

**In search of the determinants of microfinance
lending rates**

by

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Abstract

One of the most significant discussions about microfinance institutions (MFIs) concerns the apparent exorbitant interest rates they charge. Due to these high interest rates, MFIs are observed as an exploiter despite all the effort they make to eliminate poverty. Such negative views need to be verified, and therefore, more research is required to understand why these interest rates are high. This thesis studies the determinants of the interest rates in MFIs, particularly investigating the role of scale economies in controlling the higher interest rates. For that purpose, data for thirty-four large MFIs from eight Asian countries for nine years (2005 to 2013) have been used to find empirical evidence. Two approaches have been employed, replicating the Cotler and Almazan (2013) methodology, a fixed effect model (FE) for single equation estimation and three-stage least squares (3SLS) for simultaneous equation estimation. The results suggest that operating costs need to be reduced in order to control the interest rates. In addition, large MFIs are prone to achieve sustainability and efficiency more easily, thus possessing more power to exercise economies of scale that leads to lower interest rates. The outcomes of this study have important policy implications---in particular, not to restrict MFIs' growth but in fact, to support larger MFIs for they are able to reduce their interest rates. Moreover, the empirical findings in this thesis help to shed light on understanding the way microfinance operates today and suggests the scope for improvements.

Keywords:

Microfinance institutions; microfinance; interest rate; operating cost; size of MFIs; efficiency; economies of scale

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1. Introduction

Poverty is a continuous concern for which countless measures have been taken to eradicate this problem. Microfinancing is one of them. Financing to the poorest, without any collateral, is microfinance institutions' (MFIs) main priority, in addition to providing other non-financial facilities, such as financial or business start-up training plus savings and insurance facilities. The MFIs' foremost objective is to enhance social welfare by supporting the core disadvantaged population. However, these institutions are not credited as a charity for their mission---as a matter of fact, it is sheer business. MFIs are mostly non-governmental organizations (NGOs) either with a for-profit or non-profit business orientation.

MFIs often charge higher interest rates than other institutions and the reason provided is that they face a higher cost for disbursing loans to remote areas. Nevertheless, people often perceive these higher interest rates as a profit making mechanism of an MFI. The high-interest rates are of concern to governments also, who often put a ceiling on in order to protect lower socio-economic borrowers (LSEBs). Moreover, to combat the apparent situation of exploitation further, most governments have specified floors on the deposit rate, as well. MFIs do indeed ask high lending rates and offer relatively low deposit rates. The spread between these two is undeniably high and recent studies have confirmed the fact (see IMF, 2016). This government intervention forces MFIs to choose between sustainability and reaching out to the poorest. Several studies (Mersland and Strom, 2009, Cotler and Almazan, 2013) have detected this tradeoff between institutions' sustainability and their mission to serve poor with micro-loans.

This thesis studies the causes that trigger lending interest rates to be high, and to do that, it considers the relevant factors that determine these interest rate. The study also

empirically investigates large MFIs who are sustainable, efficient and have the power to practice economies of scale, which in turn have an influence on their interest rates. Considering the fact that these parameters affect the interest rate to a great deal, it is of great importance to identify a suitable method to detect their impact. Accordingly, given that scale economies negatively influence the interest rate, it is essential to ascertain the measures that influences these economies.

In this thesis, the scale economies are broken into three features: efficiency, sustainability (profitability) and size (firm and loan size). Proxies for these three are regressed against the interest rate in order to find the relationship. To conduct the investigation, a sample of thirty-four large MFIs of eight Asian countries has been collected. These MFIs hold 70% (on average) of the total microloan recipient of the corresponding country.

A database of nine years from 2005 to 2013 (the latest available) is collected from Microfinance Information exchange (MIX market). Till the date, the MIX has been the leading source available worldwide for the microfinance data since 2002, since it uses a calculation method that account for specification biases. The balanced panel data set includes operation costs, the average/gross loan portfolio (GLP), the yield on the portfolio, and the return on assets etc. for 1,158 MFIs from around the world. The institutions are selected by looking at their popularity and year of establishment, where popularity is explained by its number of active clients and size of GLP.

With the collected panel dataset of the thirty-two larger and famous institutions from eight Asian countries this thesis employs panel regression methods are employed to identify the determinants of the interest rate (or yield on portfolio) by regressing the lending rate against the cost of borrowings, operating cost, a proxy for economies of

scale, institution type (bank or cooperative or NGO) etc. A fixed-effect (FE) model is used in single equation estimation to cater for common characteristics. Three-stage least squares (3SLS) is used for the simultaneous equation model.

Nobel Laureate Dr. Yunus initiated the microfinancing concept in 1976, and from then, the project took off and has been replicated by a number of MFIs throughout the world with various modifications along the way (Armendariz de Aghion and Morduch 2010). As a result, the simple credit delivery program turned into a complex setup over time, as the institutions developed in their scales and scope of operating beyond just credit and into savings, deposit, and other facilities as well. This, however, ended up raising more questions against the provider's motives. Numerous research have been conducted over the MFIs' high rates issue, trying to prove whether this treatment is effective for the standard of living of the poor. There is no single particular answer to this, which leaves the matter open-ended.

Another related and important question often arises---why do MFIs charge higher interest rates from the lower socio-economic people? The idea of microcredit was introduced to rescue people from the exploitation of traditional lenders. One explanation is that through time MFIs have changed course and innovated more programs rather than only financing, and consequently, they employed more human capital, funds, and facilitated access to the financial services to more LSEBs. As a growing industry, it takes much capital, labor and time to be sustainable in the market for a long period. During the evolutionary period, interest rate appears to be high, however, gradually the institution adapts to the cost-efficiency via a learning-by-doing effect. Therefore, experience as defined by age of the institutions is an important factor to analyze cost and price.

The following graph shows the pricing (i.e. lending rate¹) pattern of the selected MFIs from eight Asian countries:

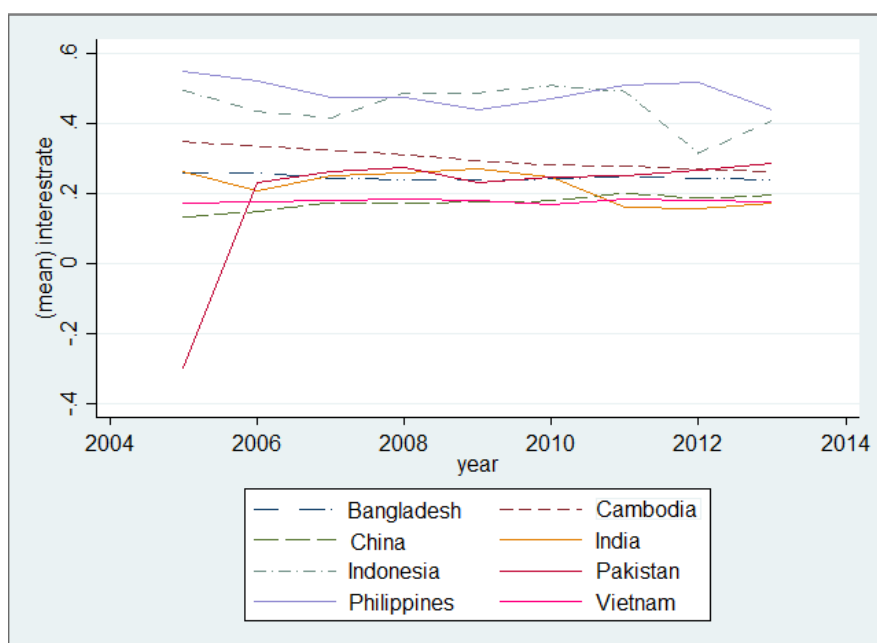


Figure 1: Lending interest rate behavior pattern

Figure 1 represents average interest rates for eight countries. Bangladesh is the oldest and thus most experienced in the microfinancing sector, therefore, the cost-effectiveness can be noticed by its steady flat line that lies around 25%, for the given time period. Vietnam shows the lowest interest rates, around 18%. The reason for this lowest interest rate is that the microfinance sector in Vietnam is mainly state-operated. India has a subtle fluctuation. After the Andhra Pradesh incident in 2010 (CGAP 2010) the interest rate declined and stayed lower around 16% from 2011 onwards. However, it is worth seeing how the MFIs are capable of reducing the lending rate despite rising inflation rates and attaining sustainability at the same time.

¹ In this paper lending rate, interest rate and price are used synonymously.

Achieving sustainability is a different matter for a traditional commercial bank than the same for the microfinance institutions, as both of the industries have a different cost structures, products and clientele. At the beginning, Md. Yunus explained that microcredit has a totally opposite concept and structure in contrast to the commercial banks. However, the model for the MFIs was in fact adopted from the traditional banking system. Previously when measuring the performance of MFIs, the influential factors were always assumed to be the same as for the commercial banks. Only recent studies have addressed the difference between these two industries operational systems, and therefore their outcomes (BI and Pandey, 2011). Only a few studies have investigated the microlending institutions' operating system, such as, operation of microcredit institution, their sustainability, outreach, and efficiency (Cull et al. 2007, Mersland & Strom 2009, Harmes, 2011), and how they set their lending rates for the LSEBs. (Gonzalez, 2010)

Furthermore, comparing these two industries (traditional banks and MFIs) may be problematical, as the transaction costs for lending large amounts is less for traditional banks compared to reaching to the poor with microfinance by the MFIs. The different clientele is likely the reason why the interest rate is higher for MFIs than commercial banks. Commercial banks work for better-off people who are in need of large finance and have collateral to offer against the loan, and hence, they charge less which is around 14% annually. On the contrary, even the most competent of the MFIs would not be able to charge that rate. Microfinance providers usually set their lending rate above 25%. This noticeable difference in rates has prompted much debate. Gonzalez (2010) designed a formula to calculate effective amounts of interest rate that would be a win-win prospect for both parties. With this formula, MFIs are able to cover their costs, plus LSEBs will also be satisfied knowing that they are not being exploited by

the providers. However, Dorfleitner et al. (2013) found that MFIs do not follow the formula while setting the interest rate, though they do use all the components one way or another.

Therefore, the factors that drive prices in MFIs cannot be the same factors as in the commercial banks. MFIs work at the grass root level---they go to the field, find potential clients, give them access to finance without much paperwork, and train them in the MFIs' regulation. MFIs reach out has made it easier for their clients to have access to the non-traditional banking system and the LSEBs' necessity has allowed MFIs to grow widely.

MFIs have thus spread across the world---at present more than 10,000 MFIs exist globally with millions of borrowers. This significant number of borrowers indicates that people do need financial aid to lift up their social status, even if only for consumption. Datar (2008) expressed that if microfinance works then poverty will no longer be persistent and all misery associated with poverty will fade away. Therefore, the research continues to check whether microfinance has achieved its desired outcomes or even has had some sort of progression towards these. Nonetheless, it is easier to ask this question than to answer it due to the fact that the methods are continuously getting updated.

If microfinance successfully beats poverty, it may suggest to some that all the poor lacks for is only financial opportunities. But since the impact of microfinancing is marginal and sometimes none in a few cases (Angelucci, Karlan, Zinman 2013), LSEBs will need more than mere financial support. Developing countries with lower income per capita have less access to the finance, and therefore, MFIs are the only organizations that turn up for all the financial services needed (such as savings, loan

and insurance, and other). Thus, people of developing countries (LDCs) are more involved in and connected with microfinance and their providers. Even so, in some LDCs, there is concern about providing clients' with adequate protection from the MFIs', often, tormenting practice when collecting repayments. In developed countries by contrast, consumer protection strongly emphasises the importance of supervision and regulation. Nevertheless, financial services are evolving fast in lower income countries despite the lack of protection and declining lending volumes. For instance, the number of ATMs and bank branches are increasing and providing faster services in LDCs.

The South Asian MFI industry grew fast in the 1990s, but in 2008, the growth was much more with the number of branches, employees and borrowers growing tremendously. By late 2010, the growth became steady and marginal. MFIs suspended expanding, perhaps due to the fact that the government-led regulating body began to intensively regulate the sector. Regulators were established to promote sustainable development of the institutions and to maintain their performance. This regulation also implied some rules and restriction for MFIs that contributed to the slowdown. Another reason could be market saturation with set targets met.

According to the Credit and Development Forum (CDF), 24 million borrowers in Bangladesh were covered by 612 MFIs in 2008, which meant half of the households in the country were active members of the MFIs. To add more members, microfinance providers started to grab other MFI members causing overlapping. Single borrowers having multiple loans from multiple MFIs led to some repayment crises. In order to fulfill their growth target, MFIs overlooked their mission to serve the poorest and added members as much they could from 2008-09. This overlapping situation caused a management crisis at numerous MFIs. As a consequence, MFIs faced the highest

level of overdue payments, and to tackle the delinquency rate, the affected institutions employed collection teams to follow up on the irregular payers. Meanwhile, they also cut down on recruitment and staff salaries and training, and improved internal controls.

Due to the poor profile of the crisis of the MFIs in recent years, external donations fell by one-third, and as a result, the MFIs had to find alternatives to survive. The progress appeared to stagnate after 2010, and instead of expanding in numbers, the larger MFIs focused on innovating new programs and sustaining themselves. In order to self-sustain, the MFIs increase their profits by charging higher interest rates, and then refinance the amount to bear the costs incurred from loaning. Therefore, checking on cost margin is of great importance for an institution. It not only gives the MFIs power to practice scale economies further, it also reduces excessive borrowing cost for the borrowers. To assess an institution's performance, a few key factors, which includes but is not limited to, cost-management skill, input-output factors, transparency of the public profile and good governance are necessary to evaluate their performance. Any improvements that foster better performance like trust building with clients leads to the MFIs performing better. To gain trust, MFIs need to be as transparent as possible.

For instance, the interest rate stated on loans is usually completely different to the amount actually paid by the borrowers, for the method they used for calculation. Some MFIs charge at a flat rate whereas others might offer a declining rate. For example, Compartamos Banco, a leading microfinance provider in Mexico, charges around 86% annually at a flat rate, which implies that if the credit is worth 1000 peso and is to be repaid in 16 weeks of installments, then the institution eventually gets 160%, more than what it says after accounting for the compounding method, VAT, and the mandatory deposit from the borrowers (Roodman, 2011). The huge difference in interest rates paid is the reason why regulators have interfered in the MFIs' operations

by capping the interest rate, so that LSEBs can be protected from any MFI's manipulative approach.

In 2010, a microfinance regulatory team in Bangladesh enforced a cap by reducing the lending rate at 27%, and a year later India also followed with a 26% cap. While these caps were implemented to ensure LSEBs' protection, the existence of a number of microlenders was jeopardized that resulted in significant underperformance of the MFI industry. This action caused great chaos in the MFI industry, and numerous small size micro banks were shut down in Bangladesh. Furthermore, it restricted the entry of new MFIs, since surviving under such clause was near to impossible unless an institution had significant capital. Government intervention may aim to improve equity but often results in inefficiency for the microfinance industry. It may turn a high rate into a more bearable one, but leads to reduced competition and availability at the same time. For this reason, India removed the overall cap in 2013, and enacted a margin cap only for large MFIs.

Cotler and Almazan's (2013) found that higher competition leads to a lower lending rate in the context of Asia. This leads to the question whether imposing restrictions that reduce competition produces healthy outcomes. If the MFIs decide to overcome the impact of such restrictions, they will simply reduce their outreach (depth²) to survive against the cap. If MFIs compromise their outreach, this will not have a useful impact on their clients as they will be excluded from MFIs' potential client list as well as from the MF benefits. The imposed cap on MFIs indicates that the price for lending can be reduced by cutting down the cost, which means not reaching out to the 10% of the poorest population (BDI, 2011). Even for a profitable MFI, the cost of capital is

² Reaching out to the poorest, does not defined by the number of the active clients.

usually at a minimum already, which means that MFIs cannot reduce their cost any lower other than re-organizing their clientele.

Economies of scale are reflected in the cost-effective behavior of the institution. Whether an MFI succeeds in increasing its output without increasing its cost, in reality such a scenario is difficult to find. However by increasing the size of the organization, the average cost per loan does subdue a little. Figure 2 shows the relationship between the operating cost ratio (OER) and firm size, which is in this case defined by initial assets (log). OER is calculated by dividing the operation cost by average GLP³.

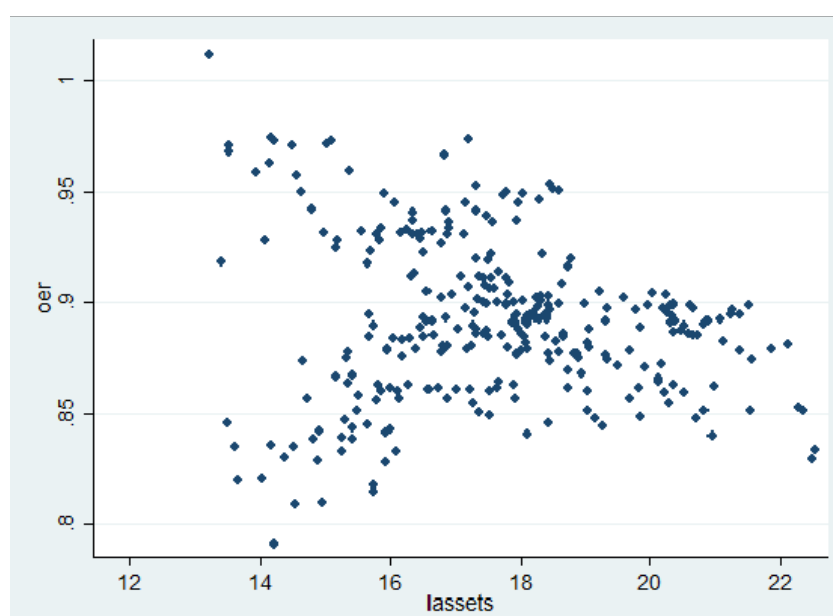


Figure 2. OER vs Log of Assets for MFIs

Figure 2 illustrates the scattered relationship between OER and firm size, and it does suggest that OER varies significantly with the MFIs size. The graph shows a likely negative association between the variables which implies that increasing firm size reduces the cost ratio. This supports the theory of economies of scale.

³ GLP- all outstanding loans including delinquency.

It also confirms that other than the competition and outreach capacity, there are few other factors as well that influence the lending rate. For instance, the size and type of the organizations are also important influences on the rate. This study investigate that aspect, apart from the interest ceiling rate set by the regulating body, asking whether economies of scale matter for deciding the lending rate. We ask whether MFIs have control, at all, over setting the interest rate. Since the impact is difficult to differentiate from the regulation exposure, only thirty-four large MFIs are considered using their nominal yield on their portfolio as a proxy for interest rates. It can be assumed that old established MFIs have the benefit of scale economies, and thus, the imposed ceiling is likely to have little or nothing to do with the lending rate charged by the large MFIs. Thereby, it will be worth investigating how influential economies of scale are in terms of determining the interest rate.

Interest rates are assumed to be a tool for increasing institutions' profit and evaluating the orientation of an MFI (whether the institution is only concerned about maximizing profit or not). Nobel laureate Dr. Yunus introduced a method to investigate the matter. Yunus' methodology classifies MFIs profit-seeking motives into three levels---green, yellow and red. MFIs falling under green means that the difference between the interest rate charged and cost of funds is less than 10%, which implies that the MFIs are less into profit making, and thus more into poverty reduction. Being in the red zone indicates that the MFI mission has drifted from being poverty-focused to a sheer profit-maximizing business. Yellow is in between. Gonzalez in his MIX data brief (2010) analyzed the interest rate premium against Dr. Yunus' proposed methodology. He questioned the method as it simply cancels out a number of influential factors. For example, MFIs with low average loan sizes (which also defines outreach) end up in the red zone which can be misleading.

Numerous researchers have argued that the effective interest rate or the effective annual percentage rate is a more accurate measure of the interest rate as it accounts for all aspects, such as opportunity cost, other hidden costs, etc. However, CGAP pointed out two ways of measuring the interest rate, either by taking a proxy of the interest yield on the portfolio or the annual percentage rate (APR). APR usually gives another perspective---the actual price paid by the borrowers. APR counts not only the interest rate but the time and expense that clients spend for attending weekly meetings at the branch office, plus any cash flows associated with the loan such as hidden charges or late fee etc. For example, a compulsory average deposit of US \$ 0.85 per week in Bangladesh. MFIs in their reports rarely file APRs as an indicator of the actual cost of borrowing, and subsequently, it is difficult to get the data for APR.

Nevertheless, this thesis is not focused on the microloan client's point of view, and therefore, the APR is not considered here. Instead, the yield on the gross portfolio is used---the total income from the loan as a percentage of the average gross loan portfolio, including other fees and charges.

The effective interest rate is another measure of the interest rate that shows how effective the rate is in terms of sustainability of an MFI. This thesis is based on MIX market data, and hence, the interest rate method is selected according to availability. As a result, the yield on the gross portfolio is used as a proxy for the interest rate.

In the literature, few studies searched for the determinants of interest rates. The interest rate has been employed in several studies, but only to assess the financial or social performance of the MFIs. These studies examined the performances of the organizations, not to understand their pricing structures. This thesis fills that gap by investigating the determining factors of interest rates charged by MFIs. This

investigation is important for future study due to the fact that it also helps to understand LSEBs behavior as well, because a sustainable business must consider its clients satisfaction.

The study finds similarity with some other large sample studies (e.g. Zacharias 2008, Cotler and Almazan, 2013, and Dorfleitner et al. 2013) showing that efficiency does play a significant role in determining the interest rate. The size of the MFIs also shows a positive relation with the dependent variable. This indicates that economies of scale have an influence over the lending rate and proves that the bigger the institution the lower the average cost of loan, thus lowering the price.

1.1. Outline of the study:

The thesis has seven sections. Following this introduction section, the second section presents a literature review where the findings of other studies are reported along with the methods, results and case studies. It also contextualizes the importance of this research. Basically, Section 2 comprises of a theoretical and empirical review of the issues of this study, and reviews the hypothetical and empirical tests of the factors that determines the interest rate of MFIs. One of the important contributions of this chapter is that it sums up all the key factors of the existing literature and uses these to find one major aspect of MFIs---the price they charge on loans. In the literature, there has been analysis about sustainability, efficiency, outreach, competition, and profitability, and also the relationships among sustainability, outreach, profits and operating cost. However, to author's best knowledge, no study combines all these factor to obtain the holistic view. This thesis compiles these factors and observes how interest rates respond to them.

Section 3 points out the four hypotheses this thesis is going to test.

Section 4 interprets the data and models used in this chapter. It consists of the description of the data used, descriptive statistics of the data (charts and tables), an explanation of the data sources, and the methods used to analyze the data.

Section 5 analyses the results, obtained from applying the data to the model in estimation. This section also explains what the results implied for the hypotheses discussed in section three. It provides checks for the rationales from the existing literature presented in Section 2. Each of the objectives of the thesis is analyzed empirically and tables or charts are used for a better understanding. In short, it interprets the results and relates them to the problems or hypotheses formulated in this study.

Section 6 explains the policy implications of the results.

The thesis concludes in Section 7 which summarises the whole study, the problem, results, the shortcomings or limitations of the study and the future scope for study in this area.

2. Review of the literature

2.1. Context

Asia is a diverse continent in terms of economic behavior, culture and so on East Asia performs better economically compared to South Asia, which has some catching up to do. Although China and India has shown remarkable economic growth, Asian countries as a whole have the highest rural poverty rate following Africa. In recent years, poverty has impressively declined in Asia and to some extent, the credit goes to microfinance since it finances the most disadvantaged people of the remotest areas. There have been several studies in the literature such as Mersland and Strom (2009), Cotler and Almazan (2013), Dorfleitner et al. (2013) that have used large worldwide datasets --for their research in microfinance. In contrast, this thesis focuses intensively only on South and East Asia

Bangladesh is the pioneer country for microfinancing. Dr. Md. Yunus implemented this microfinancing concept to help out deprived people who were suffering because of the liberation war in 1971. Microcredit is regarded as an important measure to control poverty. The microcredit institutions have grown to become an industry of its own. Most of the lending institutions are operational non-governmental organizations (NGOs), working as intermediaries who develop and provide different microfinance programs such as microloan, micro insurance, micro deposits, micro savings and much more. MFIs are also profit oriented, issuing IPOs in the market (e.g. Compartmos Bank in Mexico, Spandana in India etc.)

Poverty is one of the challenging issue to deal with, Microfinance institutions (MFIs) were created with a view to solve the problem by providing financial and non-financial assistance to the lower socioeconomic segment of the population. However, the

increasing principal amounts, and the charging of exorbitant lending rate suggests otherwise.

The recent suicide case of farmers in Andhra Pradesh, India, has heated up the controversies regarding the impact of micro-financing on social and economic indicators. CGAP (2010) analysed the causes of the incident and found that the MFIs internal management crisis in 2005-6 (i.e., poor governance, unethical ways of repayment collection etc.), the rivalry⁴ between competing MFIs and self-help groups (SHGs)⁵ and political pressure were the nontrivial reasons for that occurrence.

2.2. MFIs in Operation:

In this section how MFIs manage their costs and control risk-of-default through different approaches are explained. MFIs share their cost of funding and operation with lower socio-economic borrowers (LSEBs) by imposing high interest rates in order to maximise their profit to cover the funding cost as well as the cost incurred from operations. Moreover, as the LSEBs do not deposit any collateral, the risk of not paying back the institutions is high. Accordingly, MFIs take necessary measures such as targeting women clients and the group method of lending to reduce the default risk.

2.2.1. Managing costs and default risks:

Lower socio-economic borrowers are perceived as victims of the MFIs rather than as benefit gainers due to the high cost of borrowing. However, the higher cost of borrowing is equally an issue for all parties in the chain. As MFIs face a higher cost of

⁴ All the MFIs and SHGs have taken up each other's clients and urged them to take multiple loans from multiple sources

⁵ SHGs: Bank linkage finance program, 10-20 people in a group take loans from commercial banks.

funds themselves, and consequently, distribute the burden among all the LSEBs, which worsens their circumstances even more. In support of MFIs inability to reduce expenses Cotler and Almazan (2013) found that 90% of the MFIs have almost 0% cost of capital on average, which implies that most MFIs have hardly any possibility to reduce their costs. Therefore, increased costs are implied onto the poor who face difficulties in paying back their instalments (covering interest rate, and other fees such as compulsory deposit rate, transportation costs etc.). In order to secure the weekly instalments, MFIs select those clients who may not be in a position to offer collateral against the loan but have something (i.e., a small piece of land, hut or cattle) to offer instead, in case there is a default.

MFIs are not only considered a necessary implement for poverty elimination, but for reducing gender disparity as well. 95% of microloan clients are vulnerable rural women who have almost no alternatives to lift up their socioeconomic circumstances. According to Mersland et al. (2009), MFIs do not target women borrowers to empower them, but rather to achieve a lower default risk. Using data of 330 MFIs across the globe, the authors find a negative association between women clients and default risk. Thus, women are targeted as they are more prompt and reliable in payments (Micro Summit Report, 1997⁶) and it has been evident that women have utilized the loan money in productive ways and proved to be worthy clients for their cooperative nature with the MFIs. Nonetheless, they rarely fail to meet deadlines enabling MFIs to attain higher repayment rates.

Another approach to reduce default risk, as well as the monitoring cost, is the group method of lending. Grameen Bank in Bangladesh initially introduced the group lending

⁶ <http://www.microcreditsummit.org/>

method so that peer pressure does the monitoring without requiring staff members to do it, hence reducing the monitoring expense (i.e., frequent staff visits to enquire about the repayment). In addition, lending within a group creates group liability-that leads to checking the non-repayment issue which resulted in reducing the risk. Also, Armendariz and Morduch (2007) added that voluntary group formation leads to select lower-risk-profiled members, which alleviates the adverse selection problem.

An MFI's size and credibility depends on the size of its initial assets, the number of active borrowers and depositors and its ability to reach out to a great number of poor people in the remotest areas with their microfinance programs. MFIs expanded worldwide dramatically in a number of branches and clients in between 2005 to 2008⁷. Microlenders are more concerned to increase the number of active members. Hence, the background of the borrowers are not verified in a number of a situation, and as a result, adverse selection and moral hazard took place, which undermined portfolio quality, as Stiglitz and Weiss (1981) explained. In other studies, Godquin (2004) and Madajewicz (2011) supported Stiglitz and Weiss theory and suggested that joint liability through group lending is a key solution to this problem.

Then there is village banking, where all village borrowers are managed by one branch, which is much more cost effective compared to individual banking. Individual banking is preferable to borrowers as it involves an intensive borrower-lender relationship, whereas lenders do not appreciate this banking due to its high cost. Individual banking is expensive as it deals with reaching the bottom level of the poorest population individually as in a traditional banking system. However, based on Cull's et al. (2007) investigation on 124 institutions in 49 countries, noted that MFIs with a group-lending

⁷ CGAP Focus Note, 2013

model are switching to an individual-based model because of its larger-sized loans that achieve financial self-sufficiency for microloan institutions. The authors found that individual-based institutions tend to experience a positive relationship between profits and the depth⁸ of outreach to the poor; on the other hand, they found a trade-off between the scale of outreach and the depth. However in this thesis, the lending method has been relaxed, while the depth of outreach is measured against the interest rate, and depth can be defined by the size of loans, as a large loan size indicates less poor borrowers.

2.3. Performance of MFI:

The most debatable issue regarding MFIs is that they charge exorbitantly high lending rates, which is less than the local money lenders but much higher than commercial bank rates. Previous studies on microfinance often employed the interest rate as an important tool for studying MFIs performance, either financially to deal with the institution's cost management system (i.e. profit, efficiency, outreach and so forth), or socially to measure the social impact. As this thesis analyses MFIs financial performance with respect to the lending interest rate, the survey is based on the determinant factors of the interest rates.

2.3.1. Social performance of MFIs:

Despite having access to finance, microfinance does not show many impressive results regarding LSEBs welfare. Banarjee, Dufflo, and Kinnan, (2009) observed that most of

⁸ Breadth of outreach—how many clients are being served?, and depth of outreach—how poor are the clients? (cgap technical guide)

the LSEBs do not spend money on income generating sources; in fact, borrowers with less propensity for business end up spending more on non-durable goods compared to those with some business experience.

Banarjee et al. (2009) and Karlan and Zinman (2011) used a randomized controlled approach. Banarjee and Dufflo (2009) employed a randomized evaluation of microcredit data, to compare the beneficial outcomes between the control group and the non-control group. To conduct this research they draw a sample from 104 slums of India and observed that only households with a business background utilized their loan efficiently and benefitted from it. Other than increasing business investments, microfinance has not had any effect on health, education or women empowerment. The randomized controlled trial (RCT) approach has become a most effective way for analyzing the effect of microcredit on development indicators, and the approach has been adopted for global analysis. For example, Karlan and Zinman (2011) employed the same approach for Mexico and found small effects of microfinance on social welfare.

Angelucci et al. (2013) investigated the impact of MFIs at a 110% annual percentage rate (APR) in Mexico. The authors used clustered RCT data and found that the expansion of group lending at 110% APR does lead to some positive effects with hardly any harm to the micro-borrowers.

2.3.2. Financial performance of MFIs:

The lending rate has been used to estimate the financial performance of the microcredit institutions. Although the MFIs used to operate primarily based on government and foreign donations, the institutions now opt to be self-operating by

recycling their profit. Using these profits MFIs have expanded across the world and have become self-sustained without much external support. Higher profits are achieved from higher interest rates charged to LSEBs, without considering the consequences.

In order to examine the sensitivity of LSEBs towards higher interest rates, Dehejia, Montgomery and Morduch (2007) examined a different aspect of interest rates along with improved financial performance. Their article investigated how the demand for credit varies with interest rates. For conducting this research they collected data from an NGO- MFI called SafeSave. The reason for selecting this institution is that it charges different interest rates in three different branches, and therefore the authors were able to find the better results from the response of the clients in terms of different interest rates in these three branches. After twelve months of observation, they find that LSEBs are more sensitive towards changing interest rates and their sensitivity lies between -0.73 to -1.04%, which means if the interest rate increases 1% then their demand for loans goes down by between 0.73% and 1.04%. In addition to that, four years are required to recover and reach the original state before the changes happened.

Although the paper did not consider individual income levels, it is evident that there is a heterogeneous impact of the interest rate on clients' demands for loans. Higher interest rates filter out clients with a genuine plan as they are aware of their limitations, which resulted in adverse selection. As a result, borrowers who are desperate to have money at any cost line up for the loan. Therefore the MFI experiences that even with the higher cost of borrowing, a number of clients will accept high rates, as long as they have access to smaller and frequent loans that offer a flexible loan policy.

Operational cost of MFIs:

Microfinance institutions have a greater influence on poor households. In the case of Bangladesh that has a high-density population, only 31% adults have formal banking access and one-third have none (World Bank Findex Database, 2014). In this lower or no access situation, MFIs take every necessary step to provide microloans to the deprived people and reach to the remotest area, which is costly and time-consuming. Thus, the emerging higher transaction costs often act as a barrier against its mission to serve the poor. Roodman and Qureshi (2006) suggested a negative association between loan size and transaction costs---the smaller the loan the higher the transaction cost. This is the reason why commercial banks refer to this microfinancing as a poor idea. The authors found that the transaction costs of an MFI are covered from the higher interest rate charged, which consequently, motivates MFIs to either increase the loan size or to charge extremely high-interest rates in order to sustain the institution and perform well financially. This thesis looks deeper into the sustainability (profitability) and interest rates relationship.

Sustainability and reaching out to the poor do not necessarily follow the same direction. In fact, if an MFI is more concerned about its sustainability, it will aim to reduce the risk of default as much as it can. Therefore the MFIs target only the moderately poor who lie on the upper column of the below poverty line (Hulme and Mosley, 1997, Olivares-Polanco, 2005). In order to reduce increasing, operational costs, MFIs will select the better-off poor who have the capacity to repay a relatively larger loan. In addition, MFIs that are too much into sustainability stick with fewer programs that have a larger group impact beyond a direct one. Hartarska et al. (2010) proves the existence of the trade-off between sustainability and outreach by using a structural approach on 989 annual MFI observations. However, there are also a few

studies that stand against this trade-off and find no significant relationship (e.g. Hishigsuren, 2007 and Makame, 2008).

Microfinancing appears to be a profitable business, and so all sizes and kinds of MFIs started to grow in the market, until the government capped the interest rate in some countries. It is difficult to reduce the costs for these new entrants, and as a consequence, they exit from the market leaving those MFIs who have enough funds to survive through the adversity. Large funded or capitalized MFIs are capable of exercising market power, survived and eventually reduced their interest rates. Petersen and Rajan (1995) found evidence in their study that market power large amounts of capital used for lending for a definite time period until it exercises the power---causes interest rates to fall. They found that more market power leads to more possibilities for smaller enterprises to get grants for loans, which reduces the interest rates. However, the authors conducted this research on MFIs' that funded small enterprises and not on the individual LSEBs, in general. Also, the authors introduced a different approach of lending, which is called relationship-lending. Most MFIs invest in building relationship lending, because they gain more market power. Boot and Thakor (2000) also observed a negative association between relationship-lending and interest rates, since the relationship prevents competition (Marquez (2002)). McIntosh and Wydick (2005)'s reported against this competition-led lower interest rates. They found that competition actually triggers more risk-of-default and therefore, causes higher interest rates. Cotler and Almazan (2013) examined the methodology that had been used for this conflicting result and observed that not only the methodology, but also the very definition of the market power were the cause for these different outcomes. Moreover, the characteristics of the borrowers and lenders had an important role in selecting the lending rate.

As MFIs operation costs are significantly high, this justifies their reason for charging a high price (the interest rate) from LSEBs. Researchers have studied the effect of costs by investigating the cost structure (like, what influences cost) that encourages higher lending rate, in addition to, whether the cost reduction goal hinders the mission of an MFI. Cuellar (2012) adopted the traditional banking model (a replication of the Ho and Saunders (1981) model) to study the factors that drive MFIs cost margin⁹. The cost margin causes a drop in the interest rates. According to Allen and Santomero (1997), the financial margin is the work that MFIs do, i.e., microlenders work as intermediate body where they collect deposits and channel the funds. Determining the financial margin is complex. Nevertheless, Cuellar (2012) performed an empirical study by subsampling two groups of average loan size below and above 300 USD using a random effects panel regression model over a nine year time span. The study suggested that a small loan does engender a margin and the paper found that the operational cost is an important determinant that influences the margin to a great deal. Cotlar and Almazan (2013) also observed the relationship between cost and interest rates using unbalanced data on 1299 MFIs and reported that the interest rate moves along with the funding cost in the same direction. The authors also took a proxy for competition to investigate how interest rates behave when there is a competition.

Dorfleitner, et al. (2013) studied what determines the interest rate in the MFI sector. They examined the impact of cost factors, gender, regulations, lending methodology and organizational type on microcredit interest rates. For the study, a total of 712 MFIs' data were analysed for the time span of 2002-2011. The literature considers operational cost as the most important factor that drives interest rates. MFIs appear to use interest rate revenue to cover their expenses. The paper also concluded regarding

⁹ Cost margin is the difference between expense and income divided by MFIs' total assets.

the MFIs use of the Rosenberg (2002) model for computing interest rates and found that MFIs do not actually follow the formula but incorporate all the components into determining their effective interest rates. Therefore, it cannot be tell if the MFIs using the right measure to calculate the effective interest rate.

Profit-maximizing behavior of MFIs:

Rosenberg et al. (2009) and Gonzalez (2010) observed that MFIs earn more profits than a commercial bank but the results do not suggest any influence of profits on the interest rate. Cull and Morduch (2007) in their study investigated the trade-off between outreaching to the poor and the institution's profitability. The authors found that a higher interest rate increases profit for microcredit organizations. This also implies that MFIs do have control over the interest rates, and attaining a profit goal can be a reason for higher interest rates other than the cost factors.

To increase profit, MFIs aim to control costs and therefore, they often choose the group lending method, which at the same time also mitigates adverse selection and moral hazard issue. Ahlin and Townsend (2007) and Cassar et al. (2007) theories and empirically found evidence that joint liabilities work cost effectively for the organizations. However, when Cull and Morduch (2007) examined how interest rates impact an individual, solidarity group and village banks, based on a total of 124 MFIs from 49 countries, they found that village banking and solidarity group banking incur losses by -0.08 and -0.05 %, respectively, after all the revenue and expense calculations. While individual model based lenders earn positive returns barely by 0.01%, Individual banking may earn profit but performs poorly on the outreaching aspect. Thus, there is a trade-off between profit earnings and reaching to the poor, which is higher in the individual lending-borrowing method.

Individual lending may earn positive returns but it does not fulfill the objectives of an MFI, which is to serve the poorest. For that, Marsland and Strom (2009) added governance on investigating the financial performance of the MFIs. They used panel data based on 278 organizations from 60 countries and included competition and an internal board auditor as a proxy of governance and effective interest rates for analyzing the financial performance. The finding suggested that financial performance improves if there is a well-informed internal auditor, local director, and a woman CEO. Furthermore, there was no difference in performance of non-profit organizations and shareholder firms. Hartarska (2005) also studied financial performance and governance using a survey from three rated and unrated MFIs of Eastern Europe. Their results suggested that a higher return on assets (ROA) is possible with an independent board (except employee directors).

Interest rates and for-profit or non-profit orientation of MFIs:

The aforementioned studies clearly indicate that MFIs' type and ownership have an important role to play on their financial performance. Therefore, the interest rate has different impacts on different types (e.g. NGO, NBFi, Bank etc.) of the micro-credit institution. For example, Roberts (2013) examined whether for-profit MFIs are more effective in terms of performance. The author analyzed the interest rate in relation to for-profit organizations' profitability and sustainability. It was observed that profit making banking relies on higher interest rates, which is always criticized despite the fact that such organizations have higher costs too. He pointed out that profit corresponds to the size of an MFI which is responsible for MFI's efficiency in terms of reducing the interest rate (*ceteris paribus*). Marsland and Strom (2010) indicated that

a MFI should cut down its lending costs per client rather than getting into commercialization.

Numerous studies have attempted to explain the competition in determining financial performance of different types of MFIs. Along with the higher interest rates, mission drift is also a highlighted subject for researchers, as MFIs who are concerned about their sustainability and profitability tend to change in their priority. Barquero (2012) studied the impact of competition within the context of non-profit and for-profit microfinance institutions. The investigation was based on 379 micro banks' data from the year in between 2002 to 2008. The study explained the impact in three phases. First, it captures the pressure of competition by investigating the share of microloans issued by the for-profit microloan banks. Then, the author pointed out the environment in which an MFI develops and lastly, he checked for robustness. By doing so, he discussed the determinants of the interest rates, and the portfolio quality was defined by the portfolio-at-risk (PAR). One model explained interest rates where he considered the difference between the interest rate cap imposed by the regulators in one country and the actual rate charged by an MFI of the corresponding country. The second model was focused on the outstanding loans, also known as PAR. This comprehensive study provided evidence that only for-profit MFIs are sensitive to changes in concentration and perform well compared to non-profit organizations. As a matter of fact, profit oriented MFIs charge a lower loan rate, indicating an improved PAR in a competitive market.

Size of MFIs and interest rates:

Microfinance institutions are growing rapidly in developing countries as it is a commercially profitable sector. The positive point of the growing competition is that it

stimulates MFIs to perform efficiently at a lower effective interest rate. Mersland and Strom (2009) investigated the relationship between competition and effective interest rates. The authors' aim was to check whether MFIs are capable of charging interest rates at any level to gain higher profit. To conduct this research, they pooled panel data from 405 micro banks worldwide and re-ran the Panzer and Rosser revenue test. Although the evidence did not support the idea that MFIs can charge whatever interest rate they wish, MFIs do have monopolistic power to some extent. The reason MFIs cannot and will not charge very high rates is because of the lower cost of entrance in the market. This makes the market competitive, and as a result, prices are fixed based on its marginal cost. Additionally, Allen and Rai (1996) employed a stochastic cost frontier approach for small banks and found that large organizations lower their lending rates to keep up with the marginal cost pricing. This result indicates that the size of the organisation play a role. Moreover, interest rates vary with different size of MFIs. Further, Caudill et al. (2009) concluded that experience is equally important with a learning-by-doing effect that makes micro banks more cost efficient based on one year sample from Eastern European and Central Asian countries.

According to Roodman and Qureshi (2006), the interest rate could be measured by the gross portfolio yield (GPY), and they found that half of the individual lenders and village banks charges more than 41.7% and 48.9% interest rates, respectively. In this thesis, interest rates are defined by the nominal yield on the gross portfolio.

While surveying the relevant literature, it is evident that all the studies used almost the same variables but had a different definition. For instance, Zacharias (2008) in his article titled '*An investigation of economies of scale in microfinance institutions*', used gross loan portfolio (GLP) and average loan size to describe the size of the institutions,

and OSS¹⁰ and ROA¹¹ for profitability, while Cull et al. (2006) used portfolio at risk and loan size as the determinants of profitability. Also other studies consider total assets as a proxy for MFIs size including this thesis. Considering different proxies for the same indicated variables may have prompted differential outcomes, which is why the matter of evaluating microfinance and MFIs remains inconclusive. Therefore more research can add more information on the matter.

The determinant factors of interest rates vary with different types of MFIs and cross country economic situations. All the past studies were conducted on a broader scope taking larger samples. However, this thesis selects only one continent and a smaller sample size of 34 MFIs to conduct the research. This thesis answers what are the factors affecting the lending rate for these thirty-four MFIs, what causes their interest rates to change, is the stated interest rate for earning a higher profit or to cover the cost and where do economies of scale stand on influencing the interest rate charged.

¹⁰ Operational Self-sufficiency

¹¹ Return on Assets

3. Hypotheses

Hypothesis 1 (H1): Operation expense is the most influential factor in determining the interest rate.

The interest rate charged must count towards the expenses that are incurred from loans disbursed. Operation expense arises from the labor-intensive microlending activity and the cost is mainly covered by charging a sufficiently high interest rate. Other studies have found that this expense constitutes the main determinant of MFI interest rates (Dorfleitner et al. 2013). Ahlin et al. (2011) concluded that competition drives operation cost down (by removing any non-competitive margins), thus reducing the interest rate. It is worth finding the important factors that mostly control the interest rate so that the rates can be properly regulated and supervised.

Hypothesis 2 (H2): Larger MFIs charge a lower Interest rate.

Size and scales matters in business, and this also applies to the microfinance industry. Large MFIs may experience large costs but the average cost of lending is often lower. This is in essence the theory of economies of scale and diseconomies of scale. Lower operation cost leads (in a competitive environment) to a lower lending interest rate and this thesis investigates whether the interest rate charged varies with the institution's size.

Hypothesis 3 (H3): Small loans lead to higher interest rates.

Smaller loans incur proportionately higher transaction costs compared to larger loans. Microloans are ubiquitous for rural and disadvantaged people, and to servicing these loans to the remotest parts leads to ever-increasing cost (Paxton, Graham, and Thraen, 2000). Also, Cull et al. (2007) considered the participation of a poor clientele with small sized loans and found that MFIs with individual lending mainly provide bigger loans to secure their sustainability. Hartarska, Shen, and Merslan (2013) also added that larger loans appear to be cheaper to administer. This result implies that the MFIs struggle with rising costs, and therefore, they control the loan size to keep a lower interest rate. However, Ngo, Mullineux, and Ly (2014) found that larger loan sizes incur higher loan costs. Usually, the relationship between loan size and interest rate is expected to be negative; therefore, testing this hypothesis will be informative.

Hypothesis 4 (H4): Scale economies influence interest rates.

If an institution is big enough and efficiently handling its cost then it is likely that the institution has economies of scale. If this is so, does this benefit have any impact on the interest rate charged? Zacharias (2008) in his investigation of economies of scale in MFIs using an analysis of covariance regression model, observed that scale economies exist across firms. Ngo, Mullineux and Ly (2014) noted that large MFIs are capable of achieving efficiency, sustainability, profitability as well as outreach, which all indicate scale economies. If it can be said that the size of the MFIs indicates efficiency and sustainability (profitability), analysing whether or not economies of scale have anything to do with the rate that MFIs charge; is worth doing.

4. Data and Methodology

4.1. Overview:

In this chapter, the methodology used for testing the main hypotheses will be explained. The data that will be used in the study are also outlined, showing the descriptive statistics, charts and graphical presentations. In addition to these, the data collection sources and the method of data collection will be outlined in order to inform on the reliability and validity of the results.

4.2. Data collection

Most of the previous studies have been done on worldwide data with large sample sizes (Dorfleitner et al., 2013, Cotler and Almazan, 2013, Hartarska et al., 2013), whereas, this thesis focuses on MFIs in one specific continent, Asia¹². The reason for being so specific is to look for the impacts only for the selected region to get a better understanding, without too many cross-continent complications (i.e. difference specification bias). Further, data from many organisations in developing nations is not accessible; therefore only MFIs with higher number of active clients and old establishments have been selected. All annual data were collected for the nine year time period (from 2005 to 2013) from MIX Market. Interpolation is done to reproduce the missing data by taking reference from known data points.

The Mix Market addresses all the differences of the provided financial data by each MFIs and checks whether the definition and methodology of the reported variables are the same across the institutions, thus, making this a reliable source. MIX data facilitates conducting an in-depth analysis. All the data for financial performances are

¹² East Asia and South Asia are selected to represent Asia in this thesis.

on a yearly basis, variables such as GLP, average GLP, total assets, cost of funds, OE, OSS, ROA, ROE, LLR, profit (loss) etc. This available information made the empirical research 50% easier. Now all is to do is to find an appropriate method that produces unbiased and consistent result.

Balanced panel data were collected over a nine year time period from 2005 to 2013 for the following countries:

Table 1:
The Database

| Countries | Number of MFIs | Percentage |
|-------------|----------------|------------|
| Bangladesh | 8 | 23.53 |
| Cambodia | 4 | 11.76 |
| China | 3 | 8.82 |
| India | 4 | 11.76 |
| Indonesia | 4 | 11.76 |
| Pakistan | 4 | 11.76 |
| Philippines | 4 | 11.76 |
| Vietnam | 3 | 8.82 |
| Total | 34 | 100.00 |

Table 2: Frequency of types

| type | Freq. | Percent |
|--------------|-------|---------|
| Bank | 36 | 11.76 |
| Cooperatives | 18 | 5.88 |
| NBFI | 81 | 26.47 |
| NGO | 162 | 52.94 |
| Other | 9 | 2.94 |
| Total | 306 | 100.00 |

The MFIs are chosen based on either highest number of active clients in the country or availability of the required information. Only the large MFIs provide data on regular basis, therefore, it can be said the selected MFIs are amongst the largest in the country. Each of the organisations covers around 5 - 7 million of the total population of the country. However, very limited few MFIs upload their updated financial data in the MIX Market, which is the reason for selecting only 3 and or 4 MFIs for each country. Only one (TYM Fund in Vietnam) of the MFIs in the sample is categorized as 'other' in Table 2, but this MFI reflects the same operating style. TYM Fund is a financial institution that facilitates all the services that an MFI provides to its clients. In fact, TYM is the first MFI registered in Vietnam and allowed for savings mobilization. TYM operates from government and international funds and closely regulated by the state bank of the country.

4.3. Model:

4.3.1. Individual estimated model:

$$Y_{it} = \alpha_1 + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \beta_5 X_{5it} + \beta_6 X_{6it} + \beta_7 X_{7it} + \beta_8 X_{8it} + \beta_9 X_{9it} + \partial_i + u_{it} \quad \dots (1)$$

where,

Y = Log Interest Rate

X_1 = OER

X_2 = Cost of Funds

X_3 = ROA

X_4 = OSS

X_5 = Log Size of MFIs

X_6 = Avg. Loan Size;

X_7 = LLR

∂_i = Unobserved heterogeneity fixed-effect

Given the endogeneity of the return on assets, we will include in the estimation

$$ROA = f(\text{Interest rate, OE, GLP, Loan Loss Provision, Age, Cost of Fund, Cost per Borrower}) \dots(2)$$

where, $ROA_1 > 0, ROA_2 < 0, ROA_3 > 0, ROA_4 < 0, ROA_5 > 0, ROA_6 < 0, ROA_7 < 0$

Table 3: Definition of the variables.

| Variable | Description | Expected sign |
|----------------|--|---------------|
| Lending Rate | Yield on gross portfolio is financial revenue from loan portfolio divided by average GLP | |
| OER | Operation expense ratio, which is operating expense divided by avg. GLP or avg. total asset of the MFI | $\beta_1 > 0$ |
| Cost of Funds | Financial expenses divided by either avg. assets or GLP | $\beta_2 > 0$ |
| Loan Loss Rate | % of loan assets that MFI loses each year/ avg. outstanding loan portfolio | $\beta_7 > 0$ |
| ROA | Net operating income divided by avg. asset | $\beta_3 > 0$ |
| OSS | Operating revenue/ all the expenses including impairment | $\beta_4 > 0$ |

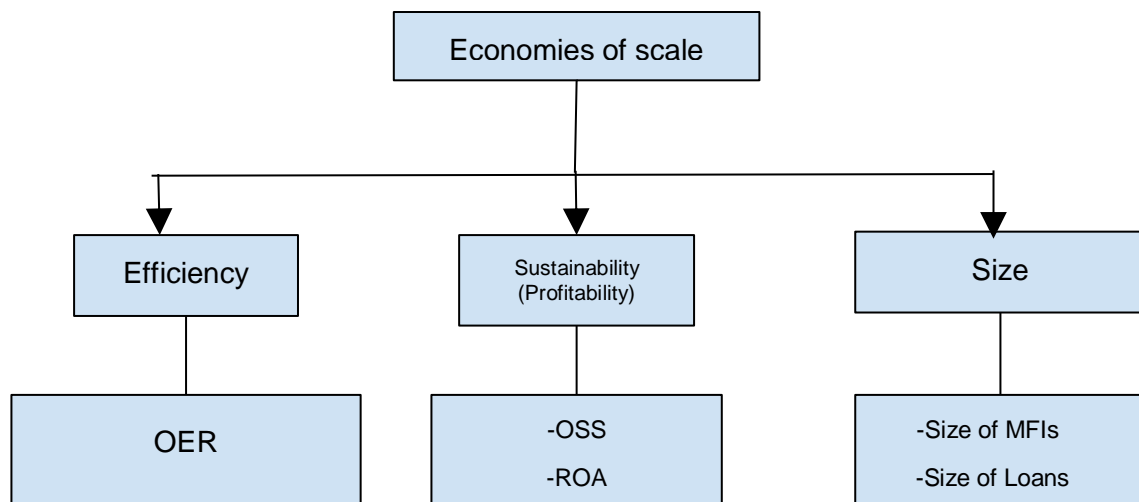
| | | |
|----------------|--|---------------|
| | losses. 1 indicates the MFI is self-sufficiently operating. | |
| Size of MFIs | Log of total assets of an MFI | $\beta_5 < 0$ |
| Avg. Loan Size | Measurement for outreach (depth) also. Derive from gross amount of loan outstanding/ number of active clients. | $\beta_6 < 0$ |
| Country | Dummy variable | |
| Types of MFIs | Dummy Variable | |

Source: MIX Market Data.

4.4. Variables

This thesis investigates whether economies of scale have any influence on determining interest rates in the micro lending institutions. For this investigation, Economies of scale have been divided into three parts, as follows:

Chart 1: Flowchart of the variables



4.4.1. Efficiency:

An efficient organization refers to how good the organization is in managing and controlling its operation costs (CGAP 2013). OER is considered a common indicator of defining efficiency. Lower OER indicates a higher efficiency of an institution. The ratio varies with the portfolio size, loan size and staff salaries or total assets (only if the formula uses average total asset instead of average GLP).

As a proxy for efficiency, the average cost per loan (OER) has been used here. The variable includes all the administrative and personnel expenses. The formula for OER is:

$$OER = \text{Operational expense} / \text{Average GLP}$$

In order to facilitate comparison, in most of the cases average total assets are appropriately used in place of GLP. For instance, a smaller loan size or a distinct number of MFI programs affects the loan portfolio, which can affect the real efficiency of the institution compared to others. However, because of the small database, using GLP does not make any difference and suffices the purpose of this paper

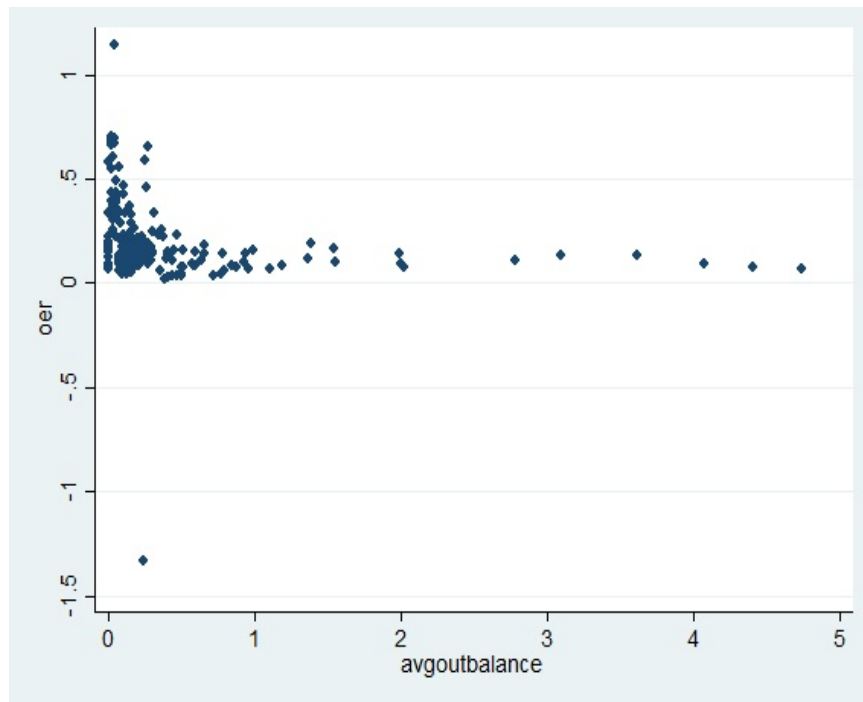


Fig 3: OER vs Avg. Outstanding Balance (proxy for Average. Loan Size)

Fig 3 shows the relationship between the operational expense ratio and the average outstanding balance (GNI per capita), which is proxy for loan size in this paper, and as smaller loan indicates poorer borrowers, therefore it also defines outreach depth. The observations for average loan size appear to cluster between 0 to 1, however, it can be seen the trend is downward, meaning OER declines with the increasing size of loans up to a point (1.5 of X-axis) when it became steady.

OER is smaller for larger loans compared to smaller loans. Thus, small loans require higher interest rates. This may imply that institutions with a high-interest rate charged, not necessarily, intend to earn higher profit; instead it could reflect the small size loan the MFI disburses. The sign is expected to be positive, as OER raises the interest rate in the same direction, but it should be noted that rising OER means the institution is less or inefficient; therefore, if efficiency increases, the interest rate declines. The

thesis only tries to just find if the institution is efficient or not, it does not answer the extent of efficiencies or inefficiencies.

4.4.2. Sustainability (Profitability):

Sustainability is the ability of the institution to continue operating in the market by utilising its revenue or grants or funds to cover all its expenses. Sustainability can be defined by either operating sustainability or/and profitability sustainability. For operating sustainability the study have considered OER in Section 4.4.1, as it links to efficiency. Profitability sustainability includes operational self-sufficiency (OSS), return on assets (ROA) and return on equity (ROE). This paper only considers the first two when defining sustainability or profitability.

- a) OSS: this is the ratio of operating revenue to all the operating expenses of an MFI, including financial cost and impairment loan loss. Schafer and Fukasawa (2011) in their investigation of defining OSS, find that OSS gets influenced by the write-off ratio¹³ and outreach. The formula for OSS is

$$OSS = \text{Total Operating Revenue} / \text{Total Admin \& Financial Expenses}$$

OSS greater than 1 indicates that the organisation is operationally self-sufficient. This variable is endogenous, since to increase sustainability an MFI tries to increase its revenue in the form of interest rate; therefore, it is likely that interest rate also have causal effects on OSS.

- b) ROA: Return on Assets is the measure of profitability plus sustainability.

The derivation of the variable is:

¹³ Write-off: an uncollectible loan that is defaulted. And the ratio is in terms of average GLP (period).

$$ROA = \text{Net Operating Income} - \text{Tax} / \text{Period Avg. Assets}$$

The sign is expected to be positive, though it could be correlated to the error term.

Therefore, this variable may be an endogenous variable.

4.4.3. Size:

Larger and older MFIs are more efficient because of their business experience, thus exhibiting a decline in price because of economies of scale. Therefore, firm size is expected to be an important factor that influences interest rates. Loan size is equally important to understand interest rates' behavior. Larger the loan size lower the interest rate charged.

4.4.4. Lending interest rate:

The paper is conducted with the data collected from MIX market and most of the articles use portfolio yield as a proxy for the interest rate (e.g. Rosenberg et al., 2009, Cotler and Almazan, 2013). The calculation for this variable is:

$$\text{Yield} = \text{Total Interest Income} + \text{Fees and Commission} / \text{GLP}$$

The thesis uses the nominal yield on the gross portfolio to define the interest rate.

Using this variable has one shortcoming, it ignores the loan losses, and thus, underestimates the true rates (Gonzalez, 2010, Dorfleitner et al. 2013). This is the dependent variable here against which all variable listed below are regressed.

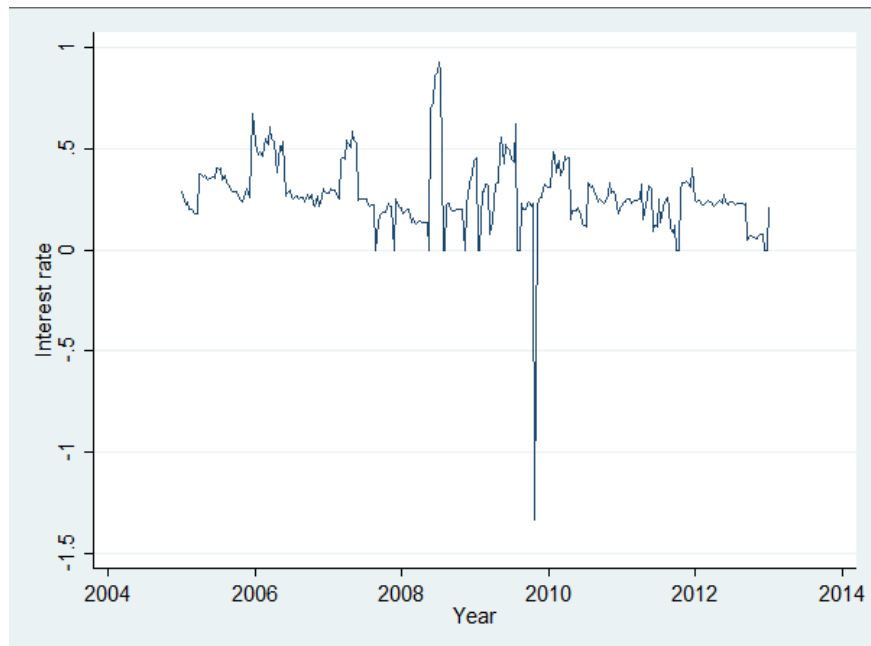


Fig 4: Behavior pattern of interest rates

The average interest rate in Fig 4 appears to be between 0 to 50% with one exception in (around) 2010 when the interest rate went to negative because of repayment crisis. Overlapping loans (i.e borrowers with multiple loan from multiple sources) increased uncertainty in the MFI industry. Other than that the fluctuation is not significantly high, even decreasing in recent past years.

Table 4: Summary statistics of key variables:

| Variables | Mean | SD | Min | Max | N |
|----------------|----------|----------|-----------|----------|-----|
| Lending Rate | .2845682 | .1696101 | -1.3329 | .924 | 292 |
| ROA | .019649 | .1017217 | -1.0825 | .1696 | 297 |
| OSS | 1.195252 | .3658088 | -.0981 | 2.7871 | 300 |
| OER | .1846219 | .1731817 | -1.332852 | 1.146407 | 299 |
| Cost of Fund | 14.35414 | 2.49227 | 5.989813 | 19.89803 | 291 |
| Avg. Loan Size | .3146878 | .5984169 | .0172 | 4.7359 | 288 |

| | | | | | |
|----------------|----------|----------|----------|----------|-----|
| Size of MFIs | 17.59242 | 2.018214 | 11.63423 | 22.53642 | 301 |
| Loan Loss Rate | .0110919 | .078071 | -.0126 | 1.3329 | 298 |

Table 4 presents descriptive statistics (i.e. mean, SD, min-max) of all the key variables, excluding dummies for the country and types of MFI. When looking at the table, the mean for OER is 18.5% and SD is 17.3% indicates the average dispersion from mean is relatively large. Also the mean for cost of fund of an MFI is much higher than the mean of OER, then again OER is a ratio not the operation expense. However, by looking at the statistics the major portion of the expense incur from refinancing, this also implies that MFIs operational sustainability mostly depends on the outside funds or donation. In other words, in order to achieve sustainability an MFI have to attain OSS at least at 1 (100%), and by looking at the summary statistics (minimum value is -9%), there are still many MFIs that do not earn enough profit to cover their costs. Moreover, LLR shows very low mean, which is good indicator for the MFIs portfolio quality.

4.5. Estimation methods:

As the data are in the balanced panel form therefore either fixed-effects (FE) or random-effects (RE) estimators are employed. For understanding the within-effect, FE is the most consistent estimator, whereas RE considers time-invariant factors. To verify the appropriate model the Hausman test is applied. In the result section it is found that for this dataset the FE estimator is appropriate. In panel data there is a possibility of heteroskedasticity; to identify that the Breusch-Pagan or Cook-Weisberg test for heteroskedasticity has been done. As the presence of heteroscedasticity is

found, to address the issue the model is redefined by modifying the problematic variables, which are the size of the financial institution and age that vary with MFIs and country context.

In the MFI industry every variables do not project in a simple one-way relationship. In fact, factors such as profit and interest rate charged could be both endogenous, if MFIs seek to influence profit to meet their profit goal. Therefore, a simultaneous estimation method may better describe the situation. Instrumental variables (IV) could be one option but for an over identified rank-order (when for every endogenous variables, more than one instruments are used), two-stage least square (TSLS) is more efficient. TSLS rectifies the endogeneity in first stage. In the second stage the regression model employs instruments that is related to the instrumented variables but indirectly with the dependent variable and not with error term. In this thesis to achieve more efficiency, a third step is included for the system estimation method. The system estimation method estimates the cross-equation variances and covariance, which give generalised least squares parameter estimates. This whole process known as three stage least square (3SLS). This whole process is known as three-stage least square (3SLS). The paper also tests the validity of the instruments and provides a model specification test---Sargan's and Basmann's test for over identification.

5. Empirical Results

5.1 Introduction:

In this section, the model is estimated based on two approaches (as in Cotler and Almazan, 2013). The first is based on single equation estimation considering only Equation 1. Subsection 5.2 gives the results as well as those for the model as corrected for heteroskedasticity. Subsection 5.3 gives the results of the second approach, which considers the simultaneous estimation of Equation 1 and Equation 2. The simultaneous equation estimation allows for the reverse causal relationship between some of the variables and addresses this endogeneity by employing three-stage least square (3SLS).

All the tests were run on the latest data analysis and statistical software STATA 14.1. STATA offers the 3SLS estimation and overall it has more options compared to Gretl or even Eviews in terms of performance. The software especially perform well for General Method of Moments (GMM) estimation and simultaneous equations model (such as 3SLS, TSLS or 2SLS, Instrument Variables estimation).

5.2 Single equation estimation:

The results in Table 5 are obtained from regressing Equation 1, where the lending rate is dependent on sustainability or profitability factors as well as efficiency and some other influential sub-factors. These factors are fixed effects (FE) estimates. A Hausman test was employed to check whether a random effects (RE) model is preferred to the FE model. With a test statistic value of $\chi^2=184.00$ ($\text{Prob}>\chi^2 =$

0.0000), the RE model is not preferred, meaning that the unique errors are correlated with the regressors. Therefore, the FE model is adopted for the estimation.

Table 5:

Dependent Variable: Lending Rate (log)

| Log Lending Rate | Coef. | Std. Err. | t | P> t | [95% Conf. Interval] | |
|------------------|-----------|-----------|-------|-------|----------------------|-----------|
| OER | .708446 | .1611723 | 4.40 | 0.000 | .3909327 | 1.025959 |
| OSS | .1226532 | .0443873 | 2.76 | 0.006 | .0352093 | .2100972 |
| ROA | 1.351728 | .181426 | 7.45 | 0.000 | .9943144 | 1.709142 |
| Log Size of MFIs | -.0561404 | .0256169 | -2.19 | 0.029 | -.1066063 | -.0056746 |
| Log Cost of Fund | .0426204 | .0174762 | 2.44 | 0.015 | .0081919 | .077049 |
| Avg.Loan Size | -.0854618 | .036826 | -2.32 | 0.021 | -.1580099 | -.0129137 |
| LLR | 1.313615 | .7758834 | 1.69 | 0.092 | -.2148942 | 2.842124 |

Note: a) Fixed effect estimators are shown due to the support of the Hausman test result, b) all the dummies (types and countries) are not presented, c) Inflation rate was also included but not reported due to its insignificant result.

Efficiency: Table 5 results show that the estimated parameters for the assumed independent variables, which are all significant at 5% or less, except for LLR, which is at 9%. The operational expense ratio (OER) is a proxy taken for efficiency---increasing OER means less efficiency, and thus, a higher interest rate. As a result, the interest rate is positively related to OER but negatively to efficiency. An increase in one dollar in operational cost leads to an increase of 71% in the interest rate (everything else being equal).

Sustainability: The lending interest rate responds positively (12% and 135%) to a 1 unit change in operational self-sufficiency (OSS) and the return on assets (ROA) respectively. ROA (a proxy for profit) is a major reason for a substantially higher interest rate.

Cost of funds: The (log) of the funding cost shows a significant but small effect on the interest rate. A 1% change in the cost will cause only a .04% change in the interest rate. This implies that the funding cost is not an economically influential factor. The operation expense cost leads to more of a change in the interest rate than the cost of funds.

Size: Whether it is the loan size or the institution's size, is negatively associated with the interest rate. The average loan size (i.e. defined by the Avg. Outstanding Loan Balance as a % of GNI) and the size of the MFI (proxied by the log of assets of each MFI) are both significantly negative in the estimated model. A 1 dollar increase in the loan size results in an 8% reduction in the interest rate. This is why MFIs control the loan size---to keep the costs low and to thus meet the interest rate ceiling imposed by the regulators to prevent a drift away from their mission of serving the poorest. As for MFI size, it is often considered that large MFIs are more efficient and it is proved once again here---an increase in the size of 1% reduces the interest rate by .05% (*ceteris paribus*).

Loan loss rate: An increasing probability of not being repaid, or the loan loss rate (LLR) pushes up the interest rate significantly high. A growing LLR increases the interest rate by 131%. In order to lower the rate, MFIs look into a borrower's profile before sanctioning loans. The profile is only made for existing clients, and therefore large loans are only made available to regular clients with a good transaction record. An LLR close to 0 indicates the MFIs possess clients with good quality profiles, whereas, 1 indicates poor quality---looking at the actual data used, all the MFIs LLTs are close to 0.

The sizes of the MFIs are not homogenous across institutions in the selected countries, nor are the ages of the institutions, and these may lead to heterogeneous impacts. Therefore, heterogeneity needs to be addressed. For this purpose, new variables have been employed amongst the explanatory variables listed in table1. The new variables are created by multiplying the Size of MFIs and their Age with some of the other variables (following Cotler and Almazan, 2013).

Table 6: Heteroskedasticity corrected model:

Dependent Variable: Lending Rate

| interestrate | Coef. | Std. Err. | t | P> t | [95% Conf. Interval] | |
|--------------------------------|-----------|-----------|-------|-------|----------------------|-----------|
| OER*Age | .0213069 | .0040522 | 5.26 | 0.000 | .0133281 | .0292857 |
| OER | .2795664 | .0862261 | 3.24 | 0.001 | .1097881 | .4493447 |
| log Size of MFIs*Age | .0001852 | .0001042 | 1.78 | 0.077 | -.0000199 | .0003904 |
| ROA | .4567398 | .0697575 | 6.55 | 0.000 | .3193879 | .5940917 |
| Avg.Loan Size | -.0281129 | .0068731 | -4.09 | 0.000 | -.0416459 | -.01458 |
| log Size of MFIs*Avg.Loan Size | .0013521 | .0005209 | 2.60 | 0.010 | .0003264 | .0023778 |
| Log Age | -.1776389 | .046921 | -3.79 | 0.000 | -.270026 | -.0852519 |
| Log Cost of Fund | .0846992 | .0101377 | 8.35 | 0.000 | .0647381 | .1046603 |
| LogSizeofMFIs*LogCost of Funds | -.0027904 | .000378 | -7.38 | 0.000 | -.0035348 | -.0020461 |
| OSS | .0318004 | .0171252 | 1.86 | 0.064 | -.0019189 | .0655198 |

Note: Pooled OLS done for this case and later regressed with predicted error term and predicted interest rate and squared term for the White's Heteroscedasticity consistent standard errors. The model is significant at 1%.

After adding the interactive variables into the model, the White test confirms homoscedasticity at 1% significance level. Table 6 shows the impacts of the regressors on the interest rate, which vary with the MFIs size and MFIs' age. A learning-by-doing effect can be observed in the interest rate behavior corresponding to the age variable---the older the institution the lower the interest rate charged. The relationship of all estimated variables in Table 6 are the same as in the previous table.

The interaction term has changed the value of the coefficients and the impact is larger when the size of MFIs is bigger.

Even after correcting for the heteroscedasticity, the result may still lack consistency because of possible endogeneity. In particular, the interest rate is expected to be related to profitability (i.e. ROA) but MFIs may control their interest rate in order to gain more profit. Therefore, estimates based on a one-way relationship model can be misleading---thus, simultaneous equations estimates are considered. It is also possible that the proxy for sustainability (profitability) and the average loan size are endogenous variables, and so are also related to the error term. In these circumstances, OLS is not only biased but inconsistent as well. To deal with this possible endogeneity, the 3SLS method is used in section 5.3.

5.3 Simultaneous equation estimation:

A system of equations may better explain the lending rate and ROA simultaneously. Along with serving poor rural people MFIs also have one more objective, which is to survive in the market as a long term business. Therefore, MFIs seek out higher profit to attain a certain goal (i.e. expansion, loan portfolio, numbers of borrowers etc.). As they can decide on how much interest rate to charge, what size of the loan to disburse and so forth, this reverse causality requires simultaneous equation estimation, which will be done with 3SLS regression. OSS and Avg. Loan Size were also included as endogenous variables but the Durbin-Wu- Hausman test rejected these two variables as being endogenous.

The Durbin-Wu-Hausman test of endogeneity was run to check whether the estimated model had any endogenous variables and the result rejects the null of exogenous variables. This test result confirms endogeneity in the model.

| |
|---|
| Durbin- Wu- Hausman Test Result: $F(3, 255) = 125.41$ Prob > F = 0.0000 |
|---|

OSS and Avg. Loan Size were also included as endogenous variables but the Durbin-Wu- Hausman test rejected these two variables as being endogenous. The 3SLS results are given in Table 3 for endogenous variables as the interest rate and return on assets.

Table 7: Simultaneous Equation Estimation results

| | Coef. | Std. Err. | z | P> z | [95% Conf. Interval] | |
|------------------|-----------|-----------|--------|-------|----------------------|-----------|
| Log Lending Rate | | | | | | |
| ROA | 1.443447 | .3295917 | 4.38 | 0.000 | .7974592 | 2.089435 |
| OSS | .244562 | .0575671 | 4.25 | 0.000 | .1317326 | .3573915 |
| Loan Size | -.1664602 | .0512618 | -3.25 | 0.001 | -.2669316 | -.0659888 |
| OER | .8853318 | .182593 | 4.85 | 0.000 | .5274561 | 1.243208 |
| Log Size of MFIs | -.3352676 | .048334 | -6.94 | 0.000 | -.4300005 | -.2405346 |
| Log Cost of Fund | .076035 | .0187241 | 4.06 | 0.000 | .0393364 | .1127335 |
| C1 | .2887071 | .0585887 | 4.93 | 0.000 | .1738754 | .4035389 |
| C2 | .6157793 | .0844249 | 7.29 | 0.000 | .4503095 | .7812492 |
| C3 | -.0039706 | .0759367 | -0.05 | 0.958 | -.1528038 | .1448627 |
| C4 | .4870184 | .0869855 | 5.60 | 0.000 | .31653 | .6575068 |
| C5 | .8146594 | .1019871 | 7.99 | 0.000 | .6147684 | 1.01455 |
| C6 | .3241807 | .060299 | 5.38 | 0.000 | .2059967 | .4423646 |
| C7 | .5136615 | .0735242 | 6.99 | 0.000 | .3695567 | .6577662 |
| C8 | 0 | (omitted) | | | | |
| T1 | -.4101685 | .0889663 | -4.61 | 0.000 | -.5845393 | -.2357977 |
| T2 | -.8895485 | .1278829 | -6.96 | 0.000 | -1.140194 | -.6389027 |
| T3 | -.4188677 | .0986961 | -4.24 | 0.000 | -.6123084 | -.2254269 |
| T4 | -.2360322 | .0789837 | -2.99 | 0.003 | -.3908374 | -.0812271 |
| T5 | 0 | (omitted) | | | | |
| ROA | | | | | | |
| Log Lending Rate | .1576657 | .028187 | 5.59 | 0.000 | .1024201 | .2129113 |
| Log OE | -.0859977 | .0066052 | -13.02 | 0.000 | -.0989436 | -.0730518 |
| Log GLP | .1030519 | .0068925 | 14.95 | 0.000 | .0895427 | .116561 |
| Provision | -.8401346 | .0493707 | -17.02 | 0.000 | -.9368995 | -.7433698 |
| Log Age | .0334796 | .0065204 | 5.13 | 0.000 | .0206999 | .0462594 |
| Log Cost of Fund | -.015854 | .0029889 | -5.30 | 0.000 | -.0217122 | -.0099959 |

Note: a) Three-stage least square regression result are presented here, b) Dummies for 8 Countries and 5 Types are included¹⁴, c) 269 observations are considered.

Table 7 presents two endogenous variables (i.e. Interest rate and ROA) and their corresponding regressors. The estimates for the interest rate (or natural log of lending rate) are all consistent with the expected coefficient signs. A negative relationship between the interest rate and the loan size is significant. As expected, MFIs charge a lower (higher) interest rate when the loan size is higher (lower), which is opposite to what one would expect in the traditional banking case.

¹⁴ C1, C2, C3, C4, C5, C6, C7 and C8 represent Bangladesh, Cambodia, China, India, Indonesia, Pakistan, Philippines and Vietnam, respectively. Also T1, T2, T3, T4, T5 stand for types Bank, Cooperatives, NBFIs, NGOs and others, respectively.

The results for the lending rate as a dependent variable indicates that ROA and OER (representing efficiency) both have a significant influence on the interest rate. An increase of 1 unit in ROA and OER causes an increase in the interest rate by 144% and 88%, respectively. The operational expenses ratio, OER is again a more influential factor than the cost of funds. The result for loan size on the interest rate, however, shows a smaller effect (16%) but remains significant. The log of assets represents the size of an MFI and shows an 1% increase in the size of MFIs reduces the interest rate by .33% (other factors unchanged). Operational self-sufficiency (OSS) or sustainability is positively associated with the interest rate. An increase of 1 unit in OSS results in the interest rate rising by 24%. Positive coefficients for ROA and OSS indicate that sustainability is mainly profit driven, and by profits that are earned mostly from the interest rate charged. Therefore, an increase in sustainability leads to an increase in the lending rate if outside funding is limited or costly.

All the estimated coefficients of dummy variables indicating different types of institutions are negative and significant. Although the interest rate varies across countries depending on types, and in this thesis dataset includes 53% of NGOs and 25% of NBFIs including only 3% 'other' category. However, in the dataset only one MFI is listed as other type because it is a Fund, even so, the result shows this 'other' type charges higher than any other type of MFIs. The results contradict the Cuellar et al. (2012) and Dorfleitner et al. (2013)'s findings that the NBFIs charge higher interest rate among all other types. However, in my data the difference between T4 (NGOs) and T5 (the 'other' type) is the lowest. NGOs charge 23% less than T5, which means NGOs are the second higher interest rate maker. T1 (Banks) and T3 (NBFIs) charge the same, therefore the difference from the T5 is same. T2 (Cooperatives) ask the lowest interest rate amongst all other types.

As for countries, all the countries are significantly positively associated with the interest rate except China---the result for China shows insignificant negative coefficients. All the positive coefficient shows that all the countries charges higher interest rate compared to Vietnam. Among which C5 (Indonesia) charges the highest about 81% and C1 (Bangladesh) that is considered having a matured MFI industry, charges the lowest 28% interest rate. The dataset shows that Indonesia has a higher range of interest rates (20% - 92%) charged among the sample countries.

ROA is an endogenous variable and is explained by the interest rate itself including the log of operation expenses, GLP, and the age of the institution (counted from the year established as of 2016) including loan loss provision (the amount MFIs keep aside to cover for uncollectible loans) and the cost of funds. Provisions is an important factor that affects negatively the ROA---1 (USD) increment in loss provision reduces .84 (USD) of the return. With Age of the institutions, profit appears to grow but notably small amount (.03). Whereas, 1% increase in the interest rate increases profit by .0016 (*ceteris paribus*). The interest rate drive profitability more than age of the institution or portfolio size.

Tests were run to check whether these instruments that were used in the 3SLS regression are well fitted for the estimation. One way to confirm this is by looking at the correlation between the instruments and the instrumented variable, as shown in Table 4.

Table 4: Correlation

| | ROA | Provision | LogBorrowers | Depositors | Logcostperborrower |
|--------------------|---------|-----------|--------------|------------|--------------------|
| ROA | 1.0000 | | | | |
| Provisions | -0.7238 | 1.0000 | | | |
| LogBorrowers | 0.0293 | 0.0942 | 1.0000 | | |
| Depositors | 0.1044 | -0.0121 | 0.5702 | 1.0000 | |
| Logcostperborrower | -0.0206 | -0.1152 | -0.5175 | -0.2895 | 1.0000 |

The table shows many significant correlations with none above an absolute value of 0.8 (beyond this point indicates a sign of multicollinearity -- see Kennedy, 2008).

Further, the model is checked for over identification restrictions. Hansen's J statistic χ^2 is reported below:

Hansen's J $\chi^2(2) = 3.77132$ (**p = 0.1517**)

The p-value exceeds 10%, and therefore, the null hypothesis that instruments are valid and the model is correctly specified, cannot be rejected. As a result the instruments are relevant for the model.

Another test is run to see if the instruments are weak or otherwise.

First-stage regression summary statistics

| Variable | R-sq. | Adjusted R-sq. | Partial R-sq. | Robust F(3,259) | Prob > F |
|----------|--------|----------------|---------------|-----------------|----------|
| roa | 0.9008 | 0.8935 | 0.7580 | 35.1125 | 0.0000 |

When looking at the partial R-square, the instruments explains 75% of the relationship, which indicates they are not weak. Therefore, these instruments can be used to specify the model.

5.4. Results supporting the Hypotheses

Hypothesis 1 (H1), that OE is the most influential factor in determining the interest rate, turned out to be true. The result provided in the previous chapter indicates that OE, which in this thesis is a ratio or OER, has an 88% determining power over the interest rate. Consistent with Mersland and Strom (2009), Rosenberg et al. (2013), Dorfleitner et al. (2013), and many other studies, we have found the operation cost is what drives the interest rate higher; and in order to control the rates, the cost should be taken into consideration. Increasing efficiency does lead to lower expenses thus lower lending rates. According to Cotler and Almazan (2013), efficiency is the key factor for reducing exorbitantly higher interest rates. Therefore H1 is proved.

Hypothesis 2 (H2) is that a bigger sized MFI charges a lower interest rate; significant and negative estimated coefficients for the size of the MFIs indicates that H2 is not rejected. The interest rate declines with increasing MFIs size (or log of assets). Cotler and Almazan (2013) and Hartarska, Shen and Merslan (2013) find that large MFIs possess more efficiency, as a result, they charge less interest rate. Our result proves the point and is thus in favor of H2.

Hypothesis 3 (H3) states small loans drive the interest rate high. The derivation of the average loan size also defines outreach to the core poor clients, and loans to the poorest cost more than to the better-off clientele. The negative significant result proves that the interest rate inversely depends on the size of loans. This relationship also explains the mission drift of the MFIs, in order to manage their cost MFIs compromise their objectives. The result is consistent with Hartarska, Shen, and Merslan (2013).

Larger loans are cost-effective and preferred by the MFIs, as for clients they get lower interest rates. The results prove H3 to be true.

Hypothesis 4 (H4) is that economies of scale have an influence over interest rates.

In this thesis, scale economies are defined by three features---efficiency, sustainability (profitability) and size. H1 proved the first part that efficiency reduces interest rate and H2 and H3 proved that size matters for the interest rate charged and had a negative association. As for sustainability (which obtains from operating revenue) MFIs who achieve an OSS at a 100% level and are profitable are more cost-efficient and can reap economies of scale (Charitonenko and Campion, 2003; Rosenberg, 2009 and Ngo et al. 2014). Therefore H4 is supported here.

6. Policy implications

MFIs are mostly appraised for their mission to reach out to the lower socioeconomic part of the population with financial 'aid'. This aid helps lower socioeconomic borrowers (LSEBs) to lift up their living standards, which is why the focused clientele are mostly the poor from the remotest area of a country. The big issue with the MFIs is that they appear to charge exorbitantly high interest rates and the reasons specified for high interest rates are high funding rates and operating costs, inefficiency of the institutions and so forth. In this thesis, the empirical findings suggest some ways to control the interest rate that policy makers could use to induce better performance by the MFIs.

The empirical results in this thesis that support **H1** indicate that the operation cost is the most influential factor in determining interest rates. In order to reduce interest rates, operating costs have to be reduced or at least controlled at a certain level without too much fluctuation. Since many MFIs no longer depend on outside funds for operating, because they mainly operate their business by refinancing the profit they earn, the higher funding cost issue has dissolved for them. And even if there is still a need to reduce the cost of funds, that is not a possibility according to Cotler and Almazan (2013), as 90% of MFIs already have 0% average funding cost (in real terms)---so there is no room for reductions. This finding indicates policy makers need to control some other factors that can be adjusted, such as operating cost.

Now the operating cost is incurred when the loan is disbursed and the service provided by the financial institutions. According to **H2**, the old and large institutions are comparatively better in efficiently tackling these costs. Large institutions, with large

capital or large initial assets, are more capable of offsetting the market forces that lead to higher interest rates. Large MFIs are often successful in maintaining lower interest rates compared to new and small firms. Therefore, only larger MFIs should continue in the market, and so governments need to consider ways to encourage merging the small MFIs so that they can operate efficiently.

The results provided in Section 4, **H2**, argue that small MFIs are incapable of lowering their interest rates---in fact small MFIs struggle to survive when economic adversity (i.e. rising inflation, imposed regulation, etc.) hits. All these struggles causes huge costs to cover, and as a consequence, the interest rate shoots up for small MFIs. Moreover, small and newly entered MFIs do not even offer any other non-financial services (i.e. insurance, training etc.) as that would be too risky, and at the same time too costly for them. This result implies that the small MFIs find difficulties in fulfilling their ultimate goal of benefitting LSEBs---in that case, government should either unite them and turn them into one big micro lending institution, or own those MFIs initially and support them financially until they reach to a certain efficiency level. Government intervention at the initial stage for infant MFIs will bring out their performances so as to uplift social welfare.

To protect LSEBs from higher interest rates, regulators have imposed ceilings on the lending interest rates, which is tends to discourage achieving the objective of the MFIs. This government interference may result in an imbalance in the MFIs' operational process---for example, the MFIs may start to choose a better-off clientele who can afford to take large loans at lower interest rates. In this way MFIs can escape from the trouble of trying to reach the poorest population. **H3** says that increasing loan sizes decreases the interest rate, and this is not rejected, which means that the bigger the loan, the more room for the MFIs to cut their costs by serving less-poor clients. As a

result the government intervention (i.e. the interest rate cap) has loopholes. India has already lifted the cap from MF interest rates because they realized that the cap was not beneficial for the clients nor the MFIs.

Instead of dictating what an MFI should charge, the government could support them more so that the industry grows more efficiently, which would be more fruitful for the MFIs and thus for society as well. Cost effectiveness is the major reason leading to lower interest rates, and since we are unable to reject **H4** this explains how a sustainable and efficient MFI is capable of practicing economies of scale which helps in controlling their interest rates. So the policy should be consistent with the factors that fosters sustainability and efficiency of the MFIs. As large MFIs are successfully competent to sustain themselves and typically efficient in delivering their services, the policy must aim to solve the problem of too small MFIs. If the government takes over the small sized MFIs, these institutions will not only become sustained, but they will be able to serve their comprehensive social purposes also---like free education programs, income generating training, savings mobility, insurance, medical emergencies and other programs too.

7. Conclusion

In this investigation, the aim was to assess the argument often made that MFIs charge excessively high interest rates. Most previous studies related to the interest rates have been examined in the context of the traditional banking industry, and only a few have taken MFIs into account. Therefore, more studies in this area will shed light into the matter. As microfinancing is a promising growing industry, to understand how it operates and how it can be efficient, more studies are required. This thesis does just that and so it is a helpful contribution to the literature.

First of all, the paper looks for the factors that determine the interest rates MFIs charge to their clients. For this, a number of variables (ROA, OSS, OER, funding cost, size etc.) were taken into account to check their relevance for the interest rate. Four hypotheses were tested: one, is operating cost a major factor determining the interest rate?; two, does the size of the MFIs have a negative impact on the interest rate?; three, is a lower interest rate charged for larger loans?; and finally the biggest question, four, do economies of scale affect the interest rate?

To answer these questions, two approaches were employed (as in Cotler and Almazan (2013)), single equation estimation and simultaneous equation estimation, using the balanced panel data collected from MIX market for 34 large MFIs in Asian countries for nine years (2005-2013), as available at the time of the research.

For single equation estimation, a fixed effects (FE) model is adopted. The result shows ROA and OSS, which represent sustainability, were positively related to the interest rate. OER and funding cost are the proxies for inefficiency (inverse of efficiency), and they presented a positive association with the interest rate. Size (Institution's size and loan size) was negatively related to the interest rate. In short, all the variables behaved

as expected. The presence of heteroscedasticity could have been a major setback but this study addressed that by including interactive variables that vary with different MFIs and countries.

In a developing economy's microfinance sector, all relevant variables may not present a clear cut one-sided dependency---for example, the return on assets not only determines the interest rate, but to fulfill a profit goal the return can be affected by the interest rates also. To explain this reciprocal relationship, a simultaneous equations model is estimated to take care of the endogeneity issue. Since the simultaneous model explains the situation better, therefore, the three-stage least square estimator is adopted for the best empirical findings.

The relevance of economies of scale is clearly supported by the methods used. However, the thesis could have been more specific if it had classified institutions into two categories, subsidized and unsubsidized institutions. As this classification would have been helpful in defining the role of costs in relation to the interest rate. The costs (i.e. operating or funding) respond differently in subsidized MFIs, and thus, the interest rate may fall accordingly even if the cost is higher. For instance, Vietnamese MFIs are mostly funded and closed governed by the states. Therefore, despite having the almost same operating cost like other MFIs, it charged constantly lower interest rates (see Figure 1).

However, future studies might take this (subsidized or non- subsidized MFIs) specification into account. Otherwise, this thesis has covered the topic precisely with clear empirical evidence to show the importance of viable size of the MFIs in keeping their interest rates low.

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