

ESSAYS ON MICROFINANCE

By

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ABSTRACT

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This dissertation consists of two chapters. The first chapter is dealing with microfinance's interest rates. Microfinance institutions' (MFIs) high interest rates have been at the center of controversy from the beginning of microfinance. One plausible and widely accepted theory, which explains MFIs' high interest rate puzzle, is that there exist fixed costs involved in making loans, say per borrower (or per loan) fixed transaction costs. However, in spite of its topicality, this fixed costs theory still remains untested empirically. Based on the theoretical operating costs function and a large data set on 526 MFIs from 75 countries, this study is the first attempt to test the fixed costs theory directly, by answering the following questions: how much of operating costs are incurred by per borrower fixed transaction costs? And how much do MFIs need to charge in order to cover their operating costs? We find that the per borrower fixed costs account for about 45% of total operating costs for a representative median MFI, which lends \$1,000 on average to 12,000 borrowers, and drive the MFI to charge at least 6 to 10 percentage points more as interest solely to cover its operating costs. Furthermore, the smaller average loan size is the more per borrower fixed costs matter to MFIs interest rates, i.e., MFIs' making small loans of \$400 have to charge about 40% percentage points higher interest rates than MFIs' making large loans of \$2,500.

The second chapter is about the religion effects on microfinance. In spite of recent emergence of religion as a crucial factor in development economics, only limited studies have been done on the effect of religion on microfinance. This study aims to provide answers to the following two questions; whether a certain religious denomination is better or worse in MFIs' operation, and whether religious intensity also has an impact on

MFIs' performances. We find that MFIs operating in Muslim-dominant countries have significantly lower operating costs than MFIs in Christian-dominant countries, and consequently, have higher operational self-sufficiency. Besides, we also find that religious intensity, which is measured by % of actively religious population, has positive effects on growth rate of MFIs' average loan size.

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To my wife, Suhyeon,
my family,
and God.

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CHAPTER 1

WHY DO MICROFINANCE INSTITUTIONS CHARGE HIGH INTEREST RATES?: AN EMPIRICAL ASSESSMENT OF THE FIXED COST THEORY

1.1 INTRODUCTION

MFIs' interest rates play an important role in the distribution of the gains to microcredit access that has skyrocketed in the past few decades. As we can see from the recent microfinance crisis, it is interest rates that most problems in microfinance emerge through, directly or indirectly, regardless of what the trigger is. At the same time, it often is interest rates that those problems are settled through. That is why MFIs' high interest rates have constantly been at issue.

While commercial banks' lending interest rates are usually from 5% to 20%,¹ microfinance institutions' (MFIs) nominal interest rates mostly disperse between 20% and 50% (Dehejia et al., 2012). After the initial public offering (IPO) of Banco Compartamos in 2007, the debate surrounding MFIs' high interest rates became even more intense.² Yunus (2007) proposed a simple method for evaluating the interest rates of MFIs. Yunus classifies MFIs into following three zones based on their interest rate premium (interest rate – cost of

¹ Calculated by the authors, based on World Bank's normal lending interest rates in 2011.

² Banco Compartamos is the largest MFI in Latin America. From the issuing of the IPO in 2007, it provided a net profit of \$467 million to its investors. Such dramatic success, however, could be due in part to the relatively high interest rates paid by its borrowers, sometimes over 100% per year.

funds): Green Zone (interest premium $\leq 10\%$), Yellow Zone ($10\% < \text{interest premium} \leq 15\%$), and Red Zone (interest premium $> 15\%$). Yunus says that MFIs, which belong to Red Zone, are loan sharks, whereas MFIs in Green Zone are devoted to the poverty reduction mission. However, it is not clear how valid this criterion is, since we lack hard data on justifiable markups by MFIs. What is clear is that it labels the majority of MFIs as ‘profit-seeking’ loan sharks.³

Thus, to set a better standard for the interest rates of MFIs, we should first look carefully into what causes MFIs’ interest rates so high. At first, people thought it is simply because of high default risk that MFIs charge high interest rates. However, it turns out not to be true. Repayment rates for microfinance are at least as high as bank loans in typical developing countries.⁴ Some raised the question whether it is because MFIs have monopolistic power on their local markets. There are several studies, both theory and empirical, that show competition in microfinance actually force MFIs to lower interest rates on their loans (McIntosh and Wydick, 2005; Porteous, 2006). The other plausible and widely accepted theory is that there are fixed costs involved in making loans, say per borrower (or per loan) fixed transaction costs. This implies that break-even interest rates for small loans will necessarily be high because the fixed costs are spread over a smaller base. Let us take a simple example to understand how much per borrower fixed costs affect MFIs’ interest rates. Suppose there are two lenders with identical cost structures and gross loan portfolios equaling \$100,000. One lender makes 1,000 small loans of \$100 each, the other makes a single large loan of \$100,000. Since MFIs’ total costs can be decomposed into three components – cost of funds, default costs, and operating costs - the identical cost structure means that both have the same cost of funds and default cost per dollar loaned, say 10% and 1%, respectively, and the same operating costs, say \$10 per borrower.⁵ In

³ Gonzalez (2010) shows that about 75% of MFIs fall into the Red Zone worldwide.

⁴ Epstein and Crane (2005) say usually it is between 95% ~ 100%.

⁵ Operating costs can be decomposed into three components: institutional fixed costs, per borrower fixed transaction costs, and per dollar loaned costs (variable costs). For the sake of simplicity, we ignore institutional fixed costs and variable costs in this example; they do not change the message, but we allow for them in the formal model and empirical specification.

this example, the break-even interest rate is 21% for the micro lender, and 11.01% for the big lender. A relatively moderate fixed cost explains a 10% markup in the micro lender's interest rate, and a rate nearly twice as high. Of course a larger fixed cost would explain a larger markup – e.g. a \$20 fixed cost would give a 20% markup.

The above example well illustrates why MFIs' small loan sizes, an essential feature of microfinance, necessarily cause high interest rates via per borrower fixed transaction costs. While widely believed to justify the relatively high interest rates of MFIs due inherently to their making small loans, this theory has never been tested empirically. Therefore, the goal of this paper is to carry out a test of this theory directly – to identify whether there are per-borrower fixed costs, and to quantify them.

Of course, there are several studies showing some correlation between MFIs' interest rates and cost structures in various aspects (see Gonzalez, 2010; Rosenberg et al., 2010; Lützenkirchen and Weistroffer, 2012). None of the previous literature, however, explicitly tests for the fixed cost that is at the heart of the accepted theory for explaining MFIs' high interest rates. This paper is the first attempt to verify empirically whether or not MFIs face fixed costs in making loans, and to estimate the magnitude of these fixed transaction costs.

We find that the per borrower fixed costs account for about 40%–45% of per borrower operating costs for a representative MFI, and increase its interest rates by seven percentage points. Since an average real interest yield is 27%, it can be inferred that if there were no per borrower fixed costs, the average real interest yield would be 20%, and resultingly per borrower fixed costs cause a 35% increase in MFIs interest yield. Besides, we also show that the smaller average loan size is, the more per borrower fixed costs affect on MFIs' interest rates. Compared to MFIs making relative large \$5,000 loans, MFIs making small \$400 loans have to charge 41% higher interest rates due to per borrower fixed costs.

The organization of this paper is as follows. The next section describes the data and variables. Section 1.3 explains the estimation methodologies. The regression results are

presented in Section 1.4. Section 1.5 concludes and suggests some further avenues of research.

1.2 DATA

All MFI data come from the databases of the microfinance information exchange (MIX), a non-profit organization incorporated in 2002.⁶ MIX provides outstanding data quantitatively as well as qualitatively. More than 2,000 MFIs, operating in over 110 countries and serving about 100 million clients, report their financial, operational, and social performance data to MIX. From these self-reported data, through several kinds of refining processes, MIX provides fairly reliable data publicly.⁷ For this reason, a great number of recent empirical research projects on microfinance are based on MIX data.

From the MIX data, we construct a panel dataset with MFIs that satisfy following criteria. First, we only use the data from MFIs which belong to one of the top two diamond levels, four or five. MIX classifies all MFIs into five levels according to their information accuracy; the higher the diamond level is, the better the quality of data. Diamond level four and five require MFIs to submit audited financial statements to MIX.⁸ Second, we dropped MFIs whose percentages of operations comprised by microfinance are lower than 80%, in order to focus on lenders primarily involved in microfinance. Third, MFIs having less than four years of relevant data are excluded. Finally, in the MIX data there are six different types of MFIs: Bank, Credit Union, NGO, Non-Bank Financial Institution, Rural Bank, and “other.” Among over 500 MFIs which meet all the previous requirements, there are only two MFIs of type “other,” which we drop.

There are several things to keep in mind when using this MIX data. Firstly, it is not a random sample of the MFI population. Since it is collected by MFIs’ voluntary sub-

⁶ <http://mixmarket.org/profiles-reports>

⁷ Some of them are mentioned later. For more detail, refer to The Premier Source for Microfinance Data and Analysis (<http://www.themix.org/sites/default/files/MIX%20Brochure.pdf>).

⁸ In a bid to provide better information, MIX itself audits all the unaudited MFI data using its audit system.

mission, it is more likely to consist of MFIs with better performance (Cull et al., 2007; Krauss and Walter, 2009). Unfortunately, this propensity might become more severe by using MFIs belong to four or five diamond level.⁹ However, no random sample from the population of MFIs appears ever likely to exist, and the MIX data are representative of a large and important share of the overall market. Secondly, MIX data require adjustments to ensure better comparison across countries. Usually MFIs submit their financial data in local currency and MIX converts them to US dollars using contemporaneous exchange rates. Thus, we made both purchasing power parity (PPP) adjustments and inflation adjustments on MIX's financial data by multiplying by a PPP (constant 2005 international \$) conversion factor. Lastly, MIX tends to underestimate actual effective interest rates that borrowers have to pay. When MIX calculates the interest rates, it uses 'interest yield,' the ratio of total income from loans to Gross Loan Portfolio (GLP). The problem is that GLP includes all outstanding loans regardless of whether they are really being paid or not. Besides, sometimes borrowers are required to make deposits out of their loans, so-called compulsory savings. Since compulsory savings reduces net loan amount, the reported interest rate becomes understated. Thus, we must bear in mind that the actual interest rates are somewhat higher than MIX's reported interest yield. In all cases, though, we see no obvious effects of these data shortcomings on the estimates of per-borrower fixed costs.

In addition to MIX data, we use two macroeconomic variables from the World Development Indicators (WDI 2011): gross national income per capita (GNIPC) and its growth rate. In accord with the MFI financial data, GNIPC, PPP (constant 2005 international \$) is used.

Finally, from the above two data sources, we construct an unbalanced panel dataset of 534 MFIs from 75 countries, each with 4–14 years of data. In most cases, the reason

⁹ In practice, it turns out that four and five diamond MFIs, compared to MFIs with a lower than three diamond level, operate efficiently, i.e. lend to more borrowers with smaller average loan size but lower operating costs.

for missing values is because MFIs had not yet begun to report their information to MIX, and once they began to report, they tended to report annually. Thus, we assume this ‘un-balanced’ issue will not cause serious selection bias.¹⁰ Table 1.1 presents the distribution of MFIs by regions and types. Table 1.2 contains each variable’s definition and sample statistics. Cost per borrower (cpb), or its logarithm, is the dependent variable. Number of borrowers and average loan size are the main explanatory variables constructing the core of the cost function.¹¹

Table 1.1: MFIs’ Institutional Type by Region

	Bank	Credit	NBFI	NGO	Rural	Total
Africa	10	18	32	24	0	84
East Asia and the Pacific	2	0	11	26	4	43
Eastern Europe and Central Asia	5	12	51	17	0	85
Latin America and the Caribbean	20	33	68	114	0	235
Middle East and North Africa	0	0	5	17	0	22
South Asia	9	2	22	23	9	65
Total	46	65	189	221	13	534

¹⁰ For robustness, we also report results based on balanced sub-panel of 375 MFIs for four years, 2006 – 2009.

¹¹ The cost function is explained in detail in the next section.

Table 1.2: Variable Description and Summary Statistics

Variable	Mean	SD	% between	% within	25%	Median	75%
cpb	401.64	823.24	52.90%	47.10%	118.55	250.94	445.97
average loan	2311.67	4666.13	83.40%	16.60%	413.62	1011.71	2570.04
borrowers	92695.16	474323.7	77.08%	22.92%	4224	12403	39991
age	12.98	8.17	90.49%	9.51%	7	11	17
Idle Assets	1029.8	18878.76	13.52%	86.48%	105.15	255.6	648.34
GNIPC	10368.75	6152.17	97.07%	2.93%	5755.94	9398.66	14640.99
growth	3.81	4.57	36.45%	63.55%	1.69	3.75	6.31
Interest rates	26.91	17.22	82.25%	17.75%	15.27	23.42	34.9

1. Obs.: 3695

2. All financial data are converted to PPP, constant 2005 international \$.

3. cpb: Expenses related to operations, including all personnel expense, depreciation and amortization, and administrative expense divided by Number of Active Borrowers

4. average loan: Loan Portfolio, Gross divided by Number of Active Borrowers

5. borrowers: The number of individuals or entities who currently have an outstanding loan balance with the MFI or are primarily responsible for repaying any portion of the Loan Portfolio, Gross. Individuals who have multiple loans with an MFI should be counted as a single borrower.

6. age: Age of the MFI

7. Idle Assets: Assets - Gross Loan Portfolio

8. growth: GNI growth (annual %)

9. Interest rates: Yield on gross portfolio (real) (%)

1.3 ESTIMATION

First, we assume total operating cost (TC) as a function of number of borrowers (N) and average loan size (L);

$$TC(N, L) = \text{Fixed Costs} + \text{Variable Costs} = \kappa + \eta N + \ell N \cdot L \quad (1.1)$$

where $N \cdot L$ represents gross loan portfolio (GLP). Here, κ represents institutional fixed costs; η reflects fixed per-borrower transaction costs; and ℓ represents variable costs, or costs per dollar loaned. Institutional fixed costs allow for operating costs that must be paid independent of how large the MFIs' operations are – e.g. basic legal or license fees, utility hookup or minimum fees, and so on. Per borrower fixed transaction costs are costs incurred by dealing with each borrower regardless of their loan size.¹² Microfinance is engaged in labor intensive activities. For example, usually loan officers meet borrowers and check their activities regularly. Such field works need a certain amounts of time and money regardless of borrowers' loan size. The costs per dollar loaned allows for operating costs to scale up with loan size. This can be justified if, for example, MFIs put more resources into monitoring and screening larger loans. From (1.1), dividing by number of borrowers, cost per borrower (cpb) can be derived as follows:

$$cpb(N, L) = \frac{\kappa}{N} + \eta + \ell L \quad (1.2)$$

In the above equation, η is our main parameter of interest, since it directly shows why lenders who give small loans must charge higher interest rates.

¹² Per borrower fixed costs consist of two different types costs; one-time costs that arise before the first disbursement, and per loan costs such as monitoring and collection. One-time fixed costs lead η to be underestimate the effects of the fixed costs that incurred with every loan because one-time fixed costs have to be spread over repeated loans. For example, if there are \$10 one-time cost and \$10 per loan costs for a MFI to lend \$100 to a new borrower, and the borrower makes total 10 loans consequently, the total costs would be \$110, not \$200.

For each factor of the above operating cost function to be precisely identified in the econometric sense, however, a couple of prerequisites have to be satisfied. The first issue is how to estimate η , per borrower fixed transaction costs. When estimating (1.2), η is the constant. Thus, in order to have validity, η should be positive and other explanatory variables, $\frac{1}{N}$ and L , should have a support that includes zero, or nearly so. Fortunately, these two ‘let the data speak’ issues turn out not to be a problem; in most estimations, η is significantly positive and both $\frac{1}{N}$ and L have supports quite near to touching zero.

A second issue is omitted variables. Since η is defined as all the remainder not explained by $\frac{1}{N}$ and L , the estimate probably is too noisy. To deal with it, we add several MFI- and country-level variables. MFI-level control variables include a quadratic in age, assets and dummy for institutional type. Age variables are included to capture learning effects. As MFIs get older, they learn and gain experience in lending cost effectively in their environment. The quadratic age variable is used to capture the diminishing returns. Similarly, most previous empirical studies also show that, on average, there is an inverse relation between an MFI’s age and its operating costs, and it gets weaker as age increases.¹³ Assets also are controlled for in the form of idle assets. Idle assets are all assets excluding loan portfolio, and reflect MFI’s operating strategy as well as capital intensity (Gonzalez, 2007). Consequently, it is likely correlated with all aspects of MFIs’ operation including active borrowers, average loan size, and costs per borrower. Lastly, MFI’s type dummy is controlled for. Lützenkirchen and Weistroffer (2012) show well how MFIs’ number of borrowers, average loan size, and operating costs vary according to their types.¹⁴ Compared to NGO-type MFIs, bank-type MFIs, which are usually more profit-oriented, might be expected to put more effort into operating cost-effectively with larger average loans, more borrowers, and lower operating costs.

¹³ Gonzalez (2007) shows that for MFIs, younger than six years old, one additional year in the market is expected to reduce the operating expense ratio between two and eight percentage points.

¹⁴ It shows the correlation between MFIs’ types and operating costs not directly but indirectly by providing a graph of MFIs’ types and real interest yield, saying bank-type MFIs charge about 24% lower interest yield than NGO-type MFIs. Since operating costs account for more than half of portfolio yield, from the table, we can infer that operating costs also vary by MFIs’ types.

Ahlin et al. (2011) and Gonzalez (2007) show that various country-specific characteristics such as physical or financial infrastructure and macroeconomic environment have significant effects on MFIs' operation. In our study, we control for gross national income per capita (GNIPC), one of the most representative macroeconomic indicators, in both level and growth rate.¹⁵ Five region dummies capture geographic-specific effects. As shown in most previous studies on microfinance, there exist huge regional effects on MFIs' performance, which might arise from political, cultural, and institutional differences among regions.

However, we should not rule out the possibility of the presence of omitted variables in spite of all the above covariates. Thus, in some specifications we exploit the panel structure by using only within-MFI variation. This eliminates time-invariant differences across MFIs.

The remaining issue we are most concerned about in our empirical approach is simultaneity. Loan size and borrowers are partly determined based on choices of the lender, and if these choices are systematically related to per-borrower operating costs in ways other than the cost structure, MFI learning curve, MFI fixed characteristics, and environmental factors already controlled for, this may bias results. While we cannot rule this out, we assume that the exogenous factors shifting borrowers and loan sizes are quantitatively more important. This is quite plausible in the uncertain MFI environment where many factors are beyond the control of the MFI, including for example the level of competition, income distribution dynamics, and regulatory/political climate. Further, MFIs are often thought of as not fully aware of their environment and technology, and thus often experimenting; consider the examples of Muhammad Yunus and the Grameen Bank honing their techniques over time, as well as the MFIs willing to match with researchers to experiment with new policies. Ultimately, then, we assume that the exogenous shifters of loan size and number of borrowers swamp the endogenous factors. Nonetheless, the

¹⁵ For the consistency in comparison, GNIPC, PPP (constant 2005 international \$) is used.

identification strategy is not as tight as we would prefer.¹⁶

Finally, based on the above functional form of total operating costs, we set the following two estimation equations, according to the way of introducing heterogeneity – either additive or multiplicative.

Equation 1

$$cpb_{ijqt} = \frac{\kappa}{N_{it}} + \eta + \ell L_{it} + \beta_M M_{it} + \beta_X X_{jt} + \beta_R R_q + e_{ijqt} \quad (1.3)$$

cpb_{ijqt} is operating costs per borrower of MFI i at time t , which operates in country j and in region q . The first three terms on the right hand side correspond to the core of the cost function, i.e. institutional fixed costs, per borrower transaction costs, and per dollar loaned costs, respectively. M_{it} is the set of MFI characteristics listed above; quadratic in age, idle assets, and dummy for institutional type. X_{jt} includes two macroeconomic variables of country j at time t ; GNIPC and its growth rate. R_q is the regional dummy.

Equation 2

$$cpb_{ijqt} = \left(\frac{\kappa}{N_{it}} + \eta + \ell L_{it} \right) \exp (\beta_M M_{it} + \beta_X X_{jt} + \beta_R R_q + e_{ijqt}) \quad (1.4)$$

Then, take logs of both sides

$$\ln cpb_{ijqt} = \ln \left(\frac{\kappa}{N_{it}} + \eta + \ell L_{it} \right) + \exp (\beta_M M_{it} + \beta_X X_{jt} + \beta_R R_q + e_{ijqt}) \quad (1.5)$$

The additive-heterogeneity specification in **Equation 1** allows only per borrower fixed transaction costs to vary across MFIs with both observables, and fixed unobservables.¹⁷ Of course, it is quite plausible that each component of the cost function is influenced by heterogeneity, and even in unique ways – but this is too empirically unwieldy to estimate.

¹⁶ It might be possible to contemplate instruments that shift demand for loans, thus affect number of borrowers and loan size, e.g. the macro-environment. But, these instruments likely do not satisfy the exclusion restriction, since they likely have a direct impact on costs (Ahlin et al., 2011).

¹⁷ Fixed unobservables are relevant only when using a first difference method.

Equation 2 is a middle ground between the two, by allowing heterogeneity to affect all parts of the cost function uniformly and multiplicatively.

1.4 RESULTS

1.4.1 Estimation Results

1.4.1.1 Three cost variables

Table 1.3 gives the results from three different econometric methods for **Equation 1** – pooled OLS estimation for a baseline, and random and fixed effects estimations to account for unobserved heterogeneity. The first three rows in Table 1.3 are about core cost variables. As shown, regardless of whether using balanced or unbalanced data, all the three coefficients of core cost variables are significant from all regressions.

While ℓ , the operating cost per dollar loaned, is estimated consistently from all regressions as around seven to eight cents, the fixed costs κ and η vary from regression to regression. However, overall per borrower fixed costs (H),¹⁸ including all the effects of other covariates, are between \$150 ~\$170 consistently from all regressions only except regression (1.3).¹⁹ For unbalanced data, since average cpb is \$400, we can see that H accounts for about 38% ~ 43% of cpb. In the same way, based on mean value of $\frac{1}{N}$ and L , one can calculate that fixed costs and per dollar costs account for about 11% ~ 14% and 38% ~ 45% of cpb, respectively.²⁰ These give us the insight that of the portion of the interest rate that would cover operating costs of MFIs, about a half would arise from the existence of H . The better way to see directly how much each cost factor contributes to

¹⁸ Thus, H is defined as following: $H = \eta + \ell L_{it} + \beta_M M_{it} + \beta_X X_{jt} + \beta_R R_q$

¹⁹ In FE methods, the constant term that stata reports is not the coefficient of intercept, but an average value of unobserved individual heterogeneity. However, in the first linear estimating equation, what we mainly focus on is not η itself, but overall per borrower fixed costs that includes all the other covariates; i.e. all the remains not explained by $\frac{1}{N}$ and L . Thus, still FE estimation provides acceptable amounts of overall per borrower fixed costs, around \$200.

²⁰ The means of $\frac{1}{N}$ and L are 0.00045 and \$2,311, respectively.

Table 1.3: Estimation results of **Equation 1**

	Unbalanced		
	Pooled OLS (1)	Random Effects (2)	Fixed Effects (3)
Fixed	120105.900*** (28727.35)	114991.900*** (31953.61)	101052.600* (52076.26)
Per Borrower	160.703** (62.57)	234.777*** (70.76)	685.849* (384.93)
Per dollar	0.080*** (0.01)	0.077*** (0.01)	0.065*** (0.03)
Age	-8.213** (4.00)	-14.231*** (4.58)	-37.237*** (11.03)
Age ²	0.154* (0.09)	0.276*** (0.10)	0.672*** (0.25)
Idle Assets	0.000 (0.00)	0.000 (0.00)	0.000 (0.00)
GNIPC	0.007 (0.01)	0.006 (0.01)	-0.014 (0.03)
Growth	-2.779 (2.13)	-1.931 (1.79)	-1.857 (2.13)
Bank	115.983*** (40.11)	127.727*** (43.45)	
Credit	-136.593** (68.69)	-139.748** (67.92)	
NBFI	58.611** (23.26)	56.174** (24.62)	
Rural	24.93 (18.26)	27.688 (20.70)	
Africa	64.309 (54.09)	38.609 (61.01)	
EAP	-73.856** (34.43)	-96.650*** (36.67)	
ECA	22.623 (45.10)	2.629 (47.02)	
MENA	-66.056** (28.96)	-89.981*** (29.04)	
SA	-122.037*** (37.34)	-147.367*** (41.41)	

¹. Unbalanced: 534 MFIs, 3695 obs. / Balanced: 375 MFIs, 1500 obs.

². Standard errors are clustered at MFI level. However, we find that even when clustered at country level, the significance levels are not changed much.

Table 1.3: (cont'd)

	Balanced		
	Pooled OLS(4)	Random Effects (5)	Fixed Effects (6)
Fixed	73663.830*** (4380.41)	38030.720*** (2045.14)	28575.970*** (1664.05)
Per Borrower	192.130*** (66.23)	206.082*** (68.28)	158.634 (97.40)
Per dollar	0.076*** (0.00)	0.079*** (0.01)	0.077*** (0.01)
Age	-7.665* (4.05)	-9.840** (4.52)	-9.414 (7.15)
Age ²	0.158* (0.09)	0.208** (0.09)	0.393** (0.19)
Idle Assets	0.000*** (0.00)	0.000*** (0.00)	0.000*** (0.00)
GNIPC	0.001 (0.00)	0.001 (0.00)	0.002 (0.01)
Growth	-1.365 (1.40)	0.91 (1.05)	2.355 (1.50)
Bank	128.638*** (30.69)	113.865*** (31.30)	
Credit	-103.125** (45.66)	-106.542** (43.31)	
NBFI	97.467*** (18.81)	93.202*** (20.49)	
Rural	39.273** (17.84)	36.526** (18.38)	
Africa	39.557 (42.62)	40.038 (42.83)	
EAP	-82.379*** (26.39)	-86.437*** (25.34)	
ECA	70.054 (47.58)	92.078* (55.02)	
MENA	-70.807*** (22.99)	-79.212*** (22.00)	
SA	-146.821*** (28.92)	-147.470*** (27.40)	

MFIs' interest rates is to compare each cost component to average loan size, \$2,300 in our data. When extrapolating the corresponding ratios, also based on mean values of each variables, we can find that MFIs need to charge at least 6.5% ~ 7.4% interest rates (real) on average to cover their operating costs caused by H , and 6.5% ~ 7.8% and 2% ~ 2.3% for covering per dollar costs and institutional fixed costs, respectively.

Table 1.4 shows the results of estimating **Equation 2**. Similarly with **Equation 1**, for both unbalanced and balanced panel data, we estimate **Equation 2** with two different regression methods according to whether we are considering unobserved heterogeneity or not – Maximum Likelihood Estimation (MLE) and First Difference estimation (FD). Setting aside not being able to estimate time invariant variables, one shortcoming of the FD method for **Equation 2** is that the three cost function parameters in logarithm are not identified up to level but only to proportionality. That means one parameter of the three cost factors has to be given an initial value. Thus, following the MLE results, the variable cost l is fixed to 0.019 and 0.026 in regression (8) and (10), respectively.

Under a different assumption that other covariates affect the three cost factors evenly and multiplicatively, the results from MLE regressions are similar to the results from Table 1.3, for both unbalanced and balanced data. Unlike in Table 1.3, when interpreting the coefficients in Table 1.4, one thing we have to keep in mind is that there exists an adjustment factor – the exponential of sum of other covariates. The adjustment factor of regression (7) and (9) are 3.51 and 2.13, respectively. Thus once multiplying them to each cost coefficient, we can find that still there are \$130~150 per borrower fixed costs, which is a little bit consistent with the findings from Table 1.3. Even though FD regressions, especially regression (10), result in different results for two fixed cost variables, 95% confidence intervals for the two coefficients from FD regressions are mostly, or entirely, overlapped by ones from MLE. That tells us that FD results do not contradict the results of MLE, but rather confirms them. The most remarkable difference, compared with the results from Table 1.3, could be summarized by the shrinkage of institutional fixed costs

Table 1.4: Estimation results of Equation 2

	Unbalanced		Balanced	
	MLE (7)	FD (8)	MLE (9)	FD (10)
Fixed	21433.75 (13136.43)	6825.716 (4329.39)	17684.28 (14433.65)	2705.464 (2019.98)
Per Borrower	38.091** (16.55)	49.614*** (8.90)	69.620** (32.05)	134.397*** (25.03)
Per dollar	0.019* (0.01)	0.019	0.026** (0.01)	0.026
Age	-0.021*** (0.01)	-0.047*** (0.01)	-0.026** (0.10)	-0.013 (0.02)
Age ²	0.000** (0.00)	0.001*** (0.00)	0.000** (0.00)	0.001** (0.00)
ln(Idle Assets)	0.194*** (0.03)	0.029** (0.01)	-0.162*** (0.03)	0.026* (0.01)
ln(GNIPC)	0.054 (0.04)	0.033 (0.10)	0.017 (0.05)	0.230** (0.11)
Growth	-0.007*** (0.00)	-0.001 (0.00)	-0.005* (0.00)	0.005 (0.00)
Bank	0.197*** (0.07)		0.276*** (0.08)	
Credit	-0.382*** (0.08)		-0.203** (0.09)	
NBFI	0.108** (0.05)		0.198*** (0.06)	
Rural	-0.045 (0.11)		0.096 (0.12)	
Africa	-0.149 (0.10)		-0.114 (0.13)	
EAP	-0.415*** (0.08)		-0.474*** (0.08)	
ECA	-0.109* (0.06)		-0.02 (0.06)	
MENA	-0.379*** (0.09)		-0.446*** (0.09)	
SA	-1.140*** (0.09)		-1.335*** (0.12)	

¹. Unbalanced: 526 MFIs, 3624 obs. (FD: 525 MFIs, 3098 obs.)

². Balanced: 375 MFIs, 1464 obs. (FD: 373 MFIs, 1089 obs.)

and enhancement of per borrower fixed costs. Consequently, it turns out that when evaluating at the mean values of $\frac{1}{N}$ and L , institutional fixed costs only account for 0.5% ~ 10% of cpb on average, while per borrower fixed costs comprise up to 67%, and per dollar loan costs do 32%~48% of cpb.²¹

1.4.1.2 Other variables

Since the primary purpose of this study is focused on above core cost variables, as for other variables, we will not deal with them in detail. We therefore simply report several things that we find. First, as most previous studies show, there exists an inverse correlation between MFIs' age and costs. The longer MFIs operate, the higher efficiency gains they receive, and consequently, the less cpb until about 25 years according to the results in Table 1.3. In some degree, however, this might be because of selection bias. Since more efficient MFIs possibly survive longer, older MFIs in the dataset would be more efficient. Institution's type also brings a significant difference - correlated but not necessarily causal - in MFIs' operating costs. For example, Table 1.3 says that, when other things are equal, average cpb of bank-type MFIs are about 30% higher than ones of NGO-type MFIs because bank-type MFIs spend \$115 more for each borrower. The results from Table 1.4 address the effects in a different way, e.g. on all three cost dimensions, bank-type MFIs spend 20% more than NGO-type MFIs. However, we can't say bank-type MFIs are less efficient than NGOs. Since they are operating generally in urban area, based on individual lending, and on a large scale, it might be a necessary consequence for them to operate under the highest cpb (Rosenberg et al., 2013). For assets and two macro variables, we fail to derive consistent results. Finally, the results show considerable regional difference in operating costs.

²¹ These weights are calculated based on the mean value of cpb, average loan size, and number of borrowers.

1.4.2 Markups

As mentioned earlier, the ultimate goal of this study is to show how much of MFIs' high interest rates are due to per borrower fixed transaction costs. Though there might be several ways to measure the extent, in this section, we will use the ratio of following two interest markups for covering the operating costs.

For MFIs to cover their operating costs, the minimal interest rate, say $\hat{I}_S$, that they have to charge to their borrower should satisfy the following equation:

$$\begin{aligned}(1 + \gamma)GLP &= (1 + \rho)GLP + \text{Total Operating Costs} \\ &= (1 + \rho)GLP + N \cdot \text{cpb}\end{aligned}\tag{1.6}$$

where ρ is a cost of fund, the interest rate that MFIs have to pay. From (1.6), we can derive cost-covering interest markups, $\gamma - \rho$, both with and without per borrower fixed transaction costs.²²

i.e. under **Equation 1**,

$$\text{markup}(\gamma - \rho) = \frac{\kappa}{LN} + \frac{H}{L} + \ell \quad \text{with } H \neq 0 \tag{1.7}$$

$$= \frac{\kappa}{LN} + \ell \quad \text{with } H = 0 \tag{1.8}$$

and under **Equation 2**,

$$\text{markup}(\gamma - \rho) = \left[\frac{\kappa}{LN} + \frac{H}{L} + \ell \right] \exp(\beta_M M + \beta_X X + \beta_R R) \quad \text{with } \eta \neq 0 \tag{1.9}$$

$$= \left[\frac{\kappa}{LN} + \ell \right] \exp(\beta_M M + \beta_X X + \beta_R R) \quad \text{with } \eta = 0 \tag{1.10}$$

From the above markup formulas, we can see that as average loan size grows, the

²² "Without per borrower fixed transaction costs" means the case where we assume there exist no per borrower transaction costs at all.

estimated markup decreases, and the magnitude depends on the parameters of two fixed cost – κ and η (or H). As shown in Section 1.4.1.1, however, number of borrowers is too large for a volatility of loan size to cause a significant fluctuation of markup through κ , institutional fixed costs. Thus, it could be inferred that when loan size varies, most of the changes in markup incurred through η (or H), per borrower fixed costs. For that reason, it is meaningful to compare the ratio $\frac{(1.7) - (1.8)}{(1.7)}$ by varying loan size, to see directly how much per borrower fixed transaction costs account for the operating cost-covering interest markup in accordance with loan sizes.

$$\text{Ratio of two markups} = \frac{\eta N + \beta_M M + \beta_X X + \beta_R}{\kappa + \eta N + \ell GLP + \beta_M M + \beta_X X + \beta_R} \quad \text{under Equation 1} \quad (1.11)$$

$$= \frac{\eta N}{\kappa + \eta N + \ell GLP} \quad \text{under Equation 2} \quad (1.12)$$

Figure 1.1 shows the changes of all the three markup indices, (1.7) – (1.12), at five different levels of average loans size, based on the results of Table 1.3.²³ Three bars are corresponding to each markup in sequence. Figure 1.1 tells us that H plays an important role in MFIs' high interest rates, especially when average loan size is small. On average, MFIs which operate with \$400 small loans have to charge substantially high interest rates to make up their operating costs from at least 50% to over 70%.²⁴ Among the interest rates, more than 80% are solely due to H , i.e. H increases MFIs interest rates more than 40 percentage points. As average loan size grows, the influence of H gradually shrinks. For a MFI, making an average \$1,000 loan, H becomes a direct cause to increase its interest

²³ Each of five average loan sizes is roughly corresponding to following five percentile of average loan size – 10%, 25%, 50%, 75%, and 90%. After we extrapolate markup for each observation at five levels of average loan size, we use the median markup for each levels of average loan size. Thus, this graph shows how much of interest markup is needed to cover its' operating costs for a representative median MFI.

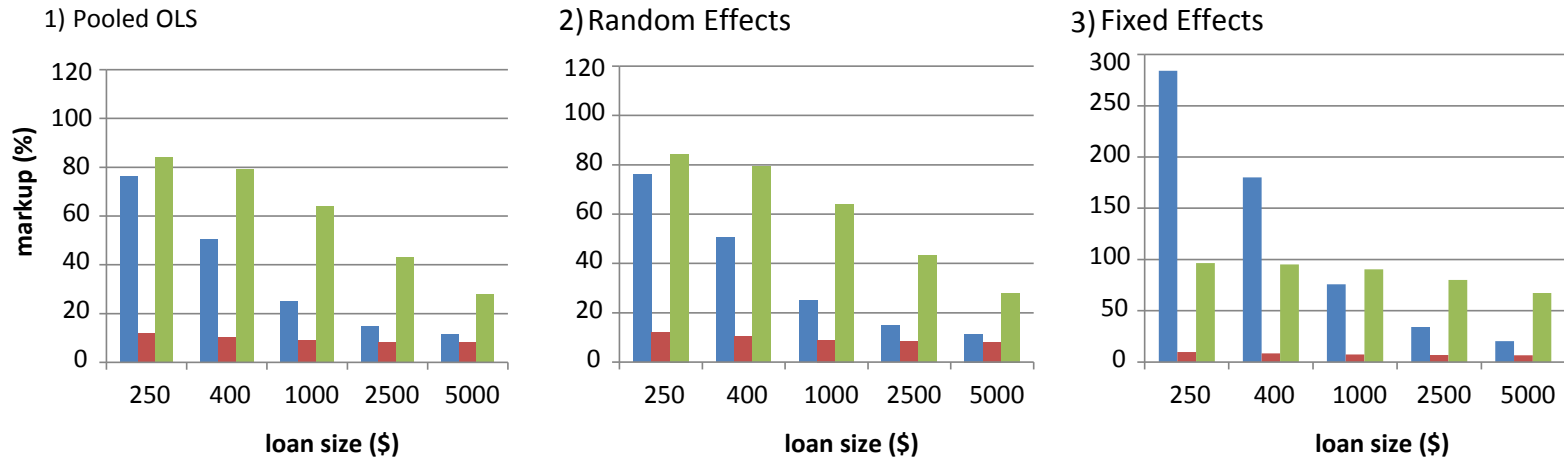
²⁴ Since the markup graph based on regression (3) shows quite exceptional results, it was excluded when analyzing the results.

rates by 15 to 20 percentage points more. And MFIs dealing with relative larger \$2,500 loans have to charge about six to nine percentage points higher interest rates to their borrowers because of H . Considering that average loan size in our data is \$2,300, these results are consistent with the one in Section 1.4.1.1, saying among MFIs' interest rates, approximately seven percentage points result from the existence of H . Since the average gross interest yield (real) is 27%, it is a substantial degree.

Markup graphs in Figure 1.2 are based on the results of Table 1.4. Markup graphs from MLE estimations are too similar with those in Figure 1.1 to add any mention. The problem comes from the graphs with FD regression results. Both of them show quite different markup ranges with others – one is too low, and the other is too high. However, since the FD estimates are anchored in given amounts of ℓ , it is of little use to be stuck with the absolute markup values. Rather, what should be focused here is the third bar, which showing the ratio of markup due to per borrower fixed costs. Then, we can confirm that these graphs also support the main finding that the smaller average loan size is, the more per borrower fixed costs matter to MFIs interest rates.

Figure 1.1: Markups based on the results of **Equation 1**

1) Unbalanced



2) Balanced

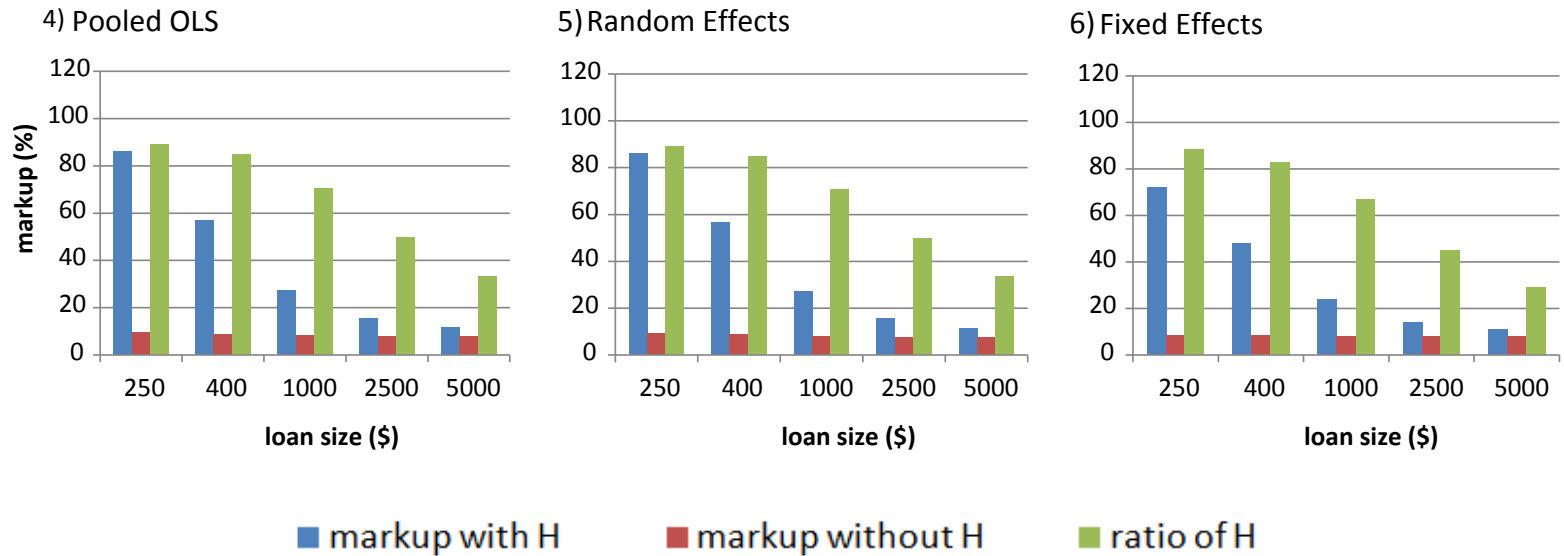
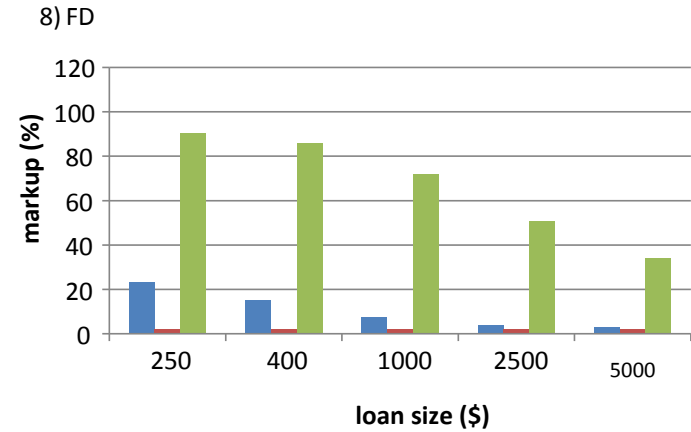
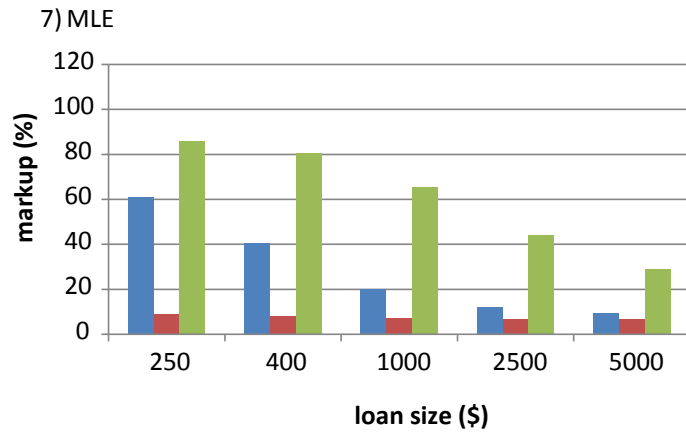
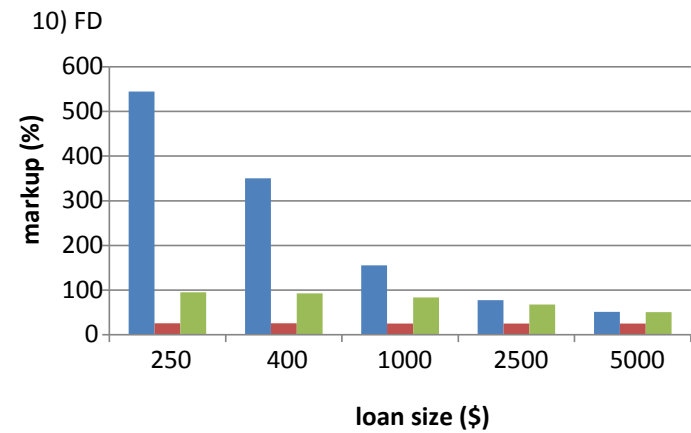
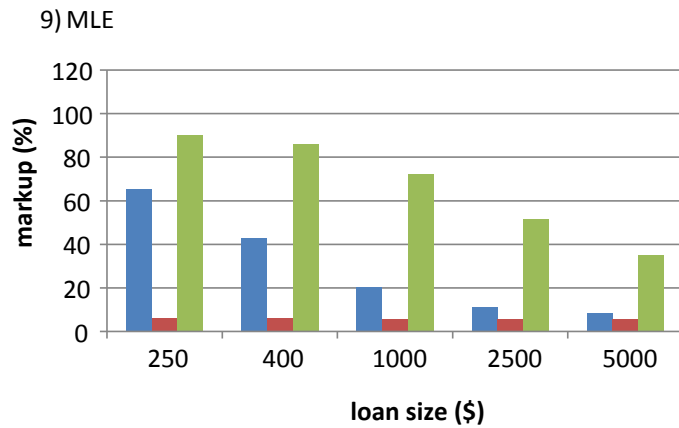


Figure 1.2: Markups based on the results of Equation 2

1) Unbalanced



2) Balanced



■ markup with η ■ markup without η ■ ratio of η

1.5 CONCLUSION

The fixed costs theory demonstrates why MFIs providing small loans have to charge higher interest rates compared to commercial banks with larger loans – it is because of the existence of per borrower fixed costs, which is not offset by any increase in number of borrowers. This theory, however, does not present a standard about how much of MFIs' interest rates are due to small loan size. Further, none of the previous literature has tested this theory directly.

Using theory-based operating cost functions and large panel data set covering 534 MFIs, this study attempts to test the fixed costs theory by answering the following two questions: are there significant fixed costs involved in microlending? And quantitatively, how much of MFI interest rates can the estimated fixed costs explain?

First, we find strong evidence that there exists about \$150 per borrower fixed transaction costs. Considering that average per borrower operating costs is \$400, the finding tells us that per borrower fixed costs explain about 40% of total operating costs, and consequently, cause an increase of MFIs' interest rates by seven percentage points. Then, by extrapolating the operating cost-covering markups, we also show that the smaller average loan size is, the larger the effect of per borrower fixed costs on MFIs interest rates. It is more than 40% between the markups of two MFIs – one makes small \$400 loans and the other makes large \$5,000 loans.

However, considering the 27% average interest rate in our data, we can infer that other than per borrower fixed costs, still there might exist other factors for MFIs' high interest rates. As mentioned earlier, lack of competition in microfinance could be one possibility. Unfortunately, because of data limitation on competition in microfinance markets, our study does not cover the effect of competition on MFIs' interest rates.

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CHAPTER 2

RELIGION AND MICROFINANCE

2.1 INTRODUCTION

It is not until recently that religion has been magnified as a significant factor in development economics even though, since Weber's seminal work, religion and religious belief has been considered critical to people's economic behavior. Deneulin and Rakodi (2011) attribute the recent rise of religion to the following three trends; an increasing importance of religion itself, an expansion of "political Islam,"¹ and an underlying role of "Faith-Based" organizations (FBOs) in developing countries. Of course, there might exist other reasons; however, the above three trends are enough to explain why religion should be counted as a significant factor in recent academic field.

Contrary to the decrease of religiosity over time from most developed countries,² in most developing countries and LDCs, religion still plays a critical role as a social norm or social capital, which has an influence on individual economic behavior, and consequently development (Levy, 2013; Harper et al., 2008). As of today, Islam is the second largest and the fastest growing religion in the world. Since the inseparability of religion and politics is a fundamental of Islam, in many Islamic countries, religious doctrines not only affect religious space but also extend their influences on political and economic space. For example, all banks in the Islamic Republic of Iran have to follow the law for usury free banking (Wilson, 2008). Islamic banking and finance is now reported to grow rapidly at 10~15% per year. Even though it has been ignored in economic development studies,

¹ Political Islam, or Islamism, is a term that refers to the inseparability between religion and politics in Islam – e.g. Islam should guide social and political as well as personal life. Berman (2003).

² The only exception is United States. Harper et al. (2008)

religious organizations, often represented by “religious NGOs” (rNGOs) or “faith-based NGOs” (FBOs), carry out important role in various fields on developing countries such as health, education, and civil society. Several studies show that almost half of all primary schooling and health services in sub-Saharan Africa are provided by FBOs (Clarke, 2010; Deneulin and Rakodi, 2011).

For such reasons, recently, mostly after 2000, a growing number of economics papers are being published on the effect of religion. McCleary and Barro (2006), using a large scale cross-country analysis, shows that not only religious affiliations but also religiosity matter to growth. They conclude that Islam, compared to other religion, is negatively correlated with per capita growth rate most significantly. They also find that religious belief is positively correlated with economic growth, while church attendance has a negative effect on the growth rate of per capita GDP.³ Noland (2005), however, does not find any evidence that Islam is an obstacle to growth. Rather, using Bayesian model averaging methods, Sala-I-Martin et al. (2004) finds a positive correlation of Islam and per capita income growth.⁴ Guiso et al. (2003) show the effect of religion on growth indirectly by estimating how religion and religiosity affect people’s attitudes that are considered to be correlated with economic performances. They find that more religious people are less open-minded about women and their role; however it differs depending on religious denomination and whether it’s a dominant religion or not. Besides, several studies investigate the effects of religion on various economic outcomes such as health (Deaton, 2011; Ellison and Levin, 1998; Green and Elliott, 2010), crime rate (Evans et al., 1995; Heaton, 2006), education (Bartkowski et al., 2008; Cooray and Potrafke, 2011), and ethics (Parboteeah et al., 2008).

Microfinance, one of the fastest growing field in development economics, might be a

³ However, using Bayesian model averaging methods, Durlauf et al. (2012) shows that McCleary and Barro (2006)’s results are not robustly significant, and only monthly church attendance, not belief variables, has a limited effect on growth. However, they find it has an opposite effect, i.e. church attendance has a positive effect on GDP growth.

⁴ An econometric approach on the religion effect, however, is bound to be exposed to the serious endogeneity problems. Richardson and McBride (2009); Platteau (2008); Greif (2006).

good industry for researcher to explore the effects of religion on economic development because still there are many poor people who are excluded from formal financial services, and a majority of them live in rural areas with strong religious social norms. For example, in many Islamic countries, even if they are eligible, quite a number poor people do not deal with conventional interest-based microloans simply because of religious reasons (Masyita and Ahmed, 2013; Karim et al., 2008). Besides, Muslims are reluctant to fall into debt because people who have a debt are not allowed to enter into Mecca (Morvant-Roux et al., 2014). On the other hand, Guérin et al. (2009) shows that in South India, a Hindu-majority region, people go into debt for religious reasons to stay in social.

However, only limited studies have been done on the effect of religion on microfinance, and even most of them are focused on Islam and the practice of Islamic finance (Ashta and Selva, 2011). Most of these studies, however, are vulnerable to external validity because they are based on a single country analyses; e.g. Al-Azzam et al. (2012) shows that when borrowers fall into a situation of loan delinquency, more religious borrowers repay faster in Jordan, a Muslim-majority Country.

One exception is Mersland et al. (2013). This is the first paper that empirically shows the differences in performances between Christian- and secular- MFIs (microfinance institutions) through cross-country analysis. They find Christian MFIs have lower cost of funding; however they have much lower gross loan portfolio yields, and consequently have lower financial performances compared to secular MFIs. However, still it has a couple of limitations: first is that it focuses on Christianity only. Second, they only consider the religious background of providers (MFIs), not recipients (borrowers). However, since it takes two to tango, both providers' and recipients' religiosity should be taken account of at the same time to estimate the effects of religion on MFIs' performances. For example, two Christianity-based MFIs – one whose staffs and borrowers are mostly Muslim and the other with a majority of Christian staffs and borrowers – might take different operating strategies, and correspondingly show different outcomes. So far, none of the

empirical studies on microfinance responds to the two 'traditional' research questions that have been explored by most previous studies on the relationship between religion and economic performances; whether a certain religious denomination is better or worse in MFIs' operation, and whether religious intensity also has an impact on MFIs' performances.

This study aims to provide answers to the above two questions. For the empirical analysis, we construct a panel data set, which consists of 3488 observations from 633 MFIs in 35 countries. MFI performance data come from Mix Market, and religion variables from World Value Survey (WVS). From World Development Indicators, country level control variables are obtained.

It is presumably assumed that, similar to what has been shown in McCleary and Barro (2006), and Guiso et al. (2003), MFIs in Islamic countries would fall behind in their performances because 1) Muslims are reluctant to pay any interest, 2) Muslims are more discriminatory against women (Guiso et al., 2003), and 3) a majority of international lenders and microfinance network are based on Christianity (Mersland et al., 2013; Harper et al., 2008).⁵ However, it turns out that, compared with MFIs operating in Muslim-dominant countries, MFIs in Christian-dominant countries have significantly lower operational self-sufficiency due to their relative inefficiency in their operation. This could be interpreted as supporting Obaidullah and Latiff (2008), which shows recent development of Islamic finance enables established microfinance models to be duplicated successfully on Islamic interest-free microfinance system.

The rest of the paper is organized as follows: The next section describes data and estimation methodology. Results are presented in Section 2.3. Section 2.4 concludes.

⁵ High interest rates, female borrowers, and subsidy are critical features of microfinance.

2.2 DATA AND ESTIMATION METHODS

The data set is constructed from three different sources. First, from the Mix Market (<http://mixmarket.org/profiles-reports>) comes all MFI data, includes all dependent variables and a set of MFI-level control variables such as age, asset, and institutional types.⁶ Dependent variables are two types of MFI performance indicators – one is Operational Self-Sufficiency and its' each components for financial performance, and the others are for growth performances; growth of average loan size and growth in number of borrowers. Second, all religion data comes from World Value Survey (WVS) 2014, the 6th wave (<http://www.worldvaluessurvey.org/WVSDocumentationWV6.jsp>);⁷ religion adherence shares and the ratio of 'religious' population, which is defined by attending religious services at least once a month. Third, two country level control variables, per capita GNI and its growth rate, are obtained from World Development Indicators (<http://data.worldbank.org/indicator>). In all, a data set consists of 633 MFIs operating in 35 countries over 1995–2010. Table 2.1 provides a summary statistics with detailed description for each variable.

It is noteworthy that there are only two religion dummies – Christianity and Islam, because it is directly connected with the core assumption of this study. Once again, one of the main purposes of this study is to show whether different religions have different effects on MFIs' performances. However, unlike previous literature, we cannot use country-level aggregated religion adherence shares to see the religion effects on MFIs' performances because MFIs are usually operating in local market, which might have a totally different religion distribution from a whole country. Problem is that we do not have detailed MFI data on religion; e.g. whether the MFI has a religious background or not, and what is the religious share of borrowers. Thus we make a rough assumption that in countries where a particular religion share comprises more than 80% of their total pop-

⁶ MFIs that microfinance form more than 80% of their operations are only included.

⁷ If a country is excluded from WVS 6th wave, but included in 5th wave, we take religion variables from the 5th wave.

Table 2.1: Summary Statistics

	Obs.	Mean	SD	25 th %ile	Median	75 th %ile
OSS	3320	117.4	77.38	99.9	111.99	131.01
CPB	2816	362.02	766.27	70.2	190.56	391
Loan Growth	2853	-0.05	37.52	-8.97	4.59	15.95
Borrower Growth	2850	-7.91	1199.4	3.89	16.55	32.1
Yield	2191	26.58	18.95	14.05	22.1	34.85
Revenue	2185	26.45	70.71	15.34	24.1	37.3
Expense	2183	5.07	10.95	2.54	4.89	7.56
Loan Loss	2818	1.5	5.23	0	0.15	1.25
PAR30	3062	5.19	8.27	0.67	2.82	6.39
Christianity	3488	0.46	0.5	0	0	1
Islam	3488	0.22	0.41	0	0	0
Attendance	3488	54.44	22.48	45.14	60.82	69.28
Age	3488	12.12	8.93	6	10	16
Asset	3485	16.06	1.99	14.76	15.91	17.34
GNI	3488	9.21	0.63	8.82	9.33	9.66
Growth	3488	4.58	4.56	2.48	4.45	7.08

- ¹. All financial data are converted to PPP, constant 2005 international \$.
- ². OSS (Operational Self-Sufficiency) is defined as Financial Revenue divided by the sum of Financial Expense, Loan loss provision expense and Operating Expense.
- ³. CPB (Cost per Borrower) is defined as total operating expenses divided by Number of Active Borrowers, where operating expenses includes all personnel expense, depreciation and amortization, and administrative expense.
- ⁴. Loan growth refers Growth rate of average loan size (Annual).
- ⁵. Borrower Growth refers Growth rate of number of borrowers (Annual).
- ⁶. Yield is gross yield per dollar loaned.
- ⁷. Revenue is financial revenue per dollar loaned.
- ⁸. Expense is financial expenses per dollar loaned.
- ⁹. Loan loss is defined as the difference between Write-offs and Value of Loans Recovered, which divided by Loan Portfolio, gross, average.
- ¹⁰. PAR30 is defined as Portfolio at Risk which is more than 30 days, divided by Loan Portfolio, gross, (%).
- ¹¹. Christianity is 1 if % of Christian adherents is greater than 80%.
- ¹². Islam is 1 if % of Islam adherents is greater than 80%.
- ¹³. Attendance is % of population that attend religious service at least once a month.
- ¹⁴. Age is age of MFI (years).
- ¹⁵. Asset=log(total net asset).
- ¹⁶. GNI=log(GNI per capita).
- ¹⁷. Growth means growth rate of GNI per capita.

ulation, operation of MFIs cannot help being affected by the major religion in all aspects. Based on the assumption, we cluster all religious denominations into 8 groups – Christianity, Islam, Buddhism, Hinduism, Jewish, Folk, Other, and none. Since there are only two religions that meet the above 80% constraint – Christianity and Islam, we reclassified all countries into following three categories by major religion: more than 80% Christian-, more than 80% Islam-, and none-dominant religion countries. Table 2.2 shows a distribution of MFIs by religion and region. Among 633 MFIs in the data, 234 MFIs (36.9%) come from Christian-dominant countries while 141 MFIs (22.3%) from Muslim-dominant countries. Considering that 31.5% of world population is Christian and 23.2% is Muslim,⁸ it seems that our data reflects well the distribution of religion in the world.

Table 2.2: Distribution of MFIs

	Christian	Islam	None	Total
Africa	21	0	21	42
East Asia and the Pacific	43	28	24	95
Easter Europe and Central Asia	17	47	110	174
Latin America and the Caribbean	153	0	2	155
Middle East and North Africa	0	14	2	16
South Asia	0	52	99	151
Total	234	141	258	633

For robustness, we apply four different estimation methods. To address outlier problem, we use median regression as well as random effects (RE) methods. Besides, in order to relax the strong assumption⁹ that is required for a consistency for the RE estimators, we employ a correlated random effects approach with the Mundlak device. It can allow for them to be correlated in a restricted way by modeling the unobserved heterogeneity as a function of time averages of the time varying covariates. Each MFI performance indicator is regressed on following covariates: 1) five religion variables – Christianity(dummy), Islam(dummy), monthly attendance, and two interactions of religion dummy and monthly attendance; 2) four MFI level variables – age, age², asset, and institutional type of MFI; 3)

⁸ Source: Pew Research (2011)

⁹ No correlation between covariates and unobserved heterogeneity.

three country level variables – per capita GNI and its growth rate, and private credit to GDP; 4) time and region dummies.

2.3 RESULTS

Univariate t-tests show that there are significant differences in almost every MFI-performance variables by religion groups.¹⁰ [Table 2.3] Most interestingly, contrary to common expectation, it turns out that MFIs in Christian countries charge much higher yields on their loans. In short, Table 2.3 shows that MFIs in Islam countries earn relatively lower yields; however, they operate much more cost-efficiently, and consequently achieve higher operational self-sufficiency, compared to MFIs in Christian countries. Besides, it also shows that religion matters on MFIs outreach performances in both depth and breadth.

Table 2.3: Univariate Analysis Results

	Mean Values			F-Stat
	Christian	Islam	Non-Dominant	
Operational Self-Sufficiency	113.41	133.4	111.81	21.07***
Costs per Borrower	384.5	223.23	425.58	13.76***
Gross Portfolio Yield	34.51	19.35	18.83	219.70***
Financial Expense per Dollar Loaned	5.71	3.24	5.18	7.64***
Loan Loss Rate	2.19	1.1	0.77	22.37***
Portfolio at Risk > 30 days	6.08	4.74	4.22	16.01***
Average Loan Growth	1.51	-1.92	-1.14	2.31*
Number of Borrowers Growth	14.4	12.76	-56.87	1.06
Age	14.08	12.08	9.41	95.59***
Asset	16.44	16.02	15.55	68.80***
GNI	9.42	8.79	9.19	304.15***
growth	3.16	4.65	6.5	198.12***

2.3.1 Financial Performances

Table 2.4 reports the regression results for MFIs' operational self-sufficiency (OSS), one of the main financial indicators, and its each component- financial revenue, financial ex-

¹⁰ The only exception is a growth of number of borrowers.

pense, impairment loss, and operating expense. Due to the country-level variation of our key independent religion variables, robust standard errors are clustered at country level.

2.3.1.1 Operational Self-Sufficiency

Table 2.4 shows that consistently in all regressions, MFIs in Christian countries operate with significantly lower level of self-sufficiency. Since both mean and median OSS of MFIs in the data are well above 100% [Table 2.1 and 2.3], the above results might be only applied for already sustainable MFIs. However, 25th quantile regression results also uphold the same, rather stronger, conclusion.¹¹ Thus we can say that regardless of whether MFIs make a break-even or profits, Christianity has a significantly negative effect on MFIs' OSS. It is consistent with Mersland et al. (2013) that shows Christianity-based MFIs' lower OSS compared with secular MFIs. Besides religion itself, religious intensity¹² also matters on MFIs' OSS. The results shows that in Christian countries, more religious people are in the country, the higher OSS MFIs have. In Islamic countries, however, we cannot see any strong evidence that religion and religiosity affect on MFI's OSS. The effects of each religion on MFIs' OSS are extrapolated at different religiosity levels in Table 2.5.

¹¹ Regardless of dominant religions, lower 25 percentile of OSS is roughly 100%. In more detail, it is about 101% in both Christian- and Muslim dominant countries, and 97% in non-dominant countries.

¹² In our model, it is represented with monthly attendance rate for official religious services.

Table 2.4: Estimation Results for OSS and its component

	Operational Self-Sufficiency			
	RE	CRE	Median	Median (CRE)
Christianity	-41.491*** (11.44)	-39.612*** (12.68)	-35.333* (19.30)	-32.597 (20.49)
Islam	-8.523 (11.97)	-3.088 (15.14)	-10.531 (9.50)	-9.381 (11.14)
Attendance	0.117 (0.20)	0.119 (0.22)	-0.112 (0.19)	-0.07 (0.23)
Christianity × Attendance	0.457** (0.18)	0.423** (0.19)	0.392* (0.22)	0.374 (0.24)
Islam × Attendance	0.184 (0.19)	0.043 (0.28)	0.200 (0.13)	0.165 (0.17)
Age	0.643 (0.42)	5.369** (2.49)	0.779 (0.55)	1.339 (2.03)
Age ²	-0.012 (0.01)	-0.111*** (0.03)	-0.015 (0.01)	-0.027 (0.02)
Asset	4.015*** (1.44)	6.406** (2.51)	3.304*** (0.99)	6.065*** (2.43)
GNI	-29.797*** (6.24)	4.547 (9.40)	-20.669*** (6.26)	3.458 (11.58)
Growth	0.756* (0.43)	0.941*** (0.32)	0.627** (0.26)	0.480*** (0.15)
Private Credit	0.312*** (0.10)	-0.279 (0.22)	0.119 (0.12)	-0.1 (0.17)
CRE device	Yes			Yes
Obs.	3304 (626)	3304 (626)	3304 (626)	3304 (626)
R ²	0.06	0.07	0.05	0.076
F-test:				
CRE		48.51***		3.08***
Chris - Islam	5.38**	5.68**	1.57	1.28
Attendance	1.62	2.19	0.61	0.67

¹. All regressions have time and region dummies.

². Robust standard errors are in parentheses, clustered at country level.

³. Median regression coefficients are reported with bootstrap standard errors.

⁴. Significance level of 10%, 5%, and 1% are denoted by *, **, and ***, respectively.

⁵. Attendance stands for monthly attendance.

Table 2.4: (cont'd)

	Operational Self-Sufficiency	
	25% ile	25% ile (CRE)
Christianity	-53.936*** (14.11)	-54.962*** (12.69)
Islam	-16.158* (9.61)	-11.379 (8.12)
Attendance	0.191 (0.13)	0.187 (0.16)
Christianity × Attendance	0.535*** (0.17)	0.551*** (0.16)
Islam × Attendance	0.174 (0.16)	0.119 (0.14)
Age	1.962*** (0.56)	2.623* (1.57)
Age ²	-0.041*** (0.01)	-0.071*** (0.02)
Asset	3.863*** (1.14)	9.661*** (1.76)
GNI	-21.911*** (3.86)	-10.136 (8.61)
Growth	0.605*** (0.20)	0.522*** (0.16)
Private Credit	0.225*** (0.07)	0.006 (0.12)
CRE device	Yes	
Obs.	3304 (626)	3304 (626)
R ²	0.04	0.04
F-test:		
CRE		9.37***
Chris - Islam	4.61**	10.40***
Attendance	2.55	5.97**

Table 2.4: (cont'd)

	Cost per Borrower			
	RE	CRE	Median	Median (CRE)
Christianity	-288.886 (487.94)	-311.62 (469.99)	-15.847 (274.83)	-73.835 (190.79)
Islam	-737.019*** (227.51)	-594.239** (272.82)	-376.299*** (90.70)	-399.761*** (130.73)
Attendance	-4.412 (3.81)	-0.954 (4.25)	-2.640** (1.27)	-2.880** (1.34)
Christianity × Attendance	9.201 (6.86)	8.123 (6.77)	2.12 (3.01)	2.82 (2.23)
Islam × Attendance	17.580*** (4.11)	16.234*** (4.45)	6.898*** (1.24)	7.264*** (1.98)
Age	-3.879 (7.48)	16.105 (25.46)	-0.482 (1.63)	-3.688 (6.40)
Age ²	0.053 (0.11)	0.455* (0.26)	0.008 (0.03)	0.116 (0.10)
Asset	-31.193** (15.31)	-15.207 (22.37)	-0.676 (3.54)	-8.16 (6.07)
GNI	380.332*** (102.98)	168.968 (163.06)	79.025* (41.06)	31.635 (44.25)
Growth	5.719* (3.42)	4.712 (2.99)	-1.838 (1.87)	-1.111 (1.42)
Private Credit	2.753 (1.86)	1.792 (2.25)	-1.027 (0.88)	0.137 (0.47)
CRE device	Yes			Yes
Obs.	2806 (570)	2806 (570)	2806 (570)	2806 (570)
R ²	0.18	0.18	0.17	0.17
F-test:				
CRE		8.72		0.49
Chris - Islam	1.01	0.45	1.57	2.83*
Attendance	2.30	2.35	2.01	3.45*

Table 2.4: (cont'd)

	Gross Yield (Real)			
	RE	CRE	Median	Median (CRE)
Christianity	-6.57 (10.98)	-2.531 (10.69)	8.997 (10.12)	10.501 (9.09)
Islam	-9.957** (4.39)	-4.69 (5.45)	-4.05 (6.85)	-2.67 (8.22)
Attendance	0.16 (0.15)	0.142 (0.14)	0.177 (0.14)	0.144 (0.16)
Christianity × Attendance	0.236 (0.16)	0.147 (0.16)	0.007 (0.18)	-0.001 (0.16)
Islam × Attendance	0.235** (0.10)	0.165 (-0.13)	0.137 (-0.14)	0.109 (-0.16)
Age	-0.386** (0.16)	0.058 (0.41)	-0.162 (0.14)	0.359 (0.88)
Age ²	0.003 (0.00)	-0.001 (0.01)	0.001 (0.00)	-0.009 (0.01)
Asset	-1.802*** (0.67)	-1.261 (0.81)	-1.333** (0.66)	-0.627 (1.11)
GNI	5.505 (4.29)	-7.379 (6.48)	10.466* (5.87)	11.369 (12.59)
Growth	0.147 (0.10)	0.146 (0.09)	0.157 (0.27)	0.265 (0.27)
Private Credit	-0.027 (0.06)	0.027 (0.06)	-0.121 (0.09)	0.015 (0.11)
CRE device	Yes			Yes
Obs.	2187 (536)	2187 (536)	2187 (536)	2187 (536)
R ²	0.34	0.36	0.35	0.35
F-test:				
CRE		11.88**		1.18
Chris - Islam	0.10	0.04	1.01	1.22
Attendance	0.00	0.01	0.30	0.28

Table 2.4: (cont'd)

	Financial Expense			
	RE	CRE	Median	Median (CRE)
Christianity	-0.808 (3.57)	-0.609 (3.32)	-1.388 (2.84)	-1.826 (2.38)
Islam	-4.527** (1.97)	-3.722* (1.93)	-5.864*** (2.12)	-5.472** (2.30)
Attendance	0.056 (0.09)	0.04 (0.08)	0.006 (0.03)	-0.005 (0.03)
Christianity × Attendance	0.001 (0.05)	0.002 (0.05)	0.012 (0.04)	0.021 (0.04)
Islam × Attendance	0.062 (0.05)	0.062 (0.04)	0.088** (0.04)	0.089** (0.04)
Age	-0.021 (0.06)	-0.054 (0.23)	0.028 (0.10)	0.099 (0.19)
Age ²	0 (0.00)	-0.003 (0.00)	-0.001 (0.00)	-0.002 (0.00)
Asset	0.540*** (0.18)	1.591*** (0.43)	0.204 (0.16)	0.768 (0.52)
GNI	3.178** (1.60)	-3.399 (2.65)	3.187 (0.75)	-1.538 (3.09)
Growth	0.029 (0.03)	0.023 (0.03)	0.07 (0.04)	0.051 (0.07)
Private Credit	-0.033 (0.03)	-0.004 (0.03)	-0.03 (0.02)	0.012 (0.02)
CRE device	Yes			Yes
Obs.	2179 (536)	2179 (536)	2179 (536)	2179 (536)
R ²	0.04	0.05	0.04	0.04
F-test:				
CRE		28.45***		1.94*
Chris - Islam	0.89	0.90	1.92	1.64
Attendance	1.21	1.66	2.70*	2.66*

Table 2.4: (cont'd)

	Loan Loss Rate			
	RE	CRE	Median	Median (CRE)
Christianity	2.667** (1.35)	3.040** (1.26)	0.719 (0.52)	0.751* (0.41)
Islam	1.926 (1.27)	2.267** (1.00)	0.164 (0.30)	0.161 (0.19)
Attendance	0.003 (0.02)	-0.007 (0.02)	-0.001 (0.00)	0 (0.00)
Christianity × Attendance	-0.012 (0.02)	-0.018 (0.02)	-0.003 (0.01)	-0.004 (0.01)
Islam × Attendance	-0.013 (0.02)	-0.022 (0.02)	0 (0.01)	-0.001 (0.00)
Age	-0.024 (0.02)	0.258 (0.17)	0.002 (0.01)	0.056** (0.02)
Age ²	0 (0.00)	-0.007** (0.00)	0 (0.00)	-0.001* (0.00)
Asset	-0.162 (0.11)	-0.683 (0.47)	0.012 (0.01)	0.019 (0.02)
GNI	1.353*** (0.43)	-2.193** (0.96)	0.201 (0.13)	0.027 (0.23)
Growth	-0.045* (0.02)	0.001 (0.02)	-0.002 (0.00)	0 (0.00)
Private Credit	-0.005 (0.01)	0.051 (0.05)	-0.001 (0.00)	-0.003 (0.00)
CRE device	Yes			Yes
Obs.	2808 (603)			
R ²	0.07	0.08	0.02	0.02
F-test:				
CRE		23.18***		1.28
Chris - Islam	0.18	0.29	0.77	1.48
Attendance	0.00	0.02	0.05	0.11

Table 2.4: (cont'd)

	PAR30		
	RE	CRE	Median
Christianity	1.796 (2.24)	1.715 (2.28)	2.421 (2.03)
Islam	-1.649 (1.12)	-1.922 (1.20)	-0.63 (1.07)
Attendance	0.053* (0.03)	0.047* (0.03)	0.025 (0.02)
Christianity × Attendance	-0.006 (0.03)	-0.005 (0.03)	-0.02 (0.03)
Islam × Attendance	0.050** (0.02)	0.066*** (0.03)	0.022 (0.02)
Age	0.140*** (0.05)	0.409 (0.26)	0.090*** (0.02)
Age ²	-0.002*** (0.00)	-0.013*** (0.00)	-0.001*** (0.00)
Asset	-0.314 (0.19)	-0.672** (0.31)	0.056 (0.09)
GNI	2.171*** (0.77)	0.853 (1.80)	0.916 (0.76)
Growth	-0.063 (0.05)	-0.055 (0.06)	-0.013 (0.02)
Private Credit CRE device	0.011 (0.02)	0.033 (0.03)	-0.014 (0.01)
		Yes	
Obs.	3046 (611)	3046 (611)	
R ²	0.06	0.06	
F-test:			
CRE		16.60***	
Chris - Islam	2.00	2.04	
Attendance	3.39*	4.66**	

Table 2.5: Effects of each religion on MFIs performances

	(1) mean		(2) 10%		(3) 25%		(4) 50%	
	Christian	Islam	Christian	Islam	Christian	Islam	Christian	Islam
OSS	-12.688 (8.52)	-0.574 (4.80)	-28.135 (17.29)	-7.977 (9.31)	-16.212 (10.39)	-2.263 (5.29)	-10.27 (7.34)	0.584 (4.80)
CPB	79.881 (78.04)	-4.22 (35.67)	-35.354 (161.25)	-300.636*** (104.38)	53.588 (95.76)	-71.852 (48.18)	97.918 (66.92)	42.176 (30.75)
Yield	10.544** (5.21)	3.441 (3.36)	10.736 (7.65)	-0.89 (5.89)	10.588** (5.22)	2.453 (3.11)	10.514* (5.43)	4.119 (3.84)
expense	-0.618 (1.00)	-0.692 (0.69)	-1.325 (1.96)	-4.108** (1.71)	-0.779 (1.12)	-1.472* (0.78)	-0.507 (0.97)	-0.158 (0.73)
Loan loss	0.546*** (0.17)	0.111 (0.07)	0.699** (0.33)	0.148 (0.14)	0.581*** (0.18)	0.119* (0.07)	0.522*** (0.17)	0.105 (0.08)
PAR 30	1.461 (1.24)	1.670*** (0.63)	1.673 (1.92)	-0.999 (0.91)	1.509 (1.31)	1.061** (0.55)	1.427 (1.24)	2.088*** (0.72)
Loan growth	5.277** (2.66)	1.743 (1.94)	4.187 (5.34)	-2.662 (4.24)	5.028 (3.13)	0.738 (1.88)	5.447** (2.44)	2.433 (2.26)
Borrower growth	-1.168 (2.90)	-1.069 (2.54)	0.112 (4.44)	6.281 (3.88)	-0.876 (2.99)	0.608 (2.29)	-1.368 (2.95)	-2.219 (2.89)

¹. Extrapolated at mean, and five different level of % of actively religious population with bootstrap standard error, based on the coefficients from median regression with CRE device (except PAR30, which is based on CRE method).

². Both Christian and Islam represent the marginal effects of each religion after netting out the effect of religiosity itself in non-dominant religion.

Table 2.5: (cont'd)

	(5) 75%		(6) 90%	
	Christian	Islam	Christian	Islam
OSS	-7.063 (5.99)	2.121 (5.20)	-0.947 (4.86)	5.052 (6.91)
CPB	121.836** (54.50)	103.699*** (31.68)	167.466*** (45.59)	221.073*** (51.68)
Yield	10.474* (5.97)	5.018 (4.73)	10.398 (7.55)	6.733 (6.80)
expense	-0.36 (1.01)	0.551 (0.89)	-0.08 (1.29)	1.904 (1.37)
Loan loss	0.490*** (0.19)	0.097 (0.10)	0.429* (0.26)	0.082 (0.15)
PAR 30	1.383 (1.29)	2.642 (0.87)	1.299*** (1.52)	3.698*** (1.21)
Loan growth	5.673** (2.31)	3.347 (2.89)	6.105** (2.67)	5.092 (4.39)
Borrower growth	-1.634 (3.16)	-3.745 (3.51)	-2.141 (3.91)	-6.655 (4.90)

Mersland et al. (2013) attribute Christian MFIs' lower OSS to their lower portfolio yield.¹³ However, the rest of the regression results of Table 2.4, which contains each component of OSS, reveal that the lower OSS of MFIs in Christian countries mainly results from their relative higher operating costs.¹⁴

2.3.1.2 Operating Expense (Costs per Borrower)

As shown in Table 2.3, per borrower operating costs of MFIs are significantly low in Islamic countries, and regression results in Table 2.4 also support the same result. A coefficient estimate of Islam dummy has a huge and significantly negative value in all regressions, from -370 up to about -700. Such a large negative effect of religion, Islam, is mostly reduced by religiosity, which is significantly and positively correlated with oper-

¹³ They conclude there are no significant differences in both operational efficiency and borrowers' repayment between Christian- and secular-MFIs.

¹⁴ More precisely, what the results show are that Islam dummy has a significantly negative effect on MFIs' cpb, while its religiosity intensity has significantly positive effects. And on average, Islam has an impact of lowering MFIs operating costs.

ating costs. However, we find little evidence on the correlation between MFIs operating costs and religion, or religiosity in Christian countries. In Table 2.5, per borrower operating costs of MFIs in Christian countries, even though being extrapolated based on insignificant coefficient estimates, are much higher than MFIs in Islamic countries. However, the higher the ratio of actively religious population, the closer the gap between two religions, and finally, in some cases with extremely higher religious population ratio, it turns out that MFIs in Christian countries operate more cost-efficiently.

Such a low operating costs of MFIs in Islam countries could be explained by their unique feature of profit and risk sharing, which gives borrowers incentives not to default and consequently enables MFIs to save their operating costs (Barden, 2010). Besides, there are some studies that support the operational cost-efficiency of MFIs in Islam countries based on Islamic ethics. Hasan (1995) finds that Islamic ethics has a positive effect on reducing the moral hazards and adverse selection problems. The finding of Guiso et al. (2003), that Islam has a negative impact on trust on others, also can be a rationale for the efficiency of MFIs in Islamic countries; i.e. under group-lending system, lower trust can be a motivation for strong “peer-monitoring.”

2.3.1.3 Financial Revenue (Gross Portfolio Yield)

Because of its strong usury ban, it could be considered that MFIs rooted in Islamic tradition might charge lower interest rates. As shown in Table 2.3, it seems that actually MFIs in Muslim-dominant countries take significantly lower financial yield compare to MFIs in Christian countries, but as high as what MFIs in non-dominant religion countries charge. However, regression results in Table 2.4 suggest that there are no religion effects on MFIs’ yield. It might be because the dependent variable is not interest rates itself but gross portfolio yield, which includes interest rates and all other fees on loans. Even though any fixed interest charge on loans is opposed to traditional Islamic view,¹⁵ Islamic bank-

¹⁵ There are two reasons why Islam prohibits charging any fixed interest rate. First is they believe it is unjust to make a money from money itself without any labor, and the second is they also believe only God

ing system has developed alternative ways to impose financial charges and fees on loans without breaking the Islamic rules. For example, Akhuwat, a MFI in Pakistan, charges borrowers a 5% membership fee and 1% of insurance of their loans (Harper et al., 2008).

2.3.1.4 Financial Expense

Religion and religiosity are also correlated with MFIs' cost of funds, which is measured by financial expenses per dollar loaned. The lower financial expense of MFIs in Islam countries, shown in Table 2.2, is still upheld in Table 2.4. Contrary to Mersland et al. (2013), we cannot find any strong evidence of lower cost of funds of MFIs in Christian countries. Rather, Table 2.3 shows that MFIs in Christian countries have the highest average financial costs, while MFIs in Islam countries have the lowest among three religion groups.

The negative correlation between Islam and financial costs of MFIs could be explained by 'charity' virtue of Muslim. Along with daily prayer and Ramadan fasting, charity consists of the five fundamental pillars of Islam, and there are several charity funds such as Zakat, Infaq, and Shadaqah.¹⁶ Usually, those funds are distributed by Islamic MFIs to the poorer of the poor borrowers as interest-free loans (Effendi, 2013). Consequently, those social funds based on Islamic tradition, enable Islamic MFIs to raise funds with lower financial costs.

Table 2.5 shows the significantly lower cost of funds of MFIs in Islam countries compared with MFIs in non-dominant religion countries.¹⁷ However, because financial costs account for only a small portion of MFIs total costs, it is hard to see it as a major factor that causes a distinct difference in OSS of MFIs.

knows the future (Harper et al., 2008).

¹⁶ Among them, Zakat, the annual distributing of 2.5% of accumulated wealth to the poor, is compulsory for all Muslims, and is the largest source of funding for development institutions in Islam countries.

¹⁷ In all the religiosity levels, it turns out that MFIs in Christian countries operate with lower financial costs. However, the results are not significant.

2.3.1.5 Loan Loss Expense (Loan loss rate and PAR 30)

Even though the results of Table 2.3 implies that MFIs in Christian countries have higher default risk, regression results for two impairment loss indicators, loan loss rate and PAR30, do not provide consistently significant effects of religion on borrowers' repayment activity. Further, all the coefficients of religion variables have small values. Thus, we can infer that the impairment costs are not the main cause of the difference in MFIs' OSS between two religion.

2.3.2 Growth Performances

Table 2.6 contains regression results for two MFIs outreach performances – loan size growth and number of borrower growth.

2.3.2.1 Average Loan Growth

Median regression results show that regardless religion, the growth of average loan size is decreasing with the increase of people's religiosity. Even though it is not reported, it turns out that level of average loan size also decreases as religiosity increases. Thus, when considering that average loan size is often used as a proxy for poverty, the above result can be interpreted that MFIs in more religious countries are putting more efforts on their social mission, and approaching poorer clients.

2.3.2.2 Number of Borrowers Growth

Table 2.1 shows that the distribution of growth in number of borrowers is seriously skewed to the left. As a result, the regression results differ, and even the signs are changed according to the estimation methods. However, in most cases, 95% confidence intervals for the coefficients from RE or CRE include the ones from median regressions. Thus, when we only focus on the median regression results, we can see that in Islamic countries, re-

Table 2.6: Estimation Results for MFIs growth variables

	Loan size growth			
	RE	CRE	Median	Median (CRE)
Christianity	9.493 (7.16)	8.564 (8.17)	4.464 (5.83)	3.821 (6.39)
Islam	0.388 (5.87)	-2.153 (5.95)	-4.018 (6.06)	-4.141 (5.60)
Attendance	-0.099 (0.10)	-0.09 (0.10)	-0.137** (0.06)	-0.153*** (0.06)
Christianity × Attendance	-0.079 (0.11)	-0.056 (0.12)	-0.003 (0.08)	0.027 (0.08)
Islam × Attendance	0.032 (0.11)	0.064 (-0.13)	0.097 (-0.14)	0.108 (-0.16)
Age	0.205 (0.21)	-1.837* (1.02)	0.133 (0.31)	-0.73 (0.61)
Age ²	-0.002 (0.00)	0.012 (0.03)	-0.001 (0.01)	-0.001 (0.02)
Asset	0.356 (0.35)	3.489* (2.08)	0.085 (0.29)	3.422*** (1.04)
GNI	-3.336 (3.57)	31.508*** (12.08)	-2.735 (2.14)	16.842*** (6.45)
Growth	-0.126 (0.30)	-0.2 (0.25)	0.167 (0.17)	0.071 (0.22)
Private Credit	0.067 (0.05)	-0.068 (0.10)	0.038 (0.03)	-0.091 (0.11)
CRE device	Yes			Yes
Obs.	2841 (563)	2841 (563)	2841 (563)	2841 (563)
R ²	0.06	0.07	0.04	0.05
F-test:				
CRE		16.92***		8.26***
Chris - Islam	1.36	1.76	2.29	2.74*
Attendance	0.97	1.01	1.27	0.98

¹. All regressions have time and region dummies.

². Robust standard errors are in parentheses, clustered at country level.

³. Median regression coefficients are reported with bootstrap standard errors.

⁴. Significance level of 10%, 5%, and 1% are denoted by *, **, and ***, respectively.

⁵. Attendance stands for monthly attendance.

Table 2.6: (cont'd)

	Borrower growth			
	RE	CRE	Median	Median (CRE)
Christianity	-58.002 (95.94)	-63.31 (85.92)	-1.624 (5.25)	0.542 (5.35)
Islam	-124.885 (77.95)	-81.923 (96.76)	6.333 (4.14)	8.748* (5.11)
Attendance	-3.618 (2.44)	-5.51 (3.48)	0.187*** (0.07)	0.102 (0.08)
Christianity × Attendance	2.384 (1.95)	2.638 (2.53)	-0.017 (0.07)	-0.031 (0.08)
Islam × Attendance	5.638*** (1.71)	4.008* (2.12)	-0.152* (0.08)	-0.180* (0.10)
Age	2.471 (4.76)	3.974 (13.15)	-1.913*** (0.40)	-5.934*** (1.12)
Age ²	0.005 (0.03)	0.706 (0.53)	0.031*** (0.01)	0.083*** (0.03)
Asset	46.885 (30.42)	114.755* (63.54)	1.230*** (0.46)	10.678*** (2.00)
GNI	-55.424 (50.56)	-107.923 (114.12)	4.566** (2.01)	-9.085 (10.89)
Growth	3.996 (3.16)	3.695 (2.64)	0.393*** (0.15)	0.443* (0.23)
Private Credit	-0.59 (0.95)	-0.466 (1.24)	-0.009 (0.03)	0.039 (0.18)
CRE device	Yes			Yes
Obs.	2838 (563)	2838 (563)	2838 (563)	2838 (563)
R ²	0.01	0.01	0	0
F-test:				
CRE		13.61**		21.63***
Chris - Islam	0.58	0.05	1.36	1.19
Attendance	3.74*	0.55	1.48	1.46

ligiosity is more negatively and significantly correlated with borrower growth rate. It could be mainly because of Islamic discipline that is not favorable with being in debt.¹⁸ However, unreported regression results say that religious intensity is positively correlated with number of borrowers in all religions. Thus the negative correlation between religiosity and borrower growth in Muslim-dominant countries might result from other factors rather than religious reasons.

2.4 CONCLUSION AND FUTURE WORK

Many previous literatures on religion and economic growth prefer to rank which religion is better for growth and most of them tend to end with some negative characteristics of Islam on growth, compared with other religion (McCleary and Barro, 2006; Guiso et al., 2003). However, to the best of our knowledge, there are no cross-religion studies that compare the effects of religions and religiosity on microfinance performances.

In this paper, after controlling unobserved heterogeneity as well as MFI- and country-specific variables, we find that MFIs operating in Muslim-dominant countries have significantly lower operating costs than MFIs in Christian-dominant countries, and consequently, have higher operational self-sufficiency.

One shortcoming of this paper is that, due to the lack of religion data of MFIs, the analyses are based on arbitrary classification assumption that in the country that has a strong dominant religion, all the MFIs operating in the country would fall under the influence of the dominant religion.

¹⁸ One of the five fundamental pillars of Islam is the pilgrimage to Mecca, which is not allowed for people who have a debt.

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