.0561	-5.0090
	(0.0527)	(6.8591)
NGO Dummy	0.0680	1.1635
	(0.0506)	(6.7133)
MFI Age	-0.0033**	-0.1957
	(0.0016)	(0.2830)
Log of Number of Borrowers	-0.0195	2.9151
	(0.0141)	(2.3585)
Log of Number of Savers	-0.0038	-1.2533
	(0.0058)	(0.8228)
Year 2006 Dummy	-0.2244***	-2.9829
	(0.0603)	(12.1806)
Regulated Dummy	-0.0236	-0.5685
	(0.0428)	(5.0509)
No Credit Rating Dummy	0.0126	-6.7423
	(0.0350)	(5.0263)
Non-Profit Dummy	-0.0771	13.7498**
	(0.0526)	(6.8194)
MFI Country GDP	0.0172***	
	(0.0055)	
Intercept	0.3731	20.1926
	(0.2110)	(43.6206)
Observations:	153	153
R^2:	0.4100	0.3828

Table 12: Portfolio At Risk Regression - Key Coefficients

Dependent Variable: Portfolio At Risk	Coefficient
Debt Relative to Assets	1.46
	(2.44)
Grants as a Percent of Assets	7.63***
	(2.16)
Share Capital as a Percent of Assets	3.44
	(2.82)
Deposits Relative to Assets	7.44*
	(4.42)
Accepts Deposits Dummy	-1.02
	(1.29)
Log of Number of Borrowers	-0.42
	(0.56)
Log of Assets	-0.61
	(0.75)
Bank Dummy	0.54
	(2.09)
NGO Dummy	-2.29*
	(1.28)
MFI Age	-0.00
	(0.05)
Log of Number of Savers	0.04
	(0.17)
African MFI Dummy	6.32***
	(1.93)
South Asian MFI Dummy	2.83
	(2.20)
Latin American MFI Dummy	6.63***
	(1.65)
East Asia and the Pacific MFI Dummy	6.44***
	(1.94)
Eastern Europe and Central Asia MFI Dummy	4.37***
	(1.45)
Regulated Dummy	-0.08
	(1.16)
No Credit Rating Dummy	1.96**
	(0.85)
Non-Profit Dummy	-0.18
	(1.22)
Group Lending Dummy	-1.34
	(0.99)
Securitization Dummy	5.72
	(4.41)
Year 2006 Dummy	2.17
	(1.77)
Operational Self-Sufficiency	0.00
	(0.02)
Macroeconomic Indicator Control Variables	Yes
Observations: 128	R^2: 0.5062

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