

Equity-Infused Microfinance: A Collaborative Success

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List of Abbreviations/Symbols

MFI	Microfinance Institution
SDI	Subsidy Dependence Index, =0 when self-sustainable
L	total loan volume outstanding
r	Bank interest rate charged to clients
d	Default rate on loan, $(1-d)=e$
I	Income from other investments
C	Costs associated with administering the loan
S	Implicit subsidies, outside funds
V	Proportion of small-business equity owned by the MFI
Π	Small business profit
p	Probability of default on equity repayment, $(1-p)=z$
T	Total capital provided, $L+V$
h	proportion of total capital held as debt
j	proportion of total capital held as equity
U	<i>Adjustments</i>
D	<i>Donations</i>
X	<i>Expenses</i>

Abstract

The microfinance community is currently debt-based and has not extended financial services to include equity provisions for poorer groups. This paper argues that an equity-infused microfinance model provides additional financial options for those in poverty, while simultaneously improving the self-sustainability of microfinance institutions. I develop a model to indicate how the self-sustainability of microfinance institutions is affected by the capital structure of microenterprises based on differing incentives generated by debt and equity portions of finance. The model suggests that infusing equity into the current microfinance debt model lowers the dependence on external funds, specifically in cases where a loss of control due to equity holdings is sufficiently small.

Introduction

What is microfinance?

Microfinance provides small-scale financial services to those who have been marginalized by the mainstream, commercial banking sector: the poor. Microfinance involves several types of financial services including loans, savings products, and microinsurance. However, the majority of microfinance activities consist of the provision of loans or microcredit. This extension of small amounts of credit is given traditionally to those in poverty, mainly within developing nations, for the sole purpose of starting or expanding a small business. Loans tend to fall below \$50 and rarely exceed \$200. Thus, by providing a means of livelihood and self-employment, microfinance is designed as a poverty alleviation tool. Although most microfinance institutions (MFIs) serve poor populations within developing areas, several MFIs also function within developed countries in areas where there are high rates of poverty. For example, the MFI Acción USA has offices in New York and Boston as well as in other areas.

Origins of microfinance

Though the “microfinance revolution” is ongoing, it began in the 1970’s with a realization of one professor at the University of Chittagong in Bangladesh while on a visit to a rural village, Jorba. This professor noticed that poverty stricken women were crafting and selling bamboo stools, but had to rely on local tradesmen to provide the raw materials for them to make the stools. The tradesmen charged the women an exorbitant amount, leaving them in a continual cycle of poverty no matter how hard they worked in their particular trade. With just \$27 out of his own pocket, this professor was able to

radically change the lives of these villagers. This was the small amount of money needed for them to collectively buy the bamboo at market wholesale price for themselves. With this idea, Professor Muhammad Yunus founded the Grameen Bank in 1983 to make small loans to help impoverished aspiring businesspeople raise themselves out of poverty with their own hard work and no handouts.

Yunus actively sought to materialize and prove his belief that every human not only has the right to a decent life, but also has the means to create that life for him or herself. In his book *Banker to the Poor: Micro-Lending and the Battle against World Poverty*, he chronicles the development of this fundamental belief, from early simple acts of kindness and through the many roadblocks faced and adjustments made to his initial model. He explored the poorest regions of his native Bangladesh in order to determine how he could be most helpful. As a Fulbright scholar in Economics, he examined basic default rates and ways to effectively lend and create a lower cost of capital. Within particular household dynamics, he recognized the credibility of poor women. Putting research into practice, Grameen lends to a demographic dominated by women at 97%. These women borrow in small groups of five members each, and meet frequently to repay loans and discuss business issues. Borrowers are also asked to abide by Grameen's "16 decisions," which are health and well-being goals for themselves and their businesses. Grameen claims that 65% of borrowers have moved above the poverty line. The offerings of the institution have expanded to offer scholarships, housing, educational loans, company networks, and pension funds. Overall, since its founding, the Grameen Bank has given out \$983 million in loans to over 7 million individuals. Due to these

accomplishments, Yunus and the Grameen Bank were joint recipients of the Nobel Peace Prize in 2006 for their success in alleviating poverty.

However, microfinance successes have not been limited to Bangladesh and the Grameen Bank. The 2006 Microfinance Summit Campaign Report estimates that 3,000 microfinance institutions have reached 100 million people with a total cash turnover of \$2.5 million. In addition, the United Nations designated the year 2005 as the International Year of Microcredit. The United Nations' Millennium Development Goals also call for a reduction, by half, of the poverty rate by 2015; microfinance has been envisioned as a major method for bringing about this goal. As a Google Ad on March 10, 2010 reads, "Microfinance Empowers: Join us in enabling the poorest of the poor to improve their own lives." (<http://www.GrameenFoundation.org>).

Over the decades, many developments have been made, improving on the efficiency of the first microfinance institutions which Yunus led to success with innovative lending patterns, such as targeting females. "Microfinance initiatives find new ways to deal with these problems through group lending, character lending, and the gradual building of credit history. By employing group lending, using either solidarity groups or village banks, the MFI delegates much of the screening and monitoring efforts to the group" (Mersland & Strom, 2009). Undeniably, businessmen and women lacking collateral in developing nations face exorbitantly high interest rates because of high default risk. Microfinance mitigates the high cost of capital with new innovations to take advantage of credit worthy characteristics. Muhammad Yunus first focused on the dependability of women, while others have recently realized new trends of worthiness, such as that found in peer groups.

The need for microfinance

As described above, Yunus' notion of poverty reduction focuses on the role of the poor in their own self-employment, bringing about economic growth and a reduction in poverty. According to the microfinance paradigm, a main constraint preventing those in poverty from becoming self-sufficient is a lack of access to credit. Traditional, commercial banks are often loath to lend to those in poverty. "MFIs are subject to problems of credit risk assessment and repayment because credit clients typically have little or no collateral" (Armendariz de Aghion and Morduch, 2005). The small size of the loans prevents banks from experiencing the economies of scale found in banks with larger-sized loans. In addition, the lack of collateral of those in poverty prevents them from effectively compensating banks for the moral hazards that the bank must endure when providing a loan under a situation of extreme asymmetric information. Thus, the small size of loans and lack of collateral prevent those in poverty from obtaining loans needed to break the cycle of poverty. Microfinance deals with these issues by using other techniques to guard against moral hazard problems, including group-liability loans, progressive lending, peer monitoring, and threats of discontinuation of future loans. Using these techniques, many MFIs have maintained high repayment rates. For example, Grameen boasts a repayment rate of about 98% amongst its members. By using these innovative financial methods, microfinance has been able to extend its outreach to larger communities and to the poorest of the poor.

Reinke (2006) notes "Frequent meetings are an important part of group lending schemes: they are crucial to the transparency and information sharing on which joint

liability depends... Extending credit to individuals without collateral and without group pressure exposes the lender to greater vulnerability towards free-riding and opportunism.” It is very difficult to mitigate the extremely high risk in each no-credit, poor client. This is the exact reason these individuals have been abandoned by the formal credit markets. Group pressure reduces the monitoring cost to the MFI because the group inherently bares it, knowing that one’s own loan is dependent on the repayment by every group member. This group lending model takes advantage of trust networks and established incentive schemes.

Current trends in microfinance

Many new techniques have fostered recent growth in MFIs. “Estimates of MFI annual growth rates range from 15% to 30%, thus suggesting a demand of somewhere between \$2.5 billion and \$5 billion for additional portfolio capital each year, with \$300 to \$400 million in additional equity required to support such lending, an estimate that could well turn out to be conservative” (Callaghan et al. 2007). MFIs are growing at unsurpassed rates and there is a huge need for additional capital investment to support this growth. Equity markets offer a much larger base of funds that should be utilized. What makes microfinance potentially compelling from a commercial perspective are relatively low default rates, which for MFIs tend to fall between 1% and 3% (Easton 2005), combined with potentially low systemic risk, impressive growth rates, and reasonable returns (Krauss 2009). Along with MFI’s great need for alternative sources of capital to sustain this growth, investors of the formal equity markets should be interested in microfinance for the very same reason.

The poor are investment-worthy of their own accord. Kiva is the first peer-to-peer lending system to put this idea into practice. Kiva is a new form of microfinance that connects individual investors to worthy small businesses. Each investor acts as a loan officer, choosing a business to lend to from the Kiva website yet differently, charging a 0% interest rate. Like Grameen, Kiva is targeted towards women entrepreneurs. A field officer monitors the loan and collects payments to be re-dispersed to investors through paypal. “Kiva's mission is to connect people, through lending, for the sake of alleviating poverty. Kiva empowers individuals to lend to an entrepreneur across the globe. By combining microfinance with the internet, Kiva is creating a global community of people connected through lending” (<http://www.kiva.org>). However, the Kiva investment model offers no incentive scheme to foster higher effort on any side. The investor receives no portion of the profit and no repayment for the opportunity cost incurred of employing capital over time. The principal is repaid, but there is no interest charged. There is no direct interaction between lender and borrower—the lender only hopes for repayment and is allowed no active hand in ensuring success and repayment. As such, this program is run as a charity and has no trace of self-sustainability, relying on donor support instead.

Equity-infused microfinance concept

As shown, despite the success of microfinance in alleviating poverty, many MFIs are heavily subsidized by donors and the state. However, the recent, global financial crisis has led to an increased interest in the promotion of MFI self-sufficiency. The reduction in donor funds and a lack of social spending by many governments due to the economic crisis has been a large concern. An important measurement that is used in the

microfinance field to gauge the degree to which an MFI can maintain itself without outside funds is the subsidy dependence index (SDI) proposed by Jacob Yaron (1997). The SDI compares an MFI's level of subsidies to the amount of loan revenue that it generates. The lower the index, the less dependent an MFI is on subsidies. Most discussions of the SDI suggest that this measure can be reduced by either raising the interest rate charged to clients and/or by reducing the costs of providing loans. While both of these methods are appealing, these discussions fail to consider the ways in which a microenterprise's capital structure may impact a microentrepreneur's incentives and behaviors, and hence, impact the MFI's revenues. This could serve to lower the SDI.

Although, traditionally, microfinance involves providing small-scale loans to those in poverty for use in microenterprises, more recently, microfinance has extended beyond credit provisions to include savings, insurance, pensions, and other financial services. However, while the financial literature suggests that small businesses could benefit from access to both debt and equity financing, the field of microfinance has failed to consider extending small scale equity capital to those in poverty. This would offer an alternative means of finance to those in poverty who have traditionally been marginalized from not just debt markets, but also the market for equity. In addition, a movement from pure debt based finance to equity-infused microfinance provisions may provide additional incentives for clients, resulting in increased revenue for MFIs and a decline in the SDI.

Despite the possible benefits of an equity-infused microfinance model, there has been little experience with equity finance in the microfinance field. Recently, several leading MFIs have issued initial public offerings and many others have had equity investments made by outside investors directly into the MFI itself. Examples include

Sequoia Capital, original venture capital investor in Yahoo!, YouTube, and Apple, who invested \$11.5 million in SKS Microfinance in 2008, and the subsequent investments by BlueOrchard, Accion Texas, BRAC USA, and Banco Compartamos in Mexico. Through these outlets, MFIs received increased equity investments in their institutions and acquired the capital needed to support their immense growth. In addition, Grameen Bank currently operates a Grameen Fund which acts as a venture capitalist providing equity investments for entrepreneurs who lack the capacity to mobilize capital or collateral. The fund focuses mainly on entrepreneurs working in information and communication technologies (ICT) and bio-engineering in Bangladesh. As such, this equity finance is limited to specific industries, and is not generally extended to all microfinance clients. Overall, then, despite these equity investments in MFIs themselves and in ITC and bio-engineering microenterprises, the field of microfinance remains credit driven and micro-equity remains limited to only a small sector of microentrepreneurs.

Therefore, this thesis argues that an equity-infused microfinance model in which all clients are offered both debt and equity financing through MFIs is superior to the traditional microfinance model that focuses exclusively on debt provisions. The equity-infused microfinance concept allows those in poverty, who have traditionally been excluded from formal equity markets, to obtain an alternative form of finance. This equity-infused microfinance paradigm also facilitates a reduction in the SDI, allowing MFIs to stop relying on donor and state support; this self-sustainability allows MFIs to carry out their social mission of poverty alleviation with greater financial stability. In order to demonstrate these aspects of the equity-infused microfinance concept, I model the impacts of the microenterprises' capital structure on the SDI. The model combines

traditional microfinance with new concepts drawn from venture capital and private equity in small businesses.

Literary Review

This paper advocates for the implementation of an equity-infused microfinance model as opposed to the current debt-based model. There are two main aspects that support this view: (1) in terms of the social mission of MFIs in alleviating poverty, equity finance provides an alternative financing option for those in poverty who have traditionally been marginalized from formal equity markets. (2) In terms of the financial sustainability of MFIs, altering the capital structure of clients' small businesses to include an equity portion may change clients' incentives resulting in increased revenue for MFIs, reducing MFIs' dependence on subsidies and lowering the SDI. Based on these reasons for advocating for the use of an equity-infused microfinance model, this section reviews the literature concerning the capital structure of small businesses and the current discussions surrounding the sustainability of MFIs.

Capital structure in small businesses

While the microfinance community has recognized the credit constraints of those in poverty, and has also expanded financial services to include savings and insurance products, MFIs have yet to acknowledge the equity financing needs of those in poverty. Due to the small size of the businesses run by those in poverty, the microenterprises of MFI clients share many similarities with other small businesses. Specifically, equity investments like those granted entrepreneurs by venture capitalists, along with the business experience offered, would add great success to microfinance clients seeking to grow their businesses.

Hovakimian et al (2004) suggest that small businesses encounter specific financing issues and models that differ from those that are considered in the traditional corporate finance field. In particular, because small businesses are usually owner-managed, many of the agency problems encountered in larger corporations are not an issue, although other agency issues arise that are solved in different ways by debt and equity contracts (Hovakimian et al 2004). In addition, Berger and Udell (1998) suggest that small businesses move through a unique business growth cycle, such that different capital structures are optimal at different points in the lifecycle of the firm. Smaller firms are more informationally opaque than larger firms, who are more likely to have a public presence and to widely report their activities. Due to the severity of the asymmetric information problem, smaller businesses are less likely to obtain public debt and equity and must rely on private debt and equity markets. In particular, smaller firms are more likely to rely on the principal owner's own equity and assets, thus providing funding internally instead of seeking external financing. However, as Rosen (1998) points out, the degree to which insider funding is possible is limited by the resources of the entrepreneur. The clients of MFIs are generally in poverty, and therefore cannot be expected to provide a significant amount of insider funding.

Following the use of internal funding, many small businesses also turn to angel investors and venture capitalists for external equity financing (Berger and Udell 1998). Because the poor are unlikely to provide a significant amount of internal funding, external, venture capital style funding may be appropriate for poverty stricken clients of MFIs. Grameen Bank has already experimented with this style of funding through their Grameen Fund. However, the Fund focuses only on high-risk ventures in ITC and bio-

engineering and does not extend equity financing to all clients. The poor entrepreneurs of developing countries are much more likely to employ basic skills for basic businesses. A survey of the Ecuadorian microfinance industry by the Central Bank of Ecuador notes that the main problem in microfinance is the uniformity of businesses (USAID 2004). This Grameen Fund seems to not effectively a large proportion of microfinance recipients.

Within the small business lifecycle model, Berger and Udell (1998) note that it is not until most small businesses establish a track record, through successful use of equity funding, that they are able to obtain debt financing. Again, this suggests the need for equity financing along with debt funding by MFIs for their clients.

In addition to the capital needs of MFI clients, debt and equity may also provide varying incentives for microentrepreneurs; the two types of finance differ in incentive structures and the types of agency and information issues with which they deal. For example, Hovakimian et al (2004) explain that different agents supplying different types of funding will use different techniques to deal with small businesses. Venture capitalists and other equity providers monitor by being an active participant in the business, while banks use collateral and short maturities for debts to sort firm types (Hovakimian et al 2004). Specific attributes of both debt and equity are offered below:

Debt: • Commitment, tight reign on managerial agency costs • <i>Insurance</i>-based, with a fixed coupon payment • <i>Threat of bankruptcy</i> • Reduced free cash flow, which cuts overspending • Monitoring by creditors • Bank charged with a lot of	Equity: • Owners monitor the managers, decreasing informational asymmetry • <i>Incentive</i>-based: growth story with potential for increased dividends for all owner participants • <i>Threat of losing all</i> • Risky to an owner: exit only upon achieving sustainable profits
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information to assess risk, payments, timing • Collateral commitments, restrictive covenants • Short maturities to sort firm types and restrain from risky behavior	• Owner can exert control over management with the threat to sell
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Different incentive schemes are expected to impact a microentrepreneur's behaviors and effort levels in different ways. The model presented in this paper analyzes the impacts of these differences and suggests that MFIs offer both debt and equity financing.

Empirically, Chaganti et al (1995) find that small businesses do rely on both debt and external equity. Similarly, Hovakimian, et al (2004) find that a large number of firms have dual issues of debt and equity, balancing the costs and benefits of the two types of financing. They benefit from the guidance of equity investors as well as the stiff contract from debt financing that keeps management to a strict regiment of low expenditures.

Overall, theories of financing in small firms, and empirical findings suggest the need for both debt and equity financing for MFI clients. The majority of these clients are in poverty, and therefore lack internal sources of funding and must instead seek external sources. To fill this gap in financing need, MFIs should provide both debt and equity financing options. In this way, MFIs would represent a central source of financing such that clients can receive many types of financial services from the same MFI. Thus, relationship banking is recommended.

Relationship banking involves the provision of multiple financial services to a client from one financial institution, causing a sustained bond between the client and officer where a profound understanding of the clients true needs and issues develops.

According to Hovakimian et al (2004) most small firms develop relationships with a financial institution and stay with the same one for an extended period of time. For example, progressive lending starts with one small loan with larger loans on the horizon so long as the client repays on time and cooperates with the credit officer. The officer can then give the client a better credit rating and a larger loan, with enough information to specify the correct amount and credit risk. With relationship lending, information is gathered by the financial institution continuously due to long and sustained relationships. This reduces the costs of due diligence performed by the financial institution for additional financial services, as each service is utilized by the same client and different branches can utilize information that MFI already attained regarding the client's previous business dealings. (Hovakimian et al 2004). That is, economies of scale are realized. There is some evidence that both German style "housebanks" and the Japanese system of longstanding relationships with a bank are beneficial for small businesses (Hoshi et al 1990 in Hovakimian et al 2004). This suggests that MFIs that provide both debt and equity financing to clients can self-sustain, while also providing needed services to their clients. However, because debt and equity provide differing incentives and effects on clients, a movement from a pure debt-based model of microfinance to an equity-infused model may impact the revenues by MFIs. My model analyzes these impacts, and specifically addresses the issue of sustainability.

Self-sustainability of MFIs

Regarding sustainability, Christine Letts, William Ryan, and Allen Grossman (1997) criticize the unstable charitable dependency of foundations in *Virtuous Capital*:

What Foundations Can Learn from Venture Capitalists. MFIs and foundations have similar donor-based and subsidy-based funding structures. The authors argue that there is no need for such dependence, and capital markets can foster grassroots growth in foundations just as it does for venture capitalist-funded entrepreneurs. “The for-profit world has a highly evolved and sophisticated network of venture capital firms to finance early-stage ventures. In the nonprofit world, foundations play a similar role of funding early efforts to build new programs.” The authors make a case for applying the venture capital model to the nonprofit context as a means of improving the focus on performance and results. This suggests that the venture capital investment model can be applied to the charitable world to create sustainability. In order to do this, foundations and non-profits need to establish clear performance objectives, responsibly manage risk through close monitoring, and plan the next stage of funding in advance. These are all goals established and maintained with the help of the direct investor with his or her own “skin in the game.” While focusing on the fiscal issues of the foundation may indicate mission drift to some observers, it is important to note that economic constraints still apply to foundations. This concern over self-sustainability is an especially prominent issue in foundations because of the complete dependence on outside funds. MFIs have been no exception to this issue.

Furthermore, CSFI (2008) identifies governance as a major obstacle to MFI growth, and recommends a venture-capital style structure for dealing with this situation. They suggest that there is a clear need for a third-party to take a strong stance and advise the MFIs on effective management. Labie (2001) continues this request for an intelligent outside party. “Many MFIs are monitored by an agent and not a principal, since they are

funded by back-donors or taxpayers. Furthermore, many MFIs often struggle with identifying board members who have an appropriate background and who are willing and able to dedicate the necessary time to monitor management effectively.” This implies that MFIs need experienced investment professionals to consult on the changing business environment and opportunities for expansion. These consultants would be outside observers with the main job of assessing the volatile market-driven economy and the explosive opportunities it offers to the MFI. As such, these advisors would act in a capacity similar to a venture capitalist, who offers expertise to those in whom they have invested.

The same year as the CSFI observation of a need for a venture-capital type intervention in MFIs, *Business Week* (2008) published an article about a new turn to equity investments in microfinance institutions, addressing this exact need for professionals. “In 2001, a pair of Europeans, Jean-Philippe de Schrevel and Cedric Lombard discovered they shared a mutual conviction that the best way to cure poverty is through the capital markets.” They founded BlueOrchard which is a vehicle that loans money to microfinance institutions. It is funded by loan portfolios of major international banks. “One advantage of taking equity positions is that BlueOrchard will gain some influence over the strategic direction of its investment targets.” The economic experience of the BlueOrchard employees greatly assists the management of the MFIs. However, this experience should also be extended to the poor people seeking loans. They have less business development knowledge than the founders of MFIs; they offer much higher returns on invested intellectual capital and equity because of their large potential to learn and grow businesses from the lower starting base, intellectually and monetarily. “One

reason for the interest in microfinance is that, as it turns out, institutions serving especially poor customers are more profitable than those serving better-off clients, partly because of the high interest paid on microloans and partly because there tend to be fewer defaults” (Business Week 2008). Microfinance continues to be analyzed and experimented with in an effort to find new ways to decrease the cost of capital and ensure high repayment rates on loans.

Other than having great charitable attributes, MFIs are investment-worthy. Krauss and Walter (2009) argue, “Apart from the social benefit associated with an increase of available funds, the argument for commercialization of microfinance is that the risk of financial loss –comprising the likelihood of default, the loss given default (LGD), and present value of expected recoveries (LR)-- tends to be low relative to the returns, and that the risk-adjusted total returns on microfinance exhibit low correlation to those of other asset classes, thereby presenting investors with an attractive opportunity for portfolio diversification.” Mutual funds should consider holding these investments in portfolios. The bottom of the pyramid population aims for subsistence and is not much affected by changes of Wall Street firms. Micro-entrepreneurs mainly sell domestically produced goods and services to low-income domestic clients who are to a certain degree detached from the formal domestic market and even more so from the global market. Moreover, the tendency for customers to move “down-market” to cheaper, domestically produced goods during times of economic stress may have a countercyclical effect on micro-entrepreneurs who supply them. Micro-borrowers may also value their access to credit more highly than ordinary commercial bank customers, since it may represent their

only opportunity to borrow, and therefore they make greater personal sacrifices to sustain it (Patten et al. 2001).

If markets are efficient, capital should be allocated towards the credit-worthy MFI projects. As can be seen, microfinance empowers poor people by efficiently using credit markets, regional demographics and character attributes to mitigate high risk.

Despite these possibilities of having equity investments made directly into MFIs, most remain dependent on donors and are reluctant to become commercialized.

Although there have been several IPOs within the MFI community, including BRI and Compartamos, Yunus has outright critiqued such movements as going against the social mission of MFIs in order to concentrate more on profitability instead of helping the poor. As such, many MFIs continue to struggle to maintain sustainability and many rely on donor support through subsidization. Capital markets may help address this shortcoming.

The issue of subsidization itself, however, is quite controversial within the field of microfinance. Should such organizations be subsidized? Some believe so because of MFIs success in alleviating poverty, much as government-funded foundations have done. But if so, for how long? If not, how can they become financially viable? As the organization UNCDF explains, “Whatever one’s position on this question, it makes sense to measure [an MFI’s] sustainability, either to tell whether its meeting a goal of the project, or else to quantify clearly the level of subsidy that is being invested for a particular result.” (uncdf.org). Thus, the microfinance field has developed several measurements to indicate the degree of financial sustainability of an MFI.

Traditional banks and financial institutions often base measurements of sustainability and profitability on calculations of the return on equity (ROE) and the

return on assets (ROA) (www.uncdf.org). These are appropriate indicators for unsubsidized institutions running off of their own revenue generation. However, as MFIs typically receive heavy subsidization in the form of grants or loans at below-market interest rates, such indicators of true profitability are inappropriate. Instead, traditional financial data must be “adjusted” to reflect the impact of subsidies. In this way, a measurement can be calculated that better tells us whether the MFI will be able to maintain itself when subsidies are no longer available (www.uncdf.org). The two most common subsidy-adjusted indicators are the financial self-sufficiency (FSS) ratio and the subsidy dependence index (SDI). The FSS compares adjusted revenue with adjusted expenses in order to determine whether or not an MFI’s revenues are covering its expenses. It does not necessarily take into account the current outside dependence of the MFI.

Jacob Yaron (1997) offers a subsidy dependence index (SDI) which is considered to be technically superior to the FSS amongst practitioners in the field (Rosenberg 2009). This index is shown here:

$$SDI = \text{Subsidies} / \text{Average Loan Portfolio} \quad (1.1)$$

As such, the SDI indicates the degree to which an MFI’s revenue can cover its subsidies. An index of 1 indicates a breakeven point, whereas an index that exceeds 1 displays that there is a high reliance on subsidies. An index below 1 suggests that the MFI is nearing self-sustainability, while an index of 0 indicates complete sustainability and independence from subsidies. Therefore, MFIs that wish to be sustainable will strive for the lowest SDI possible.

Yaron (1997) frames the SDI in terms of an increase in the MFI's interest rate which would increase loan revenues and decrease dependence on subsidies. He also suggests that other factors contribute to reducing subsidy dependence, including adequate on-lending rates and spreads, high rates of loan collection, and containment of administrative costs. Arunachalam (2006) also suggests that subsidy dependence can be reduced through savings mobilization, loan dispersals, control of operational costs, and optimization of portfolio rotation. Furthermore, Schreiner and Yaron (1999) suggest that the SDI can also be lowered by increased efficiency in terms of economies of scale via growth. However, none of these discussions considers the role of the capital structure of microenterprises for reducing the SDI. I argue that extending financial services to include equity provisions may serve to reduce the SDI, that is, to reduce outside dependency.

Schreiner and Yaron (1999) review theories presented by Khandker to develop a subsidy dependence ratio (SDR), which Khandker and others suggest augments the SDI to include other sources of revenue for the MFI in addition to loan revenue, which they argue is also used to cover costs and subsidies. This includes income from investments in non-loan assets such as treasury bills; most MFIs make investments in order to maintain liquidity so that they can meet the demands from clients for loans and withdrawals of deposits. For this reason, Khandker suggests that the SDI could be reduced by increasing revenue from these sources as well as from increased loan revenue. Thus, it is suggested that subsidies need to be compared with all forms of revenue that the MFI garners. The SDR is then similar to the SDI. Where the SDI compares subsidy and loan income:

$$SDI = \text{Subsidies} / \text{Average Loan Portfolio} \quad (1.1)$$

The SDR compares subsidy with loan and investment revenue where I is the average investment and j is the yield on investments:

$$SDI = S/(LP + Ij) \quad (1.2a)$$

However, Schreiner and Yaron (1999) argue that the SDR is inappropriate because the social mission of MFIs is not to invest in non-loan assets, but rather to lend to a target group. They do suggest, though, that in general, an MFI can decrease SDI via any increased revenue or decreased expense, so it can be useful to compare subsidy not just with loan revenue but also with other items of revenue and expense. Schreiner and Yaron (1999) continue "... lending is the prime purpose of the MFI... investment is not the main line of business of an MFI."

Overall, the SDI is the base of my evaluation. In line with Khandker's work, though, I adjust the SDI to reflect additional forms of revenue attainment, which then appear in the denominator of the SDI as modeled here. Unlike Khandker, though, in the case of my model, an element of equity finance for clients is added. Since this equity portion will be directly financing the microentrepreneurs in the target group, this is a more appropriate addition to revenues to analyze, in accordance with Schreiner and Yaron's (1999) focus on the social goals of MFIs.

Newest development: adjust the capital structure, add equity

Overall, much work has been done varying the SDI in order to create more sustainable MFIs. Debt, though, is the only product addressed within current microfinance models and these analyses of the SDI. While the financial literature suggests that microentrepreneurs would benefit from access to equity finance and studies

of the SDI acknowledge that MFIs may raise revenues from means other than debt, the possibility of offering equity to borrowers has not been considered. As discussed earlier, there are many reasons for equity investments in MFIs; the same reasons apply to investments in the small-business owners themselves.

I introduce an equity portion into the model to determine possible changes to self-sustainability and success in the MFI through the decreased SDI. However, this equity portion is invested directly from the MFI to the borrower itself. The same components MFIs gain from equity investors -- governance, training, and further experience -- would also greatly assist the borrowers themselves. As the final implementers of the capital in the market, these borrowers have the most to gain from the equity investors, as opposed to the MFI which acts as an intermediary and receives support from other sources. By introducing an equity component to the microfinance field, the capital structure of microenterprises can be analyzed and adjusted within the SDI. Because debt and equity involve different incentive mechanisms, a movement from a pure debt-based model of microfinance to an equity infused microfinance model may allow the SDI to be reduced. In the following sections, I use the subsidy dependence index (SDI) to draw out a theory of these impacts and also develop a formal model of these effects.

Theoretical Support

As explored in the literary review earlier, researchers continue to experiment with new models and theories on how to reach small business owners in developing nations most effectively. The literature on small businesses suggests that these firms need access to both debt and equity in order to grow. This indicates a possibility for successful growth by making similar provisions for the microenterprises served by MFIs. However, there is a lack of available evidence concerning the role of equity provisions by MFIs. While the Grameen Fund provides venture-capital equity funds for fast paced ITC firms and bioengineering firms, equity financing has not been extended to all microentrepreneurs. Likewise, Grameen has not analyzed the impacts of their venture capital fund. Therefore, no empirical evidence or data exists for use in analyzing the ideas put forth in this paper. Instead, this paper develops a theoretical model to indicate the impacts of microenterprises' capital structure on the SDI. In the future, this model can be tested using data from a pilot study of equity-infused MFIs.

The economic model developed here is meant to succinctly identify the effect of certain relevant variables on each other. Understanding of these relationships allows researchers to theorize on the feasibility of improvements made by introducing new variables to the already established models. In this way, my model is a theoretical approach to the collaboration of microfinance debt and venture capital equity models. Throughout this portion, I hypothesize on the possible effects of the inclusion of an equity investment from MFIs to small businesses and the new variables such a change to the current loan-based model would produce. In the next section, I develop the model that explores the impact of capitalization on the self-sustainability of MFIs.

Reducing dependence on subsidies: the preliminary model

Jacob Yaron proposes a Subsidy Dependence Index (SDI) to address some of the sustainability issues of MFIs. Specifically the SDI tracks the institution's dependence on external funds and therefore acts as a metric for the self-sustainability of an MFI. The final version of the SDI measures annual subsidies as a percentage of interest income from the MFI's primary activity- lending. Subsequently, this determines the amount of interest income generation needed to completely free the MFI of dependence on external funds. Alternatively, this is the percentage by which the interest income must change in order to replace outside dependence.

$$SDI = \frac{\text{subsidy received by MFI}}{(\text{average outstanding loan portfolio} * \text{average earned interest rate})} \quad (1.2b)$$

$$= \text{concessional funds received} / \text{interest income} \quad (1.3)$$

The SDI considers all types of explicit and implicit subsidies including concessional funds that are provided at a below-market interest rate to the MFI, in order for the MFI to loan out these funds. The SDI computes this by adjusting values based on prevailing market rates and costs. Thus, "adjustments" figure into the SDI's numerator.

The SDI can also be structured in terms of a cost-benefit analysis (Armendáriz and Morduch, 2005, p. 237) as presented here:

$$L (1+r) (1-d) + I = L + C + S \quad (2.1)$$

$$MFI \text{ revenue} = MFI \text{ expenses}$$

L represents the total loan volume outstanding from which the microfinance institution receives interest income. r represents the interest rate charged to clients. The portion of the entire loan volume expected to be repaid is represented by $(1-d)$, where d is

the expected default rate on loans. I is total funds raised from other investments. As stated earlier, MFIs often invest in treasury bills or other assets in order to maintain a desired level of liquidity. The entire first term represents all income specifically from the core microfinance activity: lending. In terms of expenses, the MFI is liable for the same L from before, total outstanding loan portfolio. C refers to the costs associated with administering the loan, including the cost of capital, loan officer salary, business training, and others. S includes all implicit subsidies from donors and state support.

Gaul (2009) suggests that the SDI can then be adjusted further to indicate how these subsidies relate to net income, as shown below:

$$SDI = (Adjustments + Donations - Net Income) / Loan Revenue \quad (3.1)$$

$$= (Adjustments + Donations - (Total Revenue - Expenses)) / Loan Revenue \quad (3.2)$$

With the formula for revenue of the MFI from (2.1),

$$= \frac{Adjustments + Donations - [(L(1+r)(1-d) + I) - Expenses]}{L(1+r)(1-d)} \quad (3.3)$$

$$= \frac{Adjustments + Donations + Expenses - \frac{L(1+r)(1-d) + I}{L(1+r)(1-d)}}{L(1+r)(1-d)} \quad (3.4)$$

As loans are the core business of the MFI, the majority of its total revenue is derived from loan revenue. Scott Gaul writes about the SDI in the *Mixmarket Microbanking Bulletin (MBB)* (2009), and suggests that I becomes negligible so that $Loan Revenue \approx Total Revenue$. As Gaul explains, “Results from the 2007 MBB benchmarks indicate that loan revenue is typically over 94 percent of MFI financial revenue, so [assuming that loan revenue is about equal to total revenue] should be a reasonable approximation.” The SDI then simplifies to:

$$SDI = \frac{Adjustments + Donations + Expenses}{L(1+r)(1-d)} - 1 \quad (3.5)$$

I am interested in evaluating the performance of an MFI once it begins to invest directly in the small businesses through equity holdings, or part-ownership. This runs along the lines of venture capital investments in start-up companies; the VC invests funds along with the hands-on training and business development it employs to support the microentrepreneur's professional growth. These last two additions follow from the potential to enjoy higher returns as a part-owner of the company, as opposed to loans with set interest payments.

I adjust the SDI for the new stated evaluation goals, based on equity investments, as the level of subsidies now must be compared with revenues from both loans and equity. As shown in Khandker's SDR measurement (Shreiner & Yaron 1999), it is possible to manipulate the income portion of the SDI equation to represent another source of fund-- in this case, equity dividends. A dividend yield, II , is returned from the microentrepreneur to the MFI and equity officer for each dollar invested as equity in the business. The average equity holdings of the MFI are designated as V . Similar to Khandker's designation of investment income for the MFI, here, the income generated would be VII . However, as in the case of the debt portfolio, there is some uncertainty as to whether or not payments will occur. For example, the microentrepreneur may not generate enough profits to sustain dividend payments to the MFI investor. Thus, while the loan portion of income is considered the default rate, d , here I introduce the term p , which is the probability of defaulting on equity repayments. It is linked to the default rate on the loan d , but distinct because of the way in which funds are dispersed in the case

of bankruptcy. Debt holders have priority; all funds or associated collateral must be repaid. Shareholders receive a portion of liquidated assets and are the last parties to be repaid (investopedia.com). Therefore, while the probability of bankruptcy is the same for a given firm, the probability of repayment to debt-holders is different than that of equity-holders. Overall, the amount of income from equity holdings repaid to the MFI as an investor can be represented by the term $V \Pi (1 - p)$. I posit a new SDI to include equity:

$$SDI = \frac{\text{Adjustments} + \text{Donations} + \text{Expenses} - 1}{L(1+r)(1-d) + V \Pi(1-p)} \quad (4.1)$$

In the next chapter, I work through the model in order to determine the effects of changing the capitalization structure of the small business, specifically with regard to the SDI. At this point, I explore the theoretical support for the inclusion of equity investments in small businesses on the part of the microfinance institutions.

The assumptions: how equity-infused microfinance would function

In order for this new equity-infused microfinance model to feasibly function, certain assumptions must be made. At any point, the small business owner has both equity and debt available. Additionally, I assume the same return on debt and equity for simplicity. While not completely realistic, it provides for an equal basis to evaluate debt and equity independently. Now, the methods for providing equity must be explained. Here, this is presented in terms of clients as well as the equity officers of the MFI.

Clients

Clients would be offered both debt and equity holdings for their small businesses, under the equity-infused microfinance model. This could be done within the group-liability system that is currently in place in most MFIs. Borrowers will now not only repay their loans as a group, but would also provide equity dividends as a group. The traditional system of peer-monitoring and social sanctions for default would continue to function, as group members have incentives to ensure high repayment rates as well as dividend payments. This is especially the case if threats of non-refinancing in the future are credible. Thus, equity finance would be administered in a similar way to debt.

In addition, equity officers would specialize in particular types of businesses and markets, such that clients with whom the officers have invested can benefit from the officers' expertise. Clients could form industry or geographically-based cooperatives that officers would then meet with to provide training and business expertise.

Equity officers and the MFI

An integrated approach to service delivery would be used here, in which a single officer at the MFI would disperse both loans and his or her own equity investments in the applying small businesses. Thus, officers will become part owners in their clients' businesses. Armendariz and Murdoch (2005) note that allowing officers to be full owners of the MFI itself would burden them with too much risk; an equity investment in combination with a flat wage rate, though, would ensure that the employee takes ownership of the investment and ensures quality. They would be long-term holders, as there is little liquidity in this particular market and the project must be made stable and

profitable before their ownership interest can be resold. “If employees have internalized the social message, employee ownership may provide a way to align all incentives appropriately. The employees are then akin to ‘social investors’ who invest part of their personal financial portfolio in institutions that deliver reasonable financial returns coupled with significant social dividends.” This ownership is one of the keys to aligning incentives and pursuing both social and profit motives at once. As social investors, the employees work alongside small-business owners to exert maximum effort, employ experienced business knowledge, and meet success in profits and poverty alleviation.

Effort in monitoring, determining information about the business, and guiding clients is also important on the part of employees and officers. Here, the dual role of the MFI officer may be helpful, as in the case of relationship banking discussed earlier. That is, under relationship banking, financial institutions can more easily elicit information about their clients through long-term and extensive business relationships. In general, then, the extent and nature of asymmetric information between the capital market and firms is a function of the systems of monitoring and corporate governance operating in the capital market. Traditionally, the Japanese system of monitoring and corporate governance is an ‘insider-based’ one, in contrast to the more decentralized arms-length Anglo-American system (Aoki, 1990). Sheard (1995) goes on to explain that “an investor that holds a large block of stock forgoes liquidity but has both the means and incentive to expend resources gathering inside information... The main bank performs an analogous monitoring and control role.” In the case of the microfinance institution, if the representative officer involved in the loan and equity disbursement has part ownership he or she has high incentive to exert effort and surpass informational gaps to better arm him

or herself to advise the company. Historically, in Japan “because main banks, as large debt and equity holders, have the means and incentive to monitor management closely, the degree of informational asymmetry may be less than in a well-diversified market setting” (Sheard). Thus, much like in the traditional Japanese system¹ where the banks sit on the boards of companies that they invest in, informational asymmetry is overcome and better collaborative decisions marked by increased effort are achieved by bringing the MFI and its officers into the management decisions of the small-business.

Because of the direct investment in the small-business, the officer has incentives to heavily monitor and guide it. As an insider, he or she has close enough contact with the owner of the company that the issue of insufficient effort exerted, referred to as *ex ante* moral hazard, can be mitigated. With the officer representing the institution as an insider of the company, he or she is fully aware of the financial progress of the small business and can ensure repayment, decreasing both d and p , the chance of failure to repay debt and equity, respectively. Thus, the degree of monitoring by the officer will be similar for both cases, and the model that I develop will assume that there is no change in monitoring due to a switch from debt to equity financing.² One reason for using an integrated approach in which the same officer provides both types of financing services is that if separate officers issue debt and equity, they can free ride off of each other’s efforts to monitor the small business, leaving little incentive by officers to exert these efforts.

In addition, equity officers are also expected to emulate some of the beneficial aspects of venture capital relationships. This occurs in terms of the officer providing

¹ More recently, the traditional Japanese banking system has been critiqued as having a weak corporate governance structure, that eventually led to economic instability in the 1990's and later (Kanaya and Woo 2000).

² In a future model, this assumption can be relaxed to include the variation in monitoring incentives offered by the part-ownership via equity and the flat wage via debt.

technical skills and expertise to the clients. The officer must be familiar with business principles in order to serve as a “quasi venture capitalist,” contributing their business skills and offering business advice to the borrower. Roles of the officer may include: monitoring business progress, advising on a business plan, and securing an exit opportunity once the business is able to sustain itself and buy back ownership interest from the investor. Once buying out the investor’s equity portion, the small-business can enjoy the profit as a full owner.

The equity officer has an incentive to provide these services under an equity provision as opposed to under a debt provision, because policies usually stipulate that outstanding debts must be repaid prior to the distribution of dividends by the firm. The officer, therefore, will want to ensure that the business is profitable enough to do so. In addition, because the dividends paid on equity will be set as a percentage of profit generated by the microenterprise, there is another incentive for the equity officer to encourage the success of the business, as he or she is a part owner in the firm and of the profits. Thus, the equity portion of the microfinance services will be similar to the ways in which venture capital financing is formulated. In addition, by being personally invested in the small businesses, the officer will want to help as many businesses as possible and to the maximum extent, which also serves the social mission of MFIs.

In addition to loan and equity officers receiving an equity claim in a small business, the MFI itself will also receive a portion of the dividend income in addition to the loan revenues that it collects. Wages and other remuneration for loan and equity officers will be structured in ways that are similar to the current system that most MFIs use under the debt-based model of microfinance. Most microfinance institutions pay loan

officers a base salary supplemented with high-power bonus incentives based on the repayment rate of the officer's loans (Aubert et al 2009). The wage structure for the equity component of an officer's work would be similarly structured. They would receive a base payment along with a high-power bonus incentive in terms of the dividends they receive from the businesses in which they invest. This high-powered bonus would not be a cost to the MFI, but instead come out of the profit of the small-business, although MFIs may need to pay a higher base salary due to the additional business expertise that the officers are expected to exhibit. The high-powered incentive would also compensate the officers for their effort and skills used in a venture-capital capacity in guiding the businesses in which they invest. In order to reduce the costs of effort and time associated with implementing these skills and guidance, each officer would invest in a whole cooperative of small businesses. The cooperative would consist of entrepreneurs with similar business models, requiring similar advice. Instead of time-consuming one-on-one tutoring for a course, one class would be offered for similarly-interested clients. In total, the equity-infused microfinance model provides both debt and equity to clients, with the officers of the MFI managing both components of financing. The change in the capital structure of small firms from being completely debt-based to a combination of debt and equity may impact the SDI of MFIs. The theoretical basis of the model has been presented here, and the formal model is presented in the following section. Exhibit A and B follow to depict these relationships and the change brought out by the new equity-infused structure.

Exhibit A

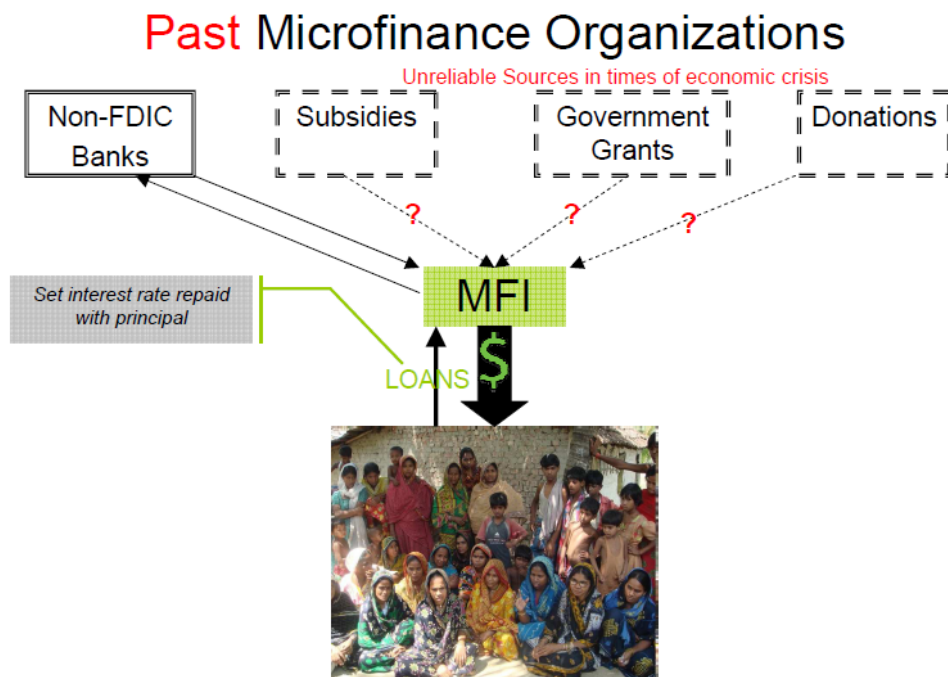
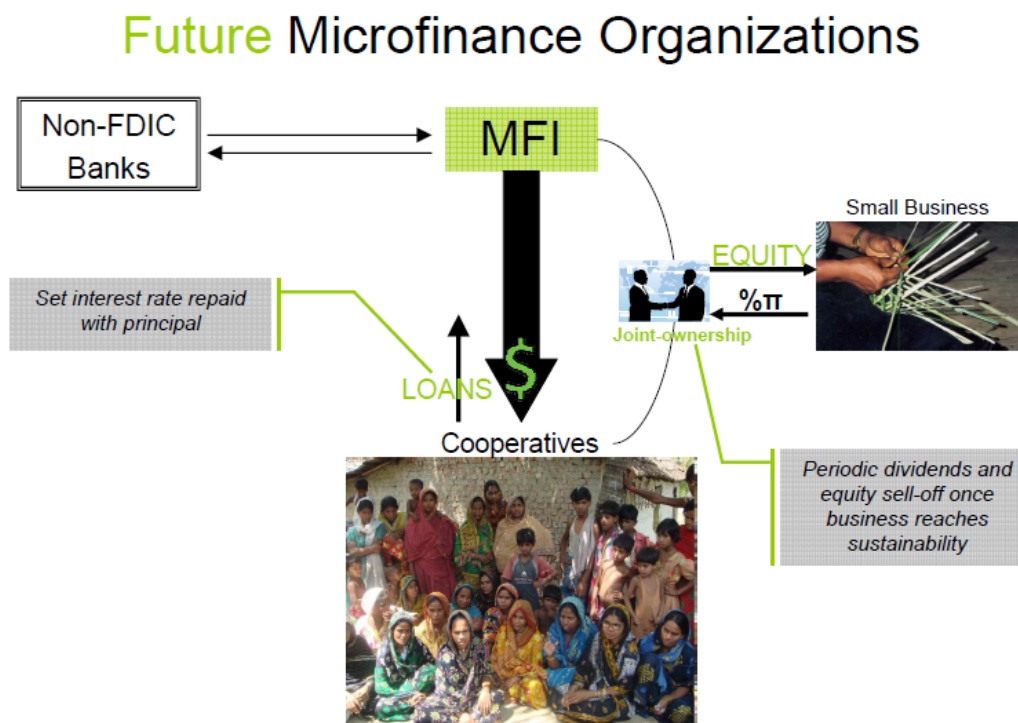


Exhibit B



Model

From equation (4.1) discussed above in the “Theoretical Support” chapter, we pick up with:

$$SDI = \frac{\text{Adjustments} + \text{donations} + \text{expenses}}{L(1+r)(1-d) + V\Pi(1-p)} - 1 \quad (4.1)$$

This SDI is a measure of the MFI dependence on outside funds. As the SDI approaches 0, it becomes more self-sustainable. We can then define the following variables:

- Total capital provided as $T = L + V$
- h = proportion of total capital held as debt = $L/(L + V)$
- $j = (1-h)$ = proportion of total capital held as equity = $V/(L + V)$, where $h + j = 1.00$
(or 100%)

Replacing this in our function, the SDI becomes:

$$SDI = \frac{\text{Adjustments} + \text{donations} + \text{expenses}}{T[h(1+r)(1-d) + (1-h)\Pi(1-p)]} - 1 \quad (4.2)$$

And denoting $U = \text{adjustments}$, $D = \text{donations}$, $X = \text{expenses}$,

$$= \frac{U + D + X}{T[h(1+r)(1-d) + (1-h)\Pi(1-p)]} - 1 \quad (4.3)$$

As explained in the previous section, agents’ payments are based on repayment rates, often with a portion having incentive based wage with a bonus rewarding high repayment rates, when debt is issued (Aubert et al 2009). As equity officers, MFI employees will receive a flat rate as well as a portion of profits, as dividends, from the clients they serve. As such, this model assumes that the cost of compensating debt and equity officers is comparable, having no impact on the salary portion of administrative costs from different finance offerings. It can also be assumed that the secretarial and paperwork costs of administering equity are comparable to the costs of administering

debt, given the style of relationship banking that MFIs will engage in when they offer both debt and equity financing. Thus, the numerator of the SDI is expected to remain constant in this analysis. Given these assumptions, our main concern is with the variables in the denominator of the SDI. In particular, we are interested in determining the impact of changing capital structure on the probabilities of default for both debt and equity.

First, we assume homogenous, identical borrowers and consider only ex-ante moral hazard (no ex-post). Next, we can explain the determinants of the default rate (d) and the probability of receiving dividends ($1 - p$).

The literature on default rates for MFI clients and for small businesses in general, suggests that the determinants of the default rate (d) include:

- industry- and firm- specific aspects (Fidrmuc et al 2006; Field and Pande 2008), which are constant in this model
- (macro)economic and temporal conditions (Fidrmuc et al 2006), which are also assumed to remain constant when capital structure changes
- and profitability (Fidrmuc et al 2006).

The last issue of profitability depends on officers' monitoring to induce effort, the client's own skill, and the indebtedness level (Fidrmuc et al 2006). The client's skill is not expected to differ with the capital structure of the microenterprise, and is assumed to be constant. Likewise, as explained earlier, the level of monitoring is assumed to be comparable across debt and equity holdings, and so can be assumed to remain constant.

Here, the concern is with how indebtedness impacts the SDI. Thus, we define $e = (1 - d)$, where e is the probability of the MFI being repaid. Note that e is a function, f , of the percentage of capital held as debt, h , as well as other variables which we just

suggested do not depend on h . It is argued that $f'(h) < 0$, because according to Fidrmuc et al (2006), issues of asymmetric information and ex ante moral hazard increase with debt level. Firms that are highly indebted pay a higher proportion of their payoff to the bank when they are successful. This lowers the incentive to exert effort, raising the probability of defaulting, holding all else constant. That is, agency theory suggests that incentives deteriorate in more highly indebted firms. Fidrmuc et al (2006) find that an increase in bank loans does raise the default rate, even when controlling for other variables. Additionally, Hovakimian et al (2004) suggest that moral hazard issues can make debt problematic. They explain that moral hazard issues are likely to occur when the amount of external debt funding is large relative to the amount of other finance. Also, debt is typically given a higher priority for repayment in the event of bankruptcy, relative to equity claims. This may pose as an additional disincentive for entrepreneurs when they are highly indebted. As such, the default rate, d , is expected to rise with rising indebtedness, such that $(1-d)$, the probability of a loan being repaid, decreases with increasing indebtedness. Hence, $f'(h) < 0$.

The probability of receiving dividends, following from the success of the small business, is defined as $1-p = g$. This probability is a function of:

- the professional experience and business skills employed by the manager or the venture capitalist (Keuschnigg and Nielsen 2001; Diller and Kaserer 2009), or MFI employee for our purposes. The level of advice and guidance given will depend on the proportion of equity relative to debt that the client utilizes. This advice and expertise is denoted as A .

- the effort of the equity officer (Keuschnigg and Nielsen 2001) in monitoring to induce effort. As explained earlier, the level of monitoring is assumed to be comparable across debt and equity holdings, and so can be assumed to remain constant.
- Client skill levels. The client's skill is not expected to differ with the capital structure of the microenterprise, and is assumed to be constant.
- ownership and control issues (Bagella 1997) which will be designated as O .

I define p as a function, where $(1-p) = g$, a function of various factors unaffected by h (the debt proportion) as explained above, along with the level of advice (A) from the equity officer, which is impacted by h . Here, $g'(A) > 0$ because managerial skills assist in business productivity. $A'(h) < 0$ because advice is mainly given only with equity and not with debt, as explained earlier. In addition, g is a function of the feeling of control (O) due to an equity stake. Here, $O'(h) > 0$, because a feeling of ownership is experienced more with debt than with equity, as microentrepreneurs may feel a loss of ownership when part of the business is owned by someone else through an equity investment. Furthermore, then, $g'(O) > 0$ because feelings of ownership and control motivate entrepreneurs to put in effort because they may feel a sense of pride in ownership, and this feeling and incentive may decline when there is an outside equity claim on the business and increase under debt.

Hovakimian et al (2004) explain this effect by suggesting that some entrepreneurs may choose debt instead of equity in order to keep control and ownership of their firm. Similarly, Bagella (1997) explains that equity finance may involve an "equity dilution" problem, in that the manager/owner of a small innovating firm may be reluctant to release

part of the control on his/her firm in exchange for long term financing coming through participation in the profits and in the decision process of the project. When the entrepreneur takes on equity and relinquishes some control of his or her firm, the entrepreneur has a reduced incentive to exert effort in the coordinated action of the firm. Overall, the “equity dilution” effect reduces incentives to exert effort and thereby reduces the expected value of revenues. Likewise, Chaganti et al (1995) explain that there is empirical evidence that suggests that small business owners would like to have control of strategic decisions (Shrivastava and Grant, 1985). In addition, Kotkin (1984) found that small companies sometimes avoid venture capital and equity funding because they fear losing control of their firm. However, ownership feelings may be maintained when debt is issued instead. Thus, $O'(h) > 0$, because ownership feelings are maintained when debt is obtained relative to an equity agreement. The total impact, then, of a change in h on p is indeterminate, as:

$g'(h) = [g'(A) * A'(h) + g'(O) * O'(h)]$, with the following signs:

$$g'(h) = [(+)(-) + (+)(+)] = [(-) + (+)].$$

The sign of $g'(h)$ will depend largely on the sensitivity of productivity to managerial input from equity officers as well as the sensitivity of clients to a loss of control of their microenterprises. Thus, $g'(h)$ will be negative if the effect from managerial input is larger than the impact from ownership issues, so that a larger debt portion of financing and less equity will result in a decline in the probability of receiving dividends. However, $g'(h)$ will be positive if the managerial input effect is smaller than the effect from a loss in ownership feelings, suggesting that an increased debt portion increases the probability of receiving dividends.

Relationship between h and SDI:

Here we can assume that all participants are risk-neutral. Beginning once again from the adjusted SDI,

$$SDI = \frac{U + D + X}{T[h(1+r)(1-d) + (1-h) \Pi (1-p)]} - 1 \quad (4.3)$$

Distributing the T symbol in the denominator, and substituting e for $(1-d)$ and z for $(1-p)$ the SDI becomes:

$$SDI = \frac{U + D + X}{Th(1+r)(e) + T(1-h)\Pi z} - 1 \quad (4.4)$$

$$SDI = \frac{U + D + X}{Th(1+r)(e) + T\Pi z - Th\Pi z} - 1 \quad (4.5)$$

$$SDI = \frac{U + D + X}{L(1+r)(e) + T\Pi z - L\Pi z} - 1 \quad (4.6)$$

Substituting in the functions of h :

$$SDI = \frac{U + D + X}{L(1+r)(f(h)) + T\Pi g(h) - L\Pi g(h)} - 1 \quad (4.7)$$

In order to see the impact of a change in the capital structure on the SDI, I differentiate it with respect to a change in h . Here, the quotient rule is used to determine the partial derivative:

$$SDI'(h) = \frac{\partial(SDI)}{\partial(h)} = \frac{0 - (U+D+X) (L(1+r)f'(h) + T\Pi g'(h) - L\Pi g'(h))}{[L(1+r)(f(h)) + T\Pi g(h) - L\Pi g(h)]^2} \quad (5.1)$$

$$= - \frac{(U+D+X) (L(1+r)f'(h) + T\Pi g'(h) - L\Pi g'(h))}{[L(1+r)(f(h)) + T\Pi g(h) - L\Pi g(h)]^2} \quad (5.2)$$

Now the sign of $SDI'(h)$ needs to be determined. Note that the denominator is the squaring of an expression, and will be positive. In the numerator, the expression $(U+D+X)$ is positive. Thus, the remainder of the expression in the numerator must be examined.

$$(L(1+r)f'(h) + T\Pi g'(h) - L\Pi g'(h)) \quad (5.3)$$

Since $f'(h) < 0$, then the first part of the expression, $L(1+r)f'(h)$ is also negative. The remainder of the expression is $[T\Pi g'(h) - L\Pi g'(h)]$ and can be reduced to $[\Pi g'(h)(T - L)]$, where since $T = L + V$, then $T - L$ must be positive, and Π , the rate of return, is also assumed to be positive. We then must determine the sign of $g'(h)$, as thus far we have the following signs in the derivative:

$$SDI'(h) = \frac{(-)(+) * [(-) + (?)(+)]}{(+)} = \frac{(-)*[(-)+(?)(+)]}{(+)} \quad (5.4)$$

If $g'(h) < 0$, then we have $(-)(-)/(+)$, so that the total sign of $SDI'(h) > 0$, indicating that an increase in the proportion of financing coming from debt will increase the SDI, causing an MFI to become more dependent on subsidies and less self-sufficient/sustainable. This suggests that an equity portion of finance is important in lowering the SDI, as funds are shifted from a debt portion to an equity portion for the same level of T , total financing. This also implies that a financial portfolio that includes only debt dispersions ($h=I$), is undesirable from the point of view of sustainability. The equity-infused microfinance model would be appropriate in this case. Recall that $g'(h)$ will be negative if the effect from managerial expertise is larger than the impact from ownership issues. Thus, this will only hold when the effect of ownership feelings is sufficiently small.

On the other hand, if $g'(h) > 0$, then we have $\{(-)*[(-) + (+)]\}/(+)$ and the sign of $SDI'(h)$ is indeterminate and will depend on the relative sizes of the effects. Specifically we must compare the following relationship: $L(1+r)f'(h)$ relative to $\Pi g'(h) (T-L)$.

This gives us the following two scenarios:

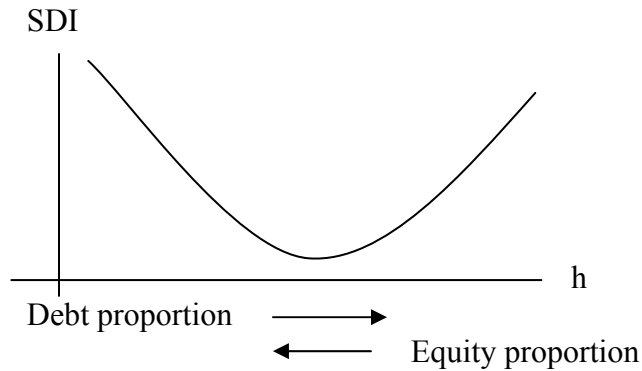
- (a.) $L(1+r)f'(h) > \Pi g'(h) (T-L)$, then the total sign of $SDI'(h)$ is positive, and an increase in the debt portion of total funding will increase the SDI, making it less sustainable relative to the equity-infused MFI model. The equity-infused microfinance model is appropriate in this case. Note that $g'(h)$ will be positive when the impact from managerial impact is smaller than the effect of a loss of ownership due to equity holdings. However, when these combined impacts are smaller than the effects of increased indebtedness, an equity-infused microfinance scheme is more applicable. This may hold in areas where the impact of indebtedness is especially high.
- (b.) $L(1+r)f'(h) < \Pi g'(h) (T-L)$, then the total sign of $SDI'(h)$ is negative, and an increase in the debt portion will actually lower the SDI and help to maintain sustainability. A pure debt model of microfinance would be applicable in this case.

Overall, in areas with relatively low sensitivity to relinquishing of control/ownership, or in areas with relatively high sensitivity to indebtedness, a switch to an equity-infused model can be effective in reducing the SDI. Using first order conditions to minimize the SDI with respect to a change in h , we have:

$$SDI'(h) = 0 = -\frac{(U+D+X)(L(1+r)f'(h) + T\Pi g'(h) - L\Pi g'(h))}{[L(1+r)f(h) + T\Pi g(h) - L\Pi g(h)]^2} \quad (5.5)$$

$$\begin{aligned}
0 &= -(U+D+X) (L(1+r)f'(h) + T \Pi g'(h) - L \Pi g'(h)) \\
0 &= (U+D+X) (L(1+r)f'(h) + T \Pi g'(h) - L \Pi g'(h)) \\
0 &= (L(1+r)f'(h) + T \Pi g'(h) - L \Pi g'(h)) \\
0 &= L(1+r)f'(h) + [\Pi g'(h)(T-L)] \\
L(1+r)f'(h) &= -[\Pi g'(h)(T-L)]
\end{aligned}$$

Replacing $T-L$ with V and minimizing the SDI, we find that minimization occurs where $L(1+r)f'(h) = -[\Pi g'(h)(V)]$. That is, the SDI is minimized when the marginal impact from a change in h on debt revenue is equal to the marginal impact from a change in h on equity revenue, within the SDI. As $f'(h) < 0$ in all cases, but $g'(h)$ is indeterminate, whenever $g'(h) > 0$, these opposing effects of a change in the capital structure must be balanced, and debt will be replaced with equity up until the point at which the marginal impacts on debt are equal to the marginal impacts from equity. This relationship can be graphed as an SDI-capital structure function, as shown below:



Whenever $g'(h) < 0$, there is an unambiguous improvement in the SDI from a movement from debt to equity provisions.

In total, the model predicts that the equity-infused microfinance paradigm will be successful in reducing the SDI, specifically in areas where the desire for ownership and control is sufficiently low. This may particularly be the case for populations which

exhibit a high degree of group and community activities. In areas already serviced by traditional group-based microfinance services, this may preserve such feelings of communality rather than fostering feelings of ownership and control. In addition, Chaganti et al (1995) discuss notions of control, using Cooper and Dunkelberg's (1986) distinction of two types of entrepreneurs: craftspeople entrepreneurs and managerial entrepreneurs. Crafters are motivated to start a business based on personal challenge and lifestyle needs, and enjoy being their own boss. However, managerial entrepreneurs are motivated towards self-employment due to pressing economic needs for a livelihood. As such, these entrepreneurs are less likely to be interested in issues of control and ownership. This suggests that micro-entrepreneurs who are in poverty may be characterized as managerial entrepreneurs and, therefore, may be relatively less sensitive to issues of control and ownership than other groups. Thus, the equity-infused microfinance model appears to both supply those in poverty with needed financial alternatives as well as contribute to the sustainability and reduction of dependence on subsidies within the microfinance sector.

Conclusion

Microfinance addresses a great need in our society. While they constitute such a large proportion of our population, the poorest people have been abandoned by large corporations along with financial institutions who fail to offer services that target their needs. This is the gap that microfinance fills by lending and structuring financial products specifically oriented towards poor small-business developers. Since the start of the microfinance revolution during the founding and subsequent success of the Grameen Bank, the models and products have changed, and greater sustainability has been achieved within the MFIs. While many attributes of the loans and terms have been addressed in order to achieve success, the capital structure and underlying incentives have not been addressed.

This thesis aims to identify the effect of infusing equity into the financial capital offerings of an MFI, specifically with respect to sustainability. I model the SDI with an additional equity portion in order to determine the impact of a change in microenterprises' capital structure on the SDI. The model indicates potential success in reducing the SDI by infusing equity when the drawback of decreased ownership is less of an issue for the small-business owner. Many of the poor small-business owners in developing nations fit this description because of their immense economic needs and less viable alternatives. They are less likely to be concerned with decreased ownership and appear to instead encourage third-party advice and investment. In this way, once offered an equity investment in their small-business, the entrepreneurs find that their capital needs are met and they are able to benefit from the increased managerial inputs from MFI officers, improving the profitability of their microenterprises. This increases the

revenues obtained by the MFI, allowing the SDI to fall and the MFI to become less dependent on subsidies.

It follows that with this newfound self-sustainability at the MFI and client level, the MFI can give more loans. Lower default rates and an improved cost of capital are achieved by accurately targeting both the capital and managerial needs of the small business developers. This enables the MFI to reach more impoverished people, which subsequently inspires other poor people to work because of the feasibility of such success. This is needed since the mission of microfinance is to guide the poor into changing their own lives by working hard, developing efficient businesses and funding their own rise out of poverty. The increased capital and sustainability that an equity offering adds to an MFI brings this mission into fruition.

Future research could extend this model in new ways, just as this model has done with Yaron's SDI. For instance, the model could be further augmented to include the effect of infused equity on wage contract incentives for the employees of the MFIs. Different wage structures could be offered to the employee in order to assure the alignment of incentives with the client, which could impact salary costs for the MFI. An equity investment would make the officer particularly responsible for the growth of any projects he or she invests in.

Throughout the paper, I have discussed theoretical support for my argument offered here— that an equity investment made directly into small-businesses on behalf of the MFI would lead to greater self-sustainability and empowerment of the poor. The next step is to implement these suggestions in an MFI in order to test viability and increased success with empirical data. That is, in order to test the theories put forth in this model, I

suggest conducting a pilot study to determine if these findings are in fact applicable in the real world. The final test of success would be in satisfying the capital needs of microentrepreneurs and simultaneously reducing the SDI of the MFI, pointing to increased self-sustainability on both parts. Thus, this model provides the basis for a new microfinance paradigm that serves both a social mission and a movement away from subsidy dependence by the MFI community.

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