

Religiosity, Borrower Gender and Loan Losses in Microfinance Institutions: A Global
Evidence

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Abstract

We examine the impact of religious beliefs on loan repayments in 770 microfinance institutions (MFIs) across 65 countries over the period 2006–2018. We find robust evidence of a negative relationship between religiosity and loan losses in MFIs. We also find that the relationship between religiosity and loan losses is stronger for MFIs in Protestant-dominated countries than in Catholic-dominated countries. Moreover, religiosity improves the operational self-sufficiency of MFIs through a reduction in loan losses. We find that religiosity does not improve the loan repayment behaviour of women borrowers, but it reduces the loan size per borrower. Overall, our evidence suggests that although religiosity reduces loan losses through religiosity-induced lender- risk aversion, it does not improve the loan repayment behaviour of borrowers. We also use several approaches to evaluate our results to the effects of endogeneity.

Keywords: microfinance institutions, religiosity, loan losses, operational self-sufficiency, cross-country panel data

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1. Introduction

Prior studies suggest that human and corporate behaviours are shaped by the surrounding social norms, such as religiosity. For example, firms and individuals in religious countries exhibit high-risk aversion (Miller and Hoffman, 1995; Hilary and Hui, 2009; Adhikari and Agrawal, 2016a) and are less likely to engage in unethical behaviour (Kurpis et al., 2008; Conroy and Emerson, 2004; Vitell et al., 2005; Walker et al., 2012). Indeed, Hilary and Hui (2009), El Ghoul et al. (2012), and Bushman and Williams (2012) argue that religiosity constrains corporate risk-taking. In other words, corporate entities rein in their risk-taking behaviours in highly religious business locations. The empirical evidence further shows that religious beliefs enhance social capital such as trust, which increases stock market participation (Guiso et al., 2008) and the decision to buy stocks (Hong et al., 2004; Brown et al., 2008). Moreover, religiosity is negatively related to opportunistic behaviour (He and Hu, 2016; Chen et al., 2016), the endorsement of ethically questionable vignettes (Walker et al., 2012), academic dishonesty (Burton et al., 2011) and unethical consumer beliefs (Vitell et al., 2005). He and Hu (2016) in particular note that lenders offer to religious adherents favourable loan terms, lower interest rates and fewer loan covenants. They attribute these findings to the fact that lenders value the traits of religious adherents, such as risk aversion, ethical behaviour and honesty. However, does religiosity affect borrowers' loan repayment behaviour? This study investigates whether religiosity influences loan repayments by reducing loan portfolio risk and improving operational-self-sufficiency.

Religious beliefs define an individual's financial responsibility and attitudes toward savings, investments and debt repayments (Stulz and Williamson, 2003; Renneboog and Spaenjers, 2012). The fact that religion promotes exemplary conduct and financial responsibility means it dissuades questionable behaviours and opportunism (Weaver and Angle, 2002; Grullon et al., 2010; McGuire et al., 2011). This is because most religious faiths evoke ethicality (Kurpis et al., 2008), which reduces the acceptability of ethically charged scenarios (Conroy and Emerson, 2004) and moral hazard (Jay, 2014) and promotes a sense of community and belongingness. Religiosity, as a national culture, should lead to risk aversion and low propensity of loan defaults (Ashraf et al., 2016). For example, Baele et al. (2014) examined the default rates on conventional and Islamic loans and found lower default rates on Islamic loans than on conventional loans. Consequently, examining the effects of religiosity on loan repayments has an intuitive appeal.

This study focuses on microfinance institutions (MFIs). Loan repayment in MFIs is influenced by firm-level (managerial) risk aversion and borrowers' riskiness (Petersen and Rajan, 1994; Uchida et al., 2012; Moro and Fink, 2013). Within firm-level risk aversion, the risk-return trade-off suggests that managers may either decline the loan applications of risky borrowers or charge higher interest rates (Ghysels et al., 2005; Porteous, 2006). Nevertheless, at the firm level, religiosity is associated with organisational risk aversion (Gao et al., 2017), and it negatively impacts on the risk-taking behaviour of financial institutions (Adhikari and Agrawal, 2016a). Further, borrowers' riskiness in MFIs mainly manifests due to asymmetric information and moral hazard. Asymmetric information arises because MFIs provide uncollateralised loans to informal businesses and low-income persons with little or no prior credit information (D'Espallier et al., 2011; Becchetti and Castriota, 2011; Rai and Ravi, 2011). To mitigate this, MFIs resort to joint liability lending (where members of the liability group have adequate information about each other) to improve loan repayment performance (Godquin, 2004). As a result, the primary source of borrower risk in MFIs is a moral hazard, where MFIs are exposed to the danger of lending to deceitful or degenerate individuals (Young, 2010). Accordingly, Simtowe et al. (2006), as well as Diagne et al. (2000), found that loan losses in MFIs are due to borrowers' unwillingness to repay loans, not an inability to repay. Thus, the fact that religiosity reduces dishonesty, unethical behaviour and moral hazard (Burton et al., 2011; Walker et al., 2012; Jay, 2014) implies that it should play a significant role in MFI loan repayments because MFIs are located in developing countries, where religiosity has a greater influence on individuals and society (Visser, 2008).

MFIs target women borrowers and have been celebrated for enhancing the welfare of women (D'Espallier et al., 2011). Accordingly, prior studies (Cull et al., 2007; D'Espallier et al., 2011) have suggested that over 73% of MFI borrowers are women. There is also evidence that the pro-women lending strategy adopted by most MFIs is due to the high repayment records of women borrowers (Ameen, 2004; Kevane and Wydick, 2001; Hulme, 1991; D'Espallier et al., 2011). Moreover, Miller and Stark (2002), as well as Walter and Davie (1998), report that women are more religious than men are. If women are more religious and have better loan repayment records than men, it is important to consider the influence of religiosity on the loan repayment behaviour of women borrowers.

To test the effects of religiosity on MFIs' loan portfolio performance, we collected data from a sample of 770 unique MFIs across 65 countries from 2006–2018 from the MIX Market

Database. Following prior studies (Hilary and Hui, 2009; Adhikari and Agrawal, 2016a; He and Hu, 2016), we obtained religiosity data from the Religious Congregations Membership Study hosted on the website of the American Religion Data Archive (ARDA), and we measured the religiosity of a country by dividing the total number of religious adherents by the total population. Like He and Hu (2016), we argue that the behaviour of the religious adherents in a country affects the overall behaviour of people in the country, including those who do not necessarily subscribe to a religious belief. We controlled for several institutional factors and country-level variables that can potentially confound the results of cross-country studies. Our study explored the religiosity-induced performance of the loan portfolios of MFIs. We conjecture that religiosity impacts the loan approval process and influences the repayment behaviour of women borrowers and the probability of loan defaults.

The results of our analyses are consistent with the hypothesis that there is a significant negative relationship between religiosity and loan performance. Using several proxies for loan performance, we found that religiosity is associated with fewer loan losses. We also found a positive relationship between operational self-sufficiency and the level of religiosity. Thus, religiosity reduces loan losses and ultimately enhances operational self-sufficiency, which culminates in financial sustainability. More so, although religiosity does not improve the loan repayment behaviour of women borrowers, it reduces the loan size per borrower. Additional results provide evidence of the positive effects of religiosity on loan performance during the financial crisis, and women borrowers enhance the performance of loan portfolios. The above findings imply that religiosity reduces loan losses through religiosity-induced lender risk aversion at the firm level, which leads to a reduction in the loan size per borrower. However, our evidence suggests that religiosity does not improve women borrowers' repayment behaviour.

We conducted several tests to ascertain the robustness of our results. First, we measured loan portfolio performance using alternative proxies, such as the loan loss rate, write-off ratio and portfolio quality (portfolio at risk for 30 days). Second, we focused on Catholic and Protestant religious groupings and re-estimated the models. Third, we partitioned the sample into five regional groups to deal with the potential effects of geographical clustering by clustering the standard errors at both the country and regional levels. In addition to the fixed-effects model, we also estimated the results using the random-effects model to deal with time-invariant covariates. Finally, we addressed the issue of endogeneity and reverse causality by estimating

the two-stage least square (2SLS) and employed Oster's (2019) test to deal with the issue of omitted variable bias. Our results remained robust to all the tests and alternative estimations used to analyse the data.

We contribute to the extant literature by studying the effects of religious beliefs on the performance of MFIs' loan portfolios. First, we complement the body of research that examines the impact of religiosity on corporate decisions and individual decision-making (Stulz and Williamson, 2003; Hilary and Hui, 2009; Renneboog and Spaenjers, 2012; Adhikari and Agrawal, 2016a). However, while we pursued an international perspective on the phenomenon, our primary focus was on MFIs, in contrast to most prior studies. At the informal micro level, where individual financial responsibility sustains MFIs and small and medium enterprises, there has been no empirical work on this important phenomenon. We mainly focused on religion to provide more-nuanced evidence of the predictive power of religiosity for economic and financial behaviour at the micro-level. In areas with weaker corporate governance (He and Hu, 2016) and weaker legal environments (Chen et al., 2016) but strong religious influences, examining the impact of religiosity on MFIs' operations is imperative.

Second, our results add to the extant empirical evidence on the impact of religiosity on debt repayment. Unlike prior studies (Chen et al., 2016; He and Hu, 2016) that have focused on how religious borrowers appear trustworthy to lenders and ultimately secure favourable loan terms, we provide new evidence on the loan repayment behaviour of religious borrowers in MFIs. Our evidence suggests that religiosity does not improve the loan repayment behaviour of women borrowers in MFIs. This finding challenges the widespread view that religious borrowers are likely to have better loan repayment records.

Third, we document that MFIs located in highly religious countries are more operationally self-sufficient. From a policy perspective, this finding will be useful for donors and funding agencies that have recently committed substantial resources to MFIs to ensure operational self-sufficiency.

Fourth, and consistent with Adhikari and Agrawal (2016a), we found that MFIs located in highly religious areas are less likely to suffer from the effects of financial crises. Overall, these findings lend some heft to the empirical evidence that religiosity minimises loan delinquencies and enhances the operational sustainability of MFIs.

The rest of the paper proceeds as follows. Section 2 reviews the prior literature and explains the development of our testable hypotheses. Section 3 describes the sample, data sources, variable definitions and empirical model. Section 4 presents the main empirical results and analysis, and Section 5 presents the robustness tests. We summarise and conclude the study in Section 6.

2. Literature Review

2.1. Religiosity, Borrower Gender and Loan Losses

The idea that religion might affect the decisions of individuals gained prominence with Weber's analysis of Protestantism. The Weberian argument strongly suggests that the Protestant ethic lay behind the emergence of the spirit of capitalism: Protestants worked harder and had greater economic attitudes than people of other religious faiths did (Weber, 1930). Arguably, this triggered other studies that focused on how religion might affect individual decisions regarding crime participation (Evans et al., 1995), alcohol and drug consumption (Cochran and Akers, 1989), divorce (Heaton and Pratt, 1990) and abortion (Cook et al., 1993). Several other studies have also theoretically linked religiosity to individuals' risk aversion. For example, Malinowski (1925) opine that religiosity is related to a desire to control things that cannot be controlled (e.g. sickness) with the available technology. Others, including Cornwall (1989) and Miller (1992), have likened religiosity to a risk avoidance strategy where individuals follow a religion to avoid the risk of not having an afterlife. Commenting on these arguments, Miller and Hoffmann (1995, p. 63) retort: "we conceive of religious behaviour as risk-averse and non-religious behaviour as risk-taking".

Other studies have also focused on gender differences in religiosity. Miller and Hoffmann (1995) theorise that relative to women, men are more likely to be irreligious because men are more apt to engage in various forms of high-risk behaviours, including being irreligious. Miller and Stark (2002, p. 1399) empirically investigated gender and religiosity and concluded that "women are more religious than men to the extent that being irreligious constitutes risk-taking behaviour". Similarly, Walter and Davie (1998) found women to be more religious than men on "every" measure of religiosity. Other studies have documented that religiosity improves ethicality (Conroy and Emerson, 2004; Ibrahim et al., 2008; Wong, 2008) and that women are more ethical (Borkowski and Ugras, 1998; Franke et al., 1997; Peterson et al., 2010; Albaum and Petersen, 2006) and have better loan repayment records (D'Espallier et al., 2010). In contrast, Chaves (2010) proposes the "religious congruence fallacy". Within this view,

religious adherents mostly practise their religious beliefs when they are together (with other religious adherents), but their behaviour (in the absence of other religious adherents) remains inconsistent with their religious beliefs and practices. This view suggests differential individual and group outcomes for religiosity.

He and Hu (2016) advance two reasons why individual religiosity may impact firm behaviour. First, firms in highly religious countries are more likely to have a larger proportion of religious employees. Second, irreligious people in highly religious countries are more likely to behave in a way that is consistent with the religious adherents with whom they regularly interact. This view is also consistent with social identity theory's suggestion that much of one's identity is derived from group membership (Abrams and Hogg, 1988). Based on these arguments, other studies have investigated how religiosity might affect firm-level outcomes. For example, Hilary and Hui (2009) investigated the effect of religiosity on organisational behaviour in the US. They found that firms located in highly religious counties exhibit higher risk aversion, which manifests through lower variance in returns on assets, as well as lower investment rates and less growth. They noted that the effect is more consistent in counties with a large proportion of Protestants. Similarly, Adhikari and Agrawal (2016a) found that US banks headquartered in more-religious areas exhibit lower stock returns, as well as lower idiosyncratic and tail risk. They also reported that banks in more-religious areas are less vulnerable to financial crises and exhibit conservatism by relying less on non-traditional banking. In a related study, Gao et al. (2017) reported that although local religiosity reduces both idiosyncratic and total risk, this relationship is mainly pronounced for funds for which local investors and local managers are important. Similarly, in China, Jiang et al. (2015) found that firms with religious entrepreneurs have lower leverage and also invest less in fixed assets.

Another stream of the literature focuses on the levels of risk aversion of Catholics and Protestants. For example, Shu et al. (2012) reported that US hedge funds located in more-Catholic areas exhibit lower risk aversion. Others, including Leege et al. (1993), Leege (1995) and Mockabee et al. (2001), have opined that Protestants are more committed to their religious beliefs than Catholics are. Consistent with these, Kumar et al. (2011) found that religion-induced gambling attitudes in the US affect investors' portfolio choices. They showed that the religious characteristic of the neighbourhood in which investors are located influences their portfolio choices. Thus, investors in regions with higher Catholic-Protestant ratios are more likely to hold lottery-type stocks. Consistent with this argument, Adhikari and Agrawal (2016b) reported that firms headquartered in US counties with higher Catholic-Protestant ratios are

innovative: they spend more on research and development and generate more and high-quality patents. This evidence is consistent with the view that Catholicism is more risk-tolerant than Protestantism is (Thompson, 2001).

Studies on the effect of religion on bank loan contracting are also burgeoning. Generally, these studies focus on religiosity and corporate borrower outcomes and are based on two main arguments. First, increases in information asymmetry increase the cost of debt (Derrien et al., 2016). However, borrowers located in highly religious areas exhibit observable characteristics associated with risk aversion (Miller and Hoffmann, 1995; Dehejia et al., 2005). For example, they have lower leverage and less-risky projects (Hilary and Hui, 2009) and thus present a less informational risk to lenders (McGuire et al., 2011). This reduces the level of asymmetric information and results in a lower cost of debt. Second, religious social norms evoke higher ethical standards and honesty (Weaver and Angle, 2002) and foster trust (Guiso et al., 2003).

Consequently, religious firms present a lower risk to lenders and get favourable loan terms (Graham and Haidt, 2010; Qi et al., 2010). Consistent with these arguments, He and Hu (2016) investigated the effect of religiosity on bank loan terms in the US. They reported that corporate borrowers in counties with high levels of religiosity have larger loans, have fewer loan covenants and are charged lower interest rates. More so, in a cross-country study, Chen et al. (2016) documented that religious corporate borrowers are associated with lower loan interest spread and lower upfront fees. Thus, the existing literature has three peculiar features. First, in terms of religiosity and firm-level outcomes, no study has focused on MFIs. Second, studies focusing on religiosity and loan contracting have examined how religiosity helps religious borrowers to obtain favourable loan terms and have not focused on how religiosity affects loan losses or the loan repayment behaviour of borrowers. Finally, although existing evidence suggests that women are more religious than men and that women have better loan repayments, how religiosity may affect the loan repayment behaviour of women borrowers is an open empirical question.

2.2. Hypothesis Development

There are several channels through which religiosity can reduce loan losses (improve loan repayments) in MFIs. Religiosity can reduce loan losses by increasing lender risk aversion. According to the risk-return trade-off, lenders may either decline high-risk borrowers or charge a higher interest rate, depending on their risk appetite (Campbell and Viceira, 2005; Porteous, 2006). However, religiosity evokes risk aversion because most religions require followers to

be conservative, be modest and place greater (less) emphasis on spiritual gain (financial gain) while trusting in God when faced with financial difficulty (Adhikari and Agrawal, 2016b). Yonker (2015) suggests that the managers and employees of firms are either located locally or adopt local norms. In fact, in highly religious countries, even irreligious individuals may behave in a way that is consistent with the norms of religious adherents due to their constant interaction at work and outside work (He and Hu, 2016). Consequently, firms located in highly religious areas become risk-averse because corporate decisions essentially reflect the character and risk preferences of the individuals that manage the entities. For example, religious firms have lower idiosyncratic risk (Adhikari and Agrawal, 2016a; Gao et al., 2017) and lower variance in returns on assets (Hilary and Hui, 2009). Subsequently, lenders in highly religious countries may exhibit higher risk aversion. He and Hu (2016) suggest that risk-averse lenders may reduce loan losses by either declining high-risk borrowers (rather than charging higher interest rates) or only granting them smaller loans.

Religion promotes exemplary conduct and a sense of financial responsibility, which dissuade questionable corporate behaviour and managerial opportunism (Weaver and Angle, 2002; Grullon et al., 2010; McGuire et al., 2011). Thus, religious individuals who borrow money from MFIs are expected to exhibit the positive attributes of trust and honesty. Consequently, MFIs located in religious countries are less likely to record significant loan losses. Religious beliefs reduce the default rates on loans due to the emphasis on contractual responsibility enshrined in religious doctrines (Stulz and Williamson, 2003; Baele et al., 2014). Therefore, higher levels of religiosity in a country should constrain an irresponsible borrowing culture among borrowers that could potentially threaten the opportunity for future debt financing for their business operations. This is consistent with a religiosity-induced lending and religiosity-induced debt repayment culture that encourages loan repayments. The overall effects of religiosity lead to fewer loan losses of the loan portfolios in the books of the MFIs. We, therefore, hypothesised that:

H1: MFIs in countries with higher levels of religiosity have fewer loan losses.

The MFI architecture has been known to foster economic opportunities for the poor, the majority of whom are women. MFIs emphasise entrepreneurship and local economic development at the micro-level, which are essential developmental tools necessary for the economic liberation of women at the local level in developing countries (Yunus, 1999, 2007). The evidence suggests that women are generally better credit risks in MFIs than men are

(D'Espallier et al., 2011; Schafer and Fukasawa, 2011). Consequently, MFIs strategically target women (Gyapong and Afrifa, 2019; Morduch, 1999), which is associated with a lower portfolio at risk, lower write-offs and lower credit-loss provisions (D'Espallier et al., 2011; Schafer and Fukasawa, 2011). As MFIs target more women than men due to the strategic objective of women's empowerment and poverty alleviation, it stands to reason that women are largely dependent on MFIs for capital for their businesses. Thus, women are expected to repay their debts to continue to receive financial assistance from the MFIs. However, women are also more religious than men are (Miller and Stark, 2002; Miller and Hoffmann, 1995; Walters and Davie, 1998), and religiosity improves ethicality (Conroy and Emerson, 2004; Wong and Vinsky, 2008) transparency (Dyregang et al., 2012) and honesty (Weaver and Angle, 2012). Therefore, to the extent that such qualities may improve loan repayments, we argue that religiosity will enhance the loan repayment behaviour of women borrowers. We, therefore, hypothesised that:

H2: The effect of religiosity on loan losses is more negative for MFIs for which women borrowers are more important.

The hypothesis of a negative relationship between religiosity and loan losses suggests that MFIs in highly religious areas will have fewer loan losses. In line with this thinking, Kanagaretnam et al. (2015) documented that banks located in religious countries are less likely to experience bank trouble or failure, due to their religiosity-induced risk aversion. In contrast, Adhikari and Agrawal (2016a) found that religiosity-induced risk aversion results in lower Tobin's q ratios for banks. Nevertheless, unlike Tobin's q ratio, operational self-sufficiency is different from other measures of market valuation because it is concerned with an MFI's ability to cover its costs through operating income. For MFIs, the loan portfolio is of utmost importance because it is by far the largest asset (Yimng, 2016). Thus, for most MFIs, the proportion of investments in other assets is negligible (Gul et al., 2017; Ahlin et al., 2011). Consistent with this, Schaffer and Fukasawa (2011) documented a negative relationship between loan losses and the operational self-sufficiency of MFIs. Therefore, to the extent that religiosity-induced risk aversion reduces loan losses, it will result in higher operational self-sufficiency. We, therefore, hypothesised that:

H3: MFIs in countries with higher levels of religiosity are more operationally self-sufficient.

3. Research Design

3.1. Sample

The data used in this study may be classified into three types: data relating to MFIs, religiosity and country. MFI-specific data was obtained from the Microfinance Information Exchange Database (MIX Market). The MIX Market Database hosts high-quality data on MFIs around the world (Servin et al., 2012) and has been used extensively in several recent studies (Blanco-Oliver et al., 2016; Wijesiri, 2016; Bogan, 2012; Servin et al., 2012; Gul et al., 2017). This study used data on MFIs located in developing countries, where intra-country religiosity data was not available. Therefore, in contrast to previous religiosity studies (Hilary and Hui, 2009; Adhikari and Agrawal, 2016a; He and Hu, 2016) that focused on the US, we used data from 65 countries to test our hypotheses. This provided an interesting setting to study religious diversity relative to the US, where religious diversity is low (Cooperman et al., 2014).

In determining the sample size, all MFIs in the MIX Market Database from 1996 to 2018 were considered. Consistent with prior MFI literature, we applied several filters. First, in consonance with Ahlin et al. (2011), MFIs for which data was not annual or the fiscal year did not end in December were excluded from the sample. Second, following Gul et al. (2017), MFIs without at least five years of data were also dropped. Lastly, we noted that most of the country-level data were not available for the sampled countries before 2006 and after 2018. Therefore, the sample data started in 2006 and ended in 2018.

In studies involving the use of panel data, a choice is made between balanced and unbalanced panels. Baum (2006) noted that, often, an unbalanced panel is preferable. This is due to two main reasons. First, loan losses are the major cause of MFI collapses. By allowing for entry and exit, we captured much of the MFI-level heterogeneity in loan losses required for this study. Second, most panels are unbalanced in the real world (Greene, 2008); consequently, an unbalanced panel makes the sample more representative of the population. Based on these aspects, we favoured the use of an unbalanced panel. The final sample thus consisted of an unbalanced panel of 770 unique MFIs across 65 countries over ten years (2006–2018). Compared to previous studies that have used MIX Market data (Gul et al., 2017; Blanco-Oliver et al., 2016; Wijesiri, 2016; Bogan, 2012; Servin et al., 2012), the sampling technique yielded the largest number of observations, and this augured well for improving the power of the tests.

3.2. Dependent Variables

This study investigated the effect of religiosity on loan losses and operational self-sufficiency in MFIs. The dependent variables included operational self-sufficiency (*OSS*) and loan losses. Following D’Espallier et al. (2010), we carefully employed three different proxies to capture loan losses at different stages. First, we used portfolio quality (*Par30*), measured as the portfolio at risk for 30 days. This measures loan losses at the early stage where loans are 30 days past due but not necessarily written off. Second, we employed the write-off ratio (*writeoffratio*) to capture the total value of loans written off and removed from the balance sheet. Lastly, we used the loan loss rate (*loanlossrate*), which represents written-off loans less the amounts recovered from written-off loans. Data relating to the dependent variables were obtained from the MIX Market Database, and the variables were defined as below:

$$\text{Operational self-sufficiency} = \frac{\text{Operating Revenue}}{(\text{Financial Expense on funding liabilities} + \text{Net impairment loss on gross loans} + \text{Operating expense})} \quad (1)$$

$$\text{Loan loss rate} = \frac{\text{Loan write-offs} - \text{Recovered loans}}{\text{Average gross loan portfolio}} \quad (2)$$

$$\text{Loan portfolio quality} = \frac{\{(\text{Outstanding balance} + \text{Portfolio Overdue}) > 30 \text{ days} + \text{Renegotiated loans}\}}{\text{Gross loan portfolio}} \quad (3)$$

$$\text{Write-off ratio} = \frac{\text{Value of loans written off}}{\text{Average gross loan portfolio}} \quad (4)$$

3.3. Main Independent Variable: Religiosity

Following prior studies (McGuire et al., 2015; Adhikari and Agrawal, 2016a; Hilary and Hui, 2009; He and Hu, 2016), we obtained religiosity data from the Religious Congregations Membership Study hosted on the website of the ARDA. The ARDA website hosts survey data on country-level religiosity statistics, gathered every ten years. Specifically, the ARDA measures the religiosity in a country by dividing the total number of religious adherents by the

total country population. We used the datasets for 2000 and 2010 and linearly interpolated the decennial data for the other years. This approach is consistent with that of previous studies in this area (Adhikari and Agrawal, 2016a; Hilary and Hui, 2009; He and Hu, 2016).

3.4. MFI-Specific Controls

We included several MFI-level characteristics. In particular, we controlled for the average outstanding loan amount (*Outstandingloan*), risk coverage (*Riskcoverage*), loan officer efficiency (*Loanofficerefficiency*), cost per borrower (*Costperborrower*), outreach (*Outreach*), number of depositors (*Depositors*) and MFI size (*Size*). Prior studies have suggested that these firm characteristics may influence loan losses. For example, Navajas et al. (2000) argued that to reduce loan losses, MFIs rely on soft information to effectively monitor borrowers. Consistent with this, Tchuigoua (2016) found smaller MFIs to be better users of soft information, suggesting that smaller MFIs have fewer loan losses. Further, D'Espallier et al. (2011) opined that loan officer efficiency, the cost per borrower and the outstanding loan amount might impact loan write-offs. More so, with a high number of depositors, MFIs can reduce loan losses by using customer deposits as collateral¹. Again, given that MFIs focus on the provision of financial services (credit and savings) to the poor, low-income persons and informal businesses (Becchetti and Castriota, 2011; D'Espallier et al., 2011; Rai and Ravi, 2011), loan losses may be higher in MFIs with broader outreach. Lastly, risk coverage is an indication of how much of the loan portfolio risk is covered by the loan loss allowance. Risk-averse managers are conservative (Choma et al., 2014) and are more likely to have a higher loan loss allowance (risk coverage). Thus, higher risk coverage is an indication of managerial risk aversion and should impact negatively on loan losses.

3.5. Country-Level Controls

Our regressions also controlled for several country-level variables, namely: population, unemployment, inequality, gross national income per capita (GNIpercapita), inflation, the rule of law, contract cost and the control of corruption. Following Adhikari and Agrawal (2016a), we included the country's population in our regressions. MFIs in highly populated countries face higher competition (He and Hu, 2016), and this incentivises borrowers to take multiple

¹ MFIs operate in an environment where collateral is scarce. Consequently, MFIs mostly resort to group lending with joint liability to create social collateral, which replaces physical collateral (Simtowe et al., 2006). However, prior studies have suggested that unlike collateralised loan contracts, joint liability loan contracts lead to loan defaults due to moral hazard, collusion and free-riding (Einar and Michael, 2016; Simtowe et al., 2006). Nevertheless, MFIs that take customer deposits have the luxury of using these deposits as collateral to either discourage customers from loan defaults or confiscate these deposits if customers default.

loans, resulting in repayment problems (McIntosh, 2015). In a theoretical model, Kumhof et al. (2015) argued that income inequalities increase loans contracted by the poor, and this results in loan defaults. We, therefore, controlled for the level of income inequality (*inequality*). Besides, following the findings of Ghosh (2015), which suggested a positive relationship between non-performing loans and unemployment, we included unemployment in our list of control variables.

We also controlled for the rate of inflation because a higher rate increases the prices of goods and services reduces purchasing power and increases the probability of loan defaults (Chandra and Bahner, 1985). Further, in consonance with Balgova et al. (2016), we controlled for country-level corruption, GNI per capita and the rule of law. Lastly, we argue that the average cost of enforcing a contract may affect loan losses. MFIs grant smaller loans relative to traditional banks. Therefore, MFI in countries where loan contracts are costly to enforce may have higher loan losses. This is particularly true when the cost of enforcing a loan contract is higher than the loan itself. Consequently, we included contract costs in our list of control variables.

3.6. Econometric Specification

A fixed-effects model² was employed to test all our hypotheses. To test the effect of religiosity on loan losses, as well as operational self-sufficiency, we adopted the following estimation:

$$\text{Loanlosses or OSS}_{i,c,t} = \alpha + \beta \text{Religiosity}_{c,t} + \gamma \text{MFIControls}_{i,c,t} + \psi \text{CountryControls}_{c,t} + \text{Year}_t + \delta_{i,c,t} + \varepsilon_{i,c,t} \quad (5)$$

To examine the effect of religiosity on the borrower–loan-losses relationship, we adopted the following estimation:

$$\text{Loanlosses or OSS}_{i,t} = \alpha + \beta \text{Religiosity}_{c,t} * \text{Gender}_{i,c,t} + \gamma \text{MFIControls}_{i,c,t} + \psi \text{CountryControls}_{c,t} + \text{Year}_t + \delta_{i,c,t} + \varepsilon_{i,c,t} \quad (6)$$

Where i , c and t index MFI, country and time, respectively. The dependent variable *loanlosses* is one of three measures of loan losses (loan loss rate, write-off ratio and loan portfolio quality), and *OSS* is a measure of operational self-sufficiency. *Gender* refers to the fraction of female borrowers. *MFIControls* is a vector of MFI-specific control variables. Specifically, these

² This was based on the results of the Hausman test (Hausman, 1978), which rejects the null hypothesis that individual effects are uncorrelated.

include size, risk coverage, outreach, depositors, loan officer efficiency, outstanding loan amount and cost per borrower. *CountryControls* is a vector of country control variables, which include unemployment, inequality, population, GNI per capita, inflation, the rule of law, contract cost and corruption. Consistent with Adhikari and Agrawal (2016a), all regressions included year fixed effects and were clustered at the firm level (MFI) to correct for heteroscedasticity. Appendix A provides definitions for the variables used in the regressions.

3.7. Descriptive Statistics

The descriptive statistics are presented in Table 1. Panels A and B show the results for the dependent variables and religiosity measures. It indicates that the *loan loss rate*, *write-off ratio* and *Par30* had means of 1.78%, 2.19% and 7.06%, respectively. These results indicate the average *loan loss rate*, *write-off ratio* and *portfolio quality* of the MFIs in our sample. The results are similar to those reported by D’Espallier et al. (2011). Further, *OSS* had a mean of 1.13, indicating that most of the sampled MFIs were operationally self-sufficient ($OSS > 1$). *Religiosity* had a mean of 50.15% and a standard deviation of 40.66%. The higher standard deviation relative to previous intra-country studies³ confirms the argument of Adhikari and Agrawal (2016a) that inter-country variation in religiosity is salient. More so, in the sampled countries, 9.43% of the population were Protestant, while 33.32% were Catholic.

Panel C presents the results for the MFI-specific characteristics. It shows that *Gender* had a mean of 64.95%, indicating that over 60% of the people who borrowed from the MFIs were women. This evidence is consistent with Strom et al.’s (2014) assertion that MFIs target women borrowers. Interestingly, some of the MFIs had 100% women borrowers, while others had no women borrowers, as indicated by the minimum and maximum values of *Gender*. On average, the MFIs incurred a cost of \$230.30 per active borrower (mean *costofborrower* = 230). The MFIs in our sample had an average *riskcoverage* of 2.651, indicating the preparedness of the MFIs to absorb credit loan losses. Further, *size*, *depositors* and *outstandingloan* had means of 15.878, 9.8855 and 0.7493, respectively. Interestingly, *loanofficerefficiency* had a mean of 311.02. This result implies a 311:1 borrower–loan-officer ratio.

Panel D shows the descriptive statistics for the country-level control variables. The mean *unemployment* rate was 5.9533%, and that of *inflation* was 6.2001%. These figures imply that the MFIs were mainly located in developing countries with relatively high unemployment and

³ The previous US studies conducted by Hilary and Hui (2009), He and Hu (2016) and Adhikari and Agrawal (2016) reported standard deviations of 0.119, 0.124 and 0.129, respectively.

inflation rates. The average level of *inequality* was 23.356. This result is comparable to that of Baiardi and Morana (2017), who reported an *inequality* (Gini Index) level of 29.625. However, compared to the level of 40.34 reported by Seven and Coskun (2016), it can be argued that *inequality* was lower in our sampled countries. The mean for *population* was 17.426, and that of *GNIpercapita* was \$3,352.40. The lower GNI per capita implies that the MFIs were mainly located in poorer countries. Further, *ruleoflaw* had a mean of -0.5864, indicating the poor quality of contract enforcement in the countries where the MFIs were located. This was coupled with high *contractcosts* (mean = 36.662) and a high level of *corruption* (mean = 32.155).

[INSERT TABLE 1 ABOUT HERE]

4. Empirical Results

4.1. Multivariate Regression Analysis

Table 2 presents the correlation matrix of the independent variables, which was used to check for multicollinearity. Generally, a correlation greater than or equal to 0.7 is an indication of multicollinearity (Liu et al., 2014). However, the results of the correlation matrix show that all the correlations were less than 0.7. This result indicates that multicollinearity was not a major concern in our regression estimates. Following Adhikari and Agrawal (2016a), we clustered the standard errors at the MFI level to reduce heteroscedasticity.

[INSERT TABLE 2 ABOUT HERE]

Columns 1–3 of Table 3 present the results of the regressions of the different measurements of loan losses and *religiosity*. The results in Column 1 show that *religiosity* had a negative relationship with the *write-off ratio*, and the relationship was statistically significant at the 1% level. This result indicates that the MFIs located in more-religious areas had lower loan losses measured as the fraction of loans that had been removed from the balance of the gross loan portfolio because they were highly unlikely to be repaid. In terms of economic significance, the estimated coefficient (-0.0294) suggests that a one standard deviation increase in the level of *religiosity* reduced the *write-off ratio* by 0.012 (i.e. $-0.0294 * 0.4066$). In addition, as shown in Column 2, *religiosity* had a negative and statistically significant relationship with *loanlossrate*. The estimated coefficient of -0.0429 implies that the MFIs in more-religious countries experienced lower loan loss rates, after controlling for several MFI- and country-level characteristics. Specifically, a one standard deviation increase in *religiosity* reduced the *loanlossrate* by 0.017. The results in Column 3 are similar when we consider *Par30*, which

captured the portion of loans (including the value of all renegotiated loans) greater than 30 days past due over the gross loan portfolio. *Religiosity* exhibited a negative and statistically significant relationship with this variable, suggesting that *religiosity* improved loan portfolio quality. Specifically, the coefficient estimate of -0.0149 indicates that a one standard deviation increase in *religiosity* reduced the loan portfolio at risk for 30 days by 0.006.

We compared the economic significance of the relationship between national religiosity and loan losses to that of local religiosity and risk. A similar calculation performed by Adhikari and Agrawal (2016a) showed that a one standard deviation increase in local *religiosity* led to a decrease of about 0.0007, 0.0015 and 0.0007 in *total risk*, *tail risk* and *idiosyncratic risk*, respectively, which were lower than the impacts of national *religiosity* on *writeoffratio* (0.012), *loanlossrate* (0.017) and *Par30* (0.006).

These results are consistent with H1 and indicate that MFIs located in highly religious countries have fewer loan losses. After reporting a negative relationship between religiosity and risk-taking in US banks, Adhikari and Agrawal (2016a) suggested that religiosity induces risk aversion at the firm level. However, Hu and He (2016) argue that risk-averse lenders might reduce loan losses by either declining risky borrowers or granting them small loans. Therefore, the findings could be attributed to religiosity-induced lender risk aversion, which results in granting small loans to or declining the loan applications of high-risk borrowers and ultimately reducing loan losses. More so, Weaver and Angle (2002) suggest that religiosity promotes exemplary conduct and dissuades questionable behaviour. Indeed, a loan default is a questionable behaviour. Therefore, to the extent that lenders in highly religious countries may lend to religious borrowers, the result could also be attributed to the better religiosity-induced loan repayment records of religious borrowers.

We next examined whether the negative religiosity–loan-losses relationship was more negative when there were women borrowers. The results are presented in Columns 4–6 of Table 3. As shown in Column 4, the religiosity–woman-borrower interaction (*religiosity*Gender*) assumed a positive relationship with *writeoffratio*, but the relationship was not statistically significant. However, the coefficients of women borrowers (*Gender*) and *religiosity* indicated negative and statistically significant relationships with *writeoffratio*. Similar results are reported in Columns 5 and 6, which show that *religiosity*gender* had positive but statistically insignificant relationships with both *loanlossrate* and *Par30*. This is in contrast to H2 and suggests that religiosity does not improve the loan repayment records of women borrowers. Prior studies

have indicated that religiosity evokes ethicality (Wong and Vinsky, 2008) and honesty (Weaver and Agle, 2012) and that, relative to men, women are more religious. Based on this notion, He and Hu (2016) documented that religious borrowers enjoy better loan terms. Furthermore, D’Espallier et al. (2011) reported that women borrowers have better loan repayment records. However, our evidence suggests that the better repayment records of women are not religiosity induced. Our result is reminiscent of Chaves’s (2010) “religious congruence fallacy”, where religiosity does not fully determine the behaviour of individual religious adherents, so religiosity does not improve borrower repayment behaviour.

Finally, we examined the effect of *religiosity* on the *OSS*⁴ of MFIs. The results in Column 7 show that *religiosity* positively predicted *OSS* and that the relationship was statistically significant at the 1% level. This evidence is consistent with H3 and implies that, on average, MFIs in more-religious countries are more operationally self-sufficient. In economic terms, the estimated coefficient of 0.7859 on *religiosity* indicates that a one standard deviation increase in *religiosity* increased *OSS* by 0.3195. The results are consistent with H3 and suggest that MFIs in highly religious countries are more operationally self-sufficient than those in lowly religious countries are. The results are consistent with the findings of Hilary and Hui (2009), who reported evidence of religiosity-induced risk-taking. Thus, given that the loan portfolio is the biggest asset of an MFI (Yimga, 2016), loan losses can render MFIs operationally self-insufficient. Therefore, to the extent that religiosity reduces loan losses, it will improve the operational self-sufficiency of MFIs.

[INSERT TABLE 3 ABOUT HERE]

4.2. Further Analyses: Catholics versus Protestants

Religious commitment is an embodiment of three aspects of religion: beliefs, belonging and behaviour (Wald and Smidt, 1993; Johnstone, 1992; Stark and Bainbridge, 1985). Based on these measures, prior literature suggests that Protestants are more committed to their religion than Catholics are (Leege et al., 1993; Mockabee et al., 2001). For instance, church attendance is more normative among Protestants (Leege, 1995), Catholics exhibit strikingly lower levels of Bible reading relative to Protestants (Leege et al., 1993) and gambling propensities are stronger in regions with higher concentrations of Catholics compared to Protestants (Kumar et

⁴ In unreported regressions, we replaced *OSS* with the *return on assets (ROA)*. The results remained qualitatively similar.

al., 2011). Based on these aspects, we investigated how the religiosity–loan-losses relationship varied between Catholics and Protestants.

Table 4 presents the results of Catholics and Protestants on the various measures of loan losses. For brevity, we only present results for the independent variables. The results in Columns 1–3 show that the coefficients of both *religiosity–Catholics* and *religiosity–Protestants* assumed negative relationships with all three measures of loan losses. This finding indicates that MFIs in either Catholic- or Protestant-dominated countries have lower loan losses. Interestingly, the point estimate on *religiosity–Protestants* was higher than that of *Catholics–Protestants*, suggesting that the religiosity–loan-losses relationship is more negative for MFIs in Protestant-dominated countries.

4.3. Religiosity, Loan Losses and Operational Self-Sufficiency

We argued in the third hypothesis that religiosity improves MFIs’ operational self-sufficiency through a reduction in loan losses. We then captured loan losses with three different proxies (loan portfolio at risk, loan write-off ratio and loan loss rate). However, as explained in Section 3.2, each of these proxies captured loan losses at different stages. For example, *Par30* captured loan portfolio quality, including loans that were overdue for 30 days; *writeoffratio* focused on loans that had been written off from the balance; and *loanlossrate* took into account the amount recovered from written-off loans.

We therefore investigated the channel through which *religiosity* improves *OSS*. To achieve this, we included loan losses (*Par30*, *loanlossrate* and *writeoffratio*) and an interaction variable for each of the loan losses proxies and *religiosity* (*religiosity*Par30*, *religiosity*writeoffratio* and *religiosity*loanlossrate*) in Equation 5. The results are presented in Table 4. As shown in Columns 4–6, *writeoffratio*, *loanlossrate* and *Par30* had negative and statistically significant relationships with *OSS*. These results suggest that higher loan losses reduce MFIs’ operational self-sufficiency. This finding is intuitive because the loan portfolio is the largest asset (Yimga, 2016) and the main source of operating revenue (Ahlin et al., 2011; Gul et al., 2017) for MFIs. For the interaction terms, the results in Columns 4 and 5 show that both *religiosity*writeoffratio* and *religiosity*loanlossrate* had positive and statistically significant relationships with *OSS*. Interestingly, although *religiosity*Par30* had a positive relationship with *OSS*, the relationship was not statistically significant. Given that *Par30* merely captured loans that were 30 days or more overdue (not loans written off from the balance sheet), the insignificance of *religiosity*Par30* in explaining *OSS* is not surprising. Overall, the results

indicate that the write-off ratio and loan loss rates are the channels through which religiosity improves operational self-sufficiency.

4.4. Religiosity and Loan Size per Borrower

Prior studies have suggested a positive link between religiosity and personal risk aversion (Osoba, 2003; Diaz, 2000). There is also evidence that this relationship exists at the corporate level: firms located in areas with higher levels of religiosity display a higher degree of risk aversion (Hilary and Hui, 2009). More specifically, Adhikari and Agrawal (2016a) reported evidence of religiosity-induced risk aversion in US banks. Their results suggest that banks headquartered in religious areas follow a more-defensive risk culture. We, therefore, investigated the proposition that MFIs in highly religious countries will exhibit religiosity-induced risk aversion. He and Hu (2016) note that banks reduce their risk exposure to loan defaults by giving small loans. Rosenberg (2010) opines that for MFIs, the average loan size per borrower is a reflection of the MFI's risk policy, rather than the borrower's need and repayment capacity. Thus, risk-averse managers will favour a smaller average loan size. Consequently, we expected religiosity to impact negatively on the average loan size per borrower due to religiosity-induced risk aversion.

To test this conjecture, we re-estimated Equation 5 by replacing the dependent variable with the loan size per borrower (*loansize*). The results are presented in Table 5. As shown in Column 7, religiosity had a negative and statistically significant relationship with loan size. This result indicates that MFIs in highly religious countries demonstrate religiosity-induced risk aversion by offering smaller loans to borrowers. This result is consistent with previous US studies (Adhikari and Agrawal, 2016a; Hilary and Hui, 2009) that documented evidence of risk aversion in US banks located in highly religious areas. He and Hu (2016) reported that borrowers located in highly religious areas obtain larger loan amounts. Our evidence suggests that MFIs (lenders) in highly religious areas offer small loan sizes.

[INSERT TABLE 4 ABOUT HERE]

5. Robustness Tests

In consonance with related studies in this area, we conducted a rich set of robustness tests.

5.1. The Financial Crisis

Our sample period included the 2008–2009⁵ global financial crisis, which affected financial institutions around the world. Therefore, a concern was whether the results were driven by the crisis period. We addressed this issue in two ways, and we present the results in Table 5. First, we re-examined the religiosity–loan-losses relationship by considering the crisis period. The objective was to determine whether religiosity impacted loan losses differently during the crisis. The results in Columns 1–3 show that *religiosity*crisis* exhibited negative and statistically significant relationships with *writeoffratio*, *loanlossrate* and *Par30*. Further, *religiosity (crisis)* exhibited negative (positive) and statistically significant relationships with all the measures of loan losses. These findings imply that although the crisis generally increased loan losses in MFIs, the loan losses were less severe for MFIs in highly religious countries. Second, we tested how religiosity affects loan losses in normal periods. Specifically, we repeated the regressions by excluding the 2008 and 2009 fiscal years. The results, as presented in Columns 4–6 of Table 5, indicate that *religiosity* had a negative and statistically significant relationship with loan losses and imply that the negative religiosity–loan-losses relationship was not peculiar to the crisis period. These findings suggest that the financial crisis did not drive our results.

5.2. Survivorship Bias

Survivorship bias may arise when firms with incomplete data across the sample years are excluded from a study (Kestens et al., 2012). This is salient when examining loan losses in MFIs because higher loan losses are the major cause of MFI collapses (Afrifa et al., 2019). Goto et al. (2015) suggest that the inclusion of all available firms within the sample period may alleviate survivorship bias. Consequently, we employed an unbalanced panel in our analyses. However, even with an unbalanced panel, our analyses might still have suffered from survivorship bias if the results were driven mainly by MFIs with complete data. Therefore, following prior studies (Afrifa et al., 2019; Schaek and Cihak, 2012), we evaluated the robustness of our results to survivorship bias by restricting our sample to MFIs that had incomplete data during the sample period. Thus, we examined whether our results still held for MFIs that entered or exited during the sample period.

The results are presented in Table 5. As shown in Column 7, the coefficient of *religiosity* assumed a negative and statistically significant relationship with *writeoffratio*. Similarly,

⁵ Following Adhikari and Agrawal (2016a), we also adopted 2007–2008 as the financial crisis years. The untabulated results remained qualitatively similar.

religiosity had a negative and statistically significant relationship with *loanlossrate*, as shown in Column 8. The results in Column 9 also indicate that *religiosity* exhibited a negative and statistically significant relationship with *Par30*. This implies that our results held even in firms that did not have complete data during the sample period and implies that our results were robust to survivorship bias.

[INSERT TABLE 5 ABOUT HERE]

5.3. *Impact of Geographical Clustering*

Although we clustered all our regressions at the MFI level, our measure of religiosity was calculated at the country level. Consequently, our results might have been biased if the policies of different MFIs in a given country were correlated. Therefore, we adjusted the standard errors for clustering effects at the country level. As shown in Table 6 (Columns 1–3), the results remained unchanged. Further, MIX Market classifies the countries in our sample into five regions: Sub-Saharan Africa, South and East Asia and the Pacific, Eastern and Central Asia, Latin America and the Caribbean, and the Middle East and North Africa. Consequently, we adopted a more conservative approach and clustered standard errors at the regional level. As shown in Table 6 (Columns 4–6), the results remained essentially unchanged. More so, as an improvement to previous studies (Hilary and Hui, 2009; Kumar et al., 2011; He and Hu, 2016; Adhikari and Agrawal, 2016a), we employed the *cluster2* command in Stata to simultaneously adjust the standard errors for both country and region. The results (untabulated) remained unchanged when we did so. This indicates the robustness of our results to geographical clustering.

5.3. *Endogeneity and 2SLS*

Another concern was that our results might have been affected by endogenous movements in demographics. To address this, we followed previous studies (Gyapong et al. 2016; Gyapong et al. 2019; Hilary and Hui, 2009; He and Hu, 2016; Adhikari and Agrawal, 2016a; Nadeem et al. 2020) and used 2SLS regression. Hilary and Hui (2009) argue that the 2SLS mitigates issues of reverse causality, removes potential measurement errors in the level of religiosity and eradicates estimation biases that may arise as a result of omitted correlated variables. In identifying suitable instruments for the 2SLS, we followed previous studies in this area. Kumar et al. (2011), as well as Hilary and Hui (2009), employed a three-year lagged value of religiosity as an instrument in their 2SLS estimation. In more-recent US studies, He and Hu (2016) used religiosity in 1980 as an instrument, while Adhikari and Agrawal (2016a) employed religiosity

measures in 1952 – the first time the ARDA collected religiosity data. However, our study involved several countries for which religiosity data was only available from 1990. Therefore, we employed religiosity data for 1990 as an instrument.

As argued by Adhikari and Agrawal (2016a), the level of religiosity in 1990 satisfied the relevance and exclusion criteria. Thus, on the one hand, it was expected to be highly correlated with present levels of religiosity due to path dependence. On the other hand, our sample spanned from 2006 to 2018, making it improbable that religiosity levels 16 years ago would directly impact loan losses except through current levels of religiosity. The results of the second-stage regression estimates of the 2SLS are presented in Table 6 (Columns 7–9). They indicate that the predicted value of religiosity ($\hat{Religiosity}$) had negative and statistically significant relationships with *writeoffratio*, *loanlossrate* and *Par30*. These results confirm the earlier religiosity–loan-losses relationship and imply that our results were robust to endogeneity and omitted variables.

[INSERT TABLE 6 ABOUT HERE]

5.5. *Diamond Star Greater than 3*

This study utilised data from the MIX Market Database. MIX Market provides self-reported MFI data, which may be either audited or unaudited, raising issues of data reliability. Nevertheless, MIX Market assigns diamond ratings of 1–5 to MFIs based on the quality and reliability of the information reported, where MFIs with diamond star 4 and above have financial statements audited by a third-party auditing firm. Therefore, in consonance with previous MFI studies (Quayes, 2012; Assefa et al., 2013; Louis and Baesens, 2013; Gul et al., 2017), we checked whether our results would be different if we restricted our sample to only MFIs with diamond star 4 and above. The results are presented in Table 7. As shown in Column 1, the coefficient of religiosity assumed a negative and statistically significant relationship with *writeoffratio*. Similarly, the coefficients of *religiosity* suggested negative and statistically significant relationships with *loanlossrate* and *Par30*, as reported in Columns 3 and 4, respectively. These findings indicate that our results in the full sample continued to hold in this sub-sample.

5.6. *An Alternative Estimation Technique*

There is generally a lack of unanimity regarding the extent of time-series variation in the *religiosity* measure. For example, Hilary and Hui (2009) assumed low time series in their

religiosity measure and thus adopted an OLS model. A major caveat of this approach is that firm-specific unobserved heterogeneity could impact the results if the individual firm effects are correlated. In contrast, Adhikari and Agrawal (2016a) noted large time-series variations in their religiosity measure. They thus retorted: “if the explanatory variable of interest has substantial time-series variation, unobserved heterogeneity is best controlled by using a fixed-effects model” (Adhikari and Agrawal, 2016a, p. 13). Due to these aspects, we adopted a safer approach and used a fixed-effects model based on the result of the Hausman test. However, to deal with the assumption of limited time-series variation in religiosity, we followed Adhikari and Agrawal (2016a) and re-estimated our regressions using a random-effects model, which was better able to deal with time-invariant covariates in the panel data.

The results are presented in Table 7. As shown in Columns 4–6, *religiosity* had negative and statistically significant relationships with *writeoffratio* (Column 1), *loanlossrate* (Column 2) and *Par30* (Column 3). These figures indicate that our results were not driven by the choice of estimation technique.

[INSERT TABLE 7 ABOUT HERE]

5.7. Other Tests

We also conducted several other tests, which are untabulated. First, a concern was the possibility that our results were driven by unspecified omitted variables so that our measure of religiosity merely captured other factors that had been omitted from our estimation technique. To address this, we followed Afrifa et al. (2018) and specifically investigated the possibility that our religiosity–loan-losses relationship was driven by omitted variable bias. In doing so, we adopted the novel method developed by Oster (2019) for assessing bias from unobservable factors. Within the Oster (2019) test, our regression estimates were not driven by omitted variables if the bias-adjusted coefficient of religiosity moved further away from zero in both directions and the changes in the bias-adjusted coefficient fell within the 95% confidence intervals of the main controlled regression. Although this method has recently been used in the economics literature (Mian and Sufi, 2014; Jha, 2015), it is new to the religiosity and social finance literature.

The results indicate that all the identified sets of bounds moved away from zero, and the identified regressions were all within the confidence intervals of the controlled effects. These findings imply that omitted variables were unlikely to have driven our results.

Second, we adopted the approach used by previous studies in this area (Hilary and Hui, 2009; He and Hu, 2016; Adhikari and Agrawal, 2016a) to address the issue of omitted variable bias by adding additional control variables. Thus, we added several country-level control variables to our baseline model. Specifically, we included the ratio of bank non-performing loans to gross loans, domestic credit by the financial sector, borrowers from commercial banks, literacy rates, net domestic credit, net foreign assets, political stability, creditor participation index and ease of doing business. The results (untabulated) still held when we included these country-level controls. We further followed Chen et al. (2016) and included another set of control variables, such as common law, creditor rights and uncertainty avoidance. Again, our results (untabulated) remained unchanged. The results are consistent with the Oster (2019) test and confirm that our regression estimates were not driven by omitted variable bias.

Third, our main independent variable was *religiosity*; therefore, a concern was that a few MFIs in highly religious countries had driven our results. Following previous studies, we addressed this by first excluding the five most religious countries (Panama, Romania, Colombia, Mexico, and Papua New Guinea). The results remained unchanged when we did so. The results also remained unchanged when we excluded the five least religious countries (Afghanistan, Bangladesh, Cambodia, Morocco, Nepal).

6. Conclusion

Prior studies have suggested that religion influences economic decisions and impacts both corporate decisions and individual financial decisions. In particular, the extant literature provides evidence that the level of religiosity affects corporate risk-taking in the banking sector. However, the extent of the impact of religious beliefs on the operations of MFIs has not been explored. For MFIs, this is very important, given the prevalence of religious beliefs in developing countries, where most MFIs are located. Using a cross-country sample of 770 MFIs across 65 countries, we investigated the effect of religion on MFI outcomes. Specifically, we focused on loan losses and operational self-sufficiency due to their importance to the survival of MFIs. The results suggest that MFIs in highly religious countries have fewer loan losses and are more operationally self-sufficient. Further, our findings suggest that religiosity does not improve the loan repayment behaviour of women borrowers.

Our study was not without limitations. First, the study relied on three loan loss measures (the write-off ratio, loan loss rate and loan portfolio at risk for 30 days) as proxies for risk-taking. Although other studies have used z-scores as a proxy for risk-taking, we were unable to use

this proxy due to data unavailability. Future studies could consider the use of z-scores. Second, although we focused on MFIs, it would have been insightful to compare our results to traditional banks in the sampled countries. However, we were unable to do this due to data unavailability. Future studies could extend our study by focusing on a comparative analysis of MFIs and traditional banks. Lastly, our study focused on the effect of religiosity on loan losses because we believe that loan losses are the major cause of MFI collapses. However, an important question is whether religiosity may affect the likelihood of an MFI failing.

The results have important implications for policymakers, governments and development agencies that have committed substantial resources to support MFIs to make them operationally self-sufficient. The results also have practical implications for individuals who make lending decisions in MFIs. This is important, given the level of information asymmetry that exists in most developing countries where MFIs operate, especially information about the credit risks of potential borrowers. More specifically, the positive effect of religiosity on operational self-sufficiency implies that investors can avoid MFIs that are less operationally self-sufficient by targeting MFIs in highly religious countries. Further, MFIs in more-religious countries have lower loan losses, and the underlying mechanism for this relationship is the effect of religiosity on managerial risk aversion. Consequently, managers in MFIs in highly religious countries follow a more-defensive risk culture by reducing their loan-to-borrower ratio to reduce their exposure to loan losses. Thus, in MFIs located in highly religious countries, risk-averse managers make loan decisions that mainly reflect the MFI's risk policy, rather than the borrower's need and repayment capacity, leading to lower loan losses. This finding has important implications for highly religious countries by highlighting the beneficial effects of religiosity. However, even in less-religious countries, MFIs can benefit from religiosity-induced risk aversion if governments and policymakers consider religiosity when making managerial appointments in MFIs.

Appendix A

Variable Definitions and Data Sources

Variables		Description/Measurement	Source
Full Name	Acronym		
<i>Dependent Variable</i>			
Loan Loss Rate	Loanlossrate	(Write-offs - Amount recovered from written-off loans) / Average gross loan portfolio	Mix Market
Write-Off-Ratio	Writeoffratio	Value of loans written-off / Average gross loan portfolio	MIX Market
Portfolio at risk for 30 Days	Par30	(Outstanding balance, portfolio overdue > 30 days + Renegotiated loans)/ Gross loan portfolio	MIX Market
Operational Self-Sufficiency	OSS	Financial Revenue (Total)/ (Financial Expense on funding liabilities + net impairment loss on gross loans + Operating Expense)	MIX Market
Loan Size	Loansize	Ln(Gross loan portfolio/ Total number of active borrowers)	MIX Market
<i>Main Independent Variables</i>			
Religiosity	Religiosity	Number of Religious Adherents(Christians) in a Country/ The total Population	ARDA
Protestant	Protestant	Number of Religious Adherents (Protestants) in a Country/ The total Population	ARDA
Catholic		Number of Religious Adherents (Catholics) in a Country/ The total Population	ARDA
<i>MFI-Specific Characteristics</i>			
Women Borrowers	Gender	Number of active female borrowers/ Number of active borrowers	MIX Market
Cost per borrower	Costperborrower	Operating expenses/ Number of active borrowers	MIX Market
Average Outstanding loan	Outstandingloan	Gross loan portfolio/ Number of loans outstanding	MIX Market
Outreach	Outreach	Indicator variables for MFI with number of borrowers <10,000, between 10,000 and 30,000, and greater than 30,000	MIX Market
Risk-Coverage	Riskcoverage	Impairment loss allowance/ PAR > 30 days	MIX Market
Size	Size	Natural logarithm of total assets.	MIX Market

Depositors	Depositors	Natural logarithm of total depositors	MIX Market
Loan Officer Efficiency		Number of Borrowers/number of loan officers	MIX Market
<i>Country-Level Control Variables</i>			
Unemployment	Unemployment	Unemployment refers to the share of the labour force that is without work but available for and seeking employment.	WDI
Gini Index	Inequality	Gini index	measures the extent to which the distribution of income (or, in some cases, consumption expenditure) among individuals or households within an economy deviates from a perfectly equal distribution. A Lorenz curve plots the cumulative percentages of total income received against the cumulative number of recipients, starting with the poorest individual or household. The Gini index measures the area between the Lorenz curve and a hypothetical line of absolute equality, expressed as a percentage of the maximum area under the line. Thus a Gini index of 0 represents perfect equality, while an index of 100 implies perfect inequality.
GNI per Capita	GNIperCapita	GNI per capita	is gross national income divided by midyear population. GNI (formerly GNP) is the sum of value added by all resident producers plus any product taxes (less subsidies) not included in the valuation of output plus net receipts of primary income (compensation of employees and property income) from abroad.
Inflation	Inflation	Inflation	as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals,

		such as yearly. The Laspeyres formula is generally used.	
Rule of Law	Ruleoflaw	Reflects perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests. Ranges from approximately -2.5 (weak) to 2.5 (strong) governance performance.	WDI
Contract Cost	Contractcost	Measures the cost for resolving a commercial dispute through a local first-instance court. It is calculated as the cost to enforce a contract per claim.	WDI
Control of Corruption	Corruption	Reflects perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests. Ranges from approximately 0 (lowest) to 100(strong).	WDI

Appendix B
Summary of Religiosity and Other Country Measures

Country	Religiosity	GNI per Capita	Rule of Law	Inequality	Contract Cost
Afghanistan	0.000628	544.300	-1.65000	7.397138	29.0000
Albania	0.238366	4125.21	-0.51400	14.37800	37.2540
Angola	0.896480	3179.46	-1.24000	12.67752	44.4000
Argentina	0.848845	9923.35	-0.63664	42.17773	17.5992
Armenia	0.950414	3709.92	-0.38211	30.50163	19.6178
Azerbaijan	0.025089	4789.97	-0.77517	7.397138	18.5000
Bangladesh	0.001815	937.300	-0.78701	11.35728	66.8000
Benin	0.407514	1066.63	-0.61220	14.74422	64.7000
Bolivia	0.948000	2020.52	-1.02762	44.86548	25.000
Bosnia and Herze	0.518713	4849.19	-0.34919	12.56949	34.8871
Brazil	0.874129	10802.2	-0.17294	48.74560	21.1425
Bulgaria	0.825448	6559.04	-0.06428	35.19933	18.6000
Burundi	0.887612	303.600	-1.11578	14.10303	36.1000
Cambodia	0.004008	861.116	-1.06606	7.397138	103.257
Cameroon	0.498014	1311.16	-1.08865	14.67005	46.6000
Chile	0.900297	11185.4	0.500000	26.70065	25.6000
China	0.058000	4797.58	-0.44033	33.49927	16.2000
Colombia	0.970100	6579.80	-0.36510	47.09745	47.3635
Congo, Dem. Rep.	0.926175	334.996	-1.61530	12.00058	127.265
Costa Rica	0.906210	8175.67	0.491946	48.90537	24.3000
Dominican Republic	0.856461	5704.46	-0.60307	46.66769	40.9000
Ecuador	0.907027	4833.44	-1.01364	47.48844	27.2000
Egypt	0.121294	2539.87	-0.32844	15.93872	26.2000
El Salvador	0.880375	2970.44	-0.65434	43.67101	28.4000
Georgia	0.818400	3726.57	-0.08487	38.28823	27.6789
Ghana	0.642726	1295.34	0.015972	10.23834	23.0000
Guatemala	0.950000	2933.56	-1.04360	14.88341	26.5000
Haiti	0.831142	705.670	-1.26857	9.804485	42.6000
Honduras	0.900320	1876.75	-0.97701	53.12797	38.8000
India	0.023369	1502.36	-0.00136	12.96676	31.0000
Indonesia	0.108336	3401.29	-0.62779	37.77529	70.3000
Iraq	0.019310	4710.80	-1.59850	10.02285	29.5985
Jordan	0.030000	3575.05	0.326315	14.91112	31.2000
Kazakhstan	0.297418	8042.12	-0.70432	28.06426	22.0000
Kenya	0.811694	993.887	-0.76394	9.003045	37.6750
Laos	0.015000	1273.44	-0.87434	12.16077	31.6000
Lebanon	0.407000	6938.92	-0.72368	10.60804	30.8000
Madagascar	0.585521	471.062	-0.70825	12.54618	39.9779
Malawi	0.714298	460.923	-0.21607	12.11714	110.244
Mali	0.028700	676.329	-0.43055	15.14605	52.0000
Mexico	0.960030	9549.385	-0.53622	28.90619	33.0000
Mongolia	0.016398	3194.100	-0.33292	22.32317	30.6000

Morocco	0.010000	2848.480	-0.21578	12.93025	26.5000
Mozambique	0.463252	474.5221	-0.68676	14.75647	53.3000
Nepal	0.014696	608.5702	-0.75486	10.6607	26.8000
Nicaragua	0.900500	1613.451	-0.74822	13.60797	26.8000
Nigeria	0.420329	2191.441	-1.12302	14.12620	38.9000
Pakistan	0.017000	1099.993	-0.82113	16.86553	20.5000
Panama	0.979300	8646.641	-0.10298	51.31343	41.9403
Papua New Guinea	0.960000	1803.200	-0.83823	8.411928	110.300
Paraguay	0.936144	4256.955	-0.82028	49.90580	30.0000
Peru	0.945743	5052.308	-0.59381	45.62018	41.2000
Philippines	0.913306	2538.398	-0.47956	20.57716	26.9226
Romania	0.978422	8382.591	0.027777	36.15365	21.4666
Rwanda	0.895176	647.2133	-0.250531	16.80103	77.2031
Senegal	0.036021	1292.068	-0.244396	11.51000	29.9137
Serbia	0.912200	5650.097	-0.361538	18.96227	30.4717
South Africa	0.805842	7180.254	0.1371420	21.34081	33.2000
Sri Lanka	0.076550	2737.149	-0.024812	19.03506	22.8000
Tajikistan	0.023817	921.0842	-1.242587	13.39468	25.5000
Tanzania	0.485204	754.2959	-0.447580	15.08331	14.3000
Togo	0.477539	568.3375	-0.877343	19.37462	47.5000
Uganda	0.821487	815.3250	-0.360294	15.43161	41.0000
Uzbekistan	0.054449	1551.499	-1.283607	7.397138	20.98771
Vietnam	0.093910	1340.495	-0.454580	21.55199	29.46183

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Table 1
Descriptive Statistics-Full sample

The table reports descriptive statistics of our key variables of interest. Panel A shows the descriptive statistics of the dependent variables. Panel B shows the descriptive statistics of the independent variables. Panel C provides the descriptive statistics of MFI-specific characteristics whereas Panel D shows the descriptive statistics of the country-specific characteristics. The sample consists of MFIs in MIX Market database from 2006 to 2018. All variables in the table are defined in the Appendix A.

Variable	Obs	Mean	Std. Dev.	25th	50th	75th	95th
Panel A							
<i>Dependent Variable</i>							
Loan loss rate	11,108	0.0178	0.0359	0.0000	0.0033	0.0191	0.0866
Write-off ratio	10,193	0.0219	0.0395	0.0000	0.0072	0.0251	0.0981
Portfolio at risk 30days	11,424	0.0706	0.1055	0.0131	0.0394	0.0795	0.2561
OSS	12,068	1.1306	0.3470	1.0007	1.1153	1.2705	1.7130
Loan Size	13,376	6.3538	1.3106	5.3187	6.2380	7.2680	8.6673
Independent Variables							
<i>Panel B: Religiosity</i>							
Religiosity	14,753	0.5015	0.4066	0.0272	0.5588	0.9091	0.9686
Religiosity-Protestant	14,753	0.0943	0.1162	0.0073	0.0500	0.1414	0.3200
Religiosity-Catholic	14,753	0.3332	0.3532	0.0074	0.1500	0.7700	0.8700
Women borrowers	10,699	0.6495	0.2689	0.4353	0.6371	0.9297	1.0000
<i>Panel C: MFI-Specific Characteristics</i>							
Cost per borrower	10,908	230.30	339.19	40.000	136.00	275.00	738.00
Risk-Coverage	10,308	2.6511	8.4714	0.4955	0.8823	1.3795	8.5042
Size	14,068	15.878	2.1767	14.346	15.789	17.341	19.680
Depositors	14,921	9.8855	1.6691	9.8856	9.8856	9.8856	12.452
Loan officer Efficiency	11,932	311.02	280.19	154.11	243.62	370.51	777.72
Outstanding loan	13,917	0.7493	0.1984	0.6529	0.7838	0.8755	0.9835
<i>Panel D: Country-Specific Characteristics</i>							

Unemployment	14,921	5.9533	3.9605	3.8000	5.9533	5.9533	12.700
Inequality	14,921	23.356	18.446	7.3971	7.3971	43.400	52.200
Population	14,753	17.426	1.6643	16.113	17.092	18.537	20.019
GNI per Capita	13,689	3352.4	2942.2	1127.9	2074.9	4951.5	9794.3
Inflation	14,502	6.2001	4.5499	3.1000	5.2000	8.4000	14.500
Rule of Law	14,908	-0.5864	0.4338	-0.900	-0.600	-0.300	0.1000
Cost of Contract	12,043	36.662	21.073	25.500	29.900	41.200	81.700
Corruption	14,911	32.158	16.147	19.200	31.400	43.600	59.200

Table 2
Correlation Matrix

The table reports Pearson correlation coefficients among select independent and control variables. Numbers in **bold** are statistically significant at the 5% level

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
OSS	1	1																	
Loan Size	2	0.099	1																
Religiosity	3	-0.060	0.331	1															
Gender	4	-0.003	-0.624	-0.211	1														
Costperborrower	5	-0.128	0.345	0.228	-0.416	1													
Riskcoverage	6	0.070	-0.131	-0.137	0.154	-0.089	1												
Size	7	0.116	0.381	0.137	-0.114	0.138	0.011	1											
Depositors	8	0.051	0.077	0.045	-0.003	0.035	0.016	0.409	1										
L/Efficiency	9	0.100	-0.218	-0.059	0.150	-0.270	0.073	0.134	0.072	1									
Outloaqn	10	0.212	0.058	-0.054	0.137	-0.160	0.054	0.065	-0.007	0.082	1								
Unemp	11	0.001	0.148	0.054	-0.164	0.082	-0.035	0.033	-0.016	-0.064	0.043	1							
Gini	12	0.009	0.300	0.463	-0.146	0.157	-0.070	0.094	0.01	-0.028	0.103	-0.014	1						
Population	13	0.026	-0.411	-0.347	0.431	-0.218	0.152	-0.005	0.024	0.124	0.125	-0.221	-0.087	1					
GNIperCapita	14	0.002	0.353	0.489	-0.168	0.286	-0.097	0.105	0.003	-0.097	0.125	0.158	0.463	0.004	1				
Inflation	15	0.041	-0.267	-0.176	0.088	-0.118	0.059	-0.158	-0.042	0.028	-0.076	-0.065	-0.191	0.117	-0.256	1			
RuleofLaw	16	-0.006	-0.084	-0.012	0.198	-0.044	0.043	0.029	-0.001	0.140	0.128	0.216	0.038	0.284	0.249	-0.061	1		
CostofContract	17	-0.083	-0.090	-0.018	0.070	-0.023	-0.042	0.009	0.015	0.028	-0.136	-0.097	-0.128	-0.061	-0.278	-0.065	-0.158	1	
Corruption	18	-0.042	0.078	0.234	0.075	0.051	-0.003	0.035	-0.01	0.101*	0.118	0.228	0.231	0.092	0.363	-0.155	0.388	-0.110	1

Table 3

Religiosity, Borrower Gender, and Loan Losses

The table reports regression estimates of loan losses (*writeoffratio*, *loanlossrate* and *Par30*) on the religiosity proxy, *Religiosity* as shown in Columns 1-3. Columns 4-6 show the regression estimates of loan losses and borrower gender on the religiosity proxy. Column 7 shows the regression estimates of operational self-sufficiency (*OSS*) on the religiosity proxy, *Religiosity*. All the variables are defined in the Appendix A. All regressions include year fixed effects. Standard errors are corrected for heteroscedasticity and are clustered at the MFI level, and *p-values* are in parentheses. *, **, and *** show significance at the 10%, 5%, and 1% level, respectively.

	Religiosity and Loan Losses			Religiosity, Borrower Gender and Loan Losses			Religiosity and OSS
	1 Writeoffratio	2 Loanlossrate	3 Par30	4 Writeoffratio	5 Loanlossrate	6 Par30	7 OSS
Religiosity	-0.0294*** (0.000)	-0.0429*** (0.000)	-0.0149*** (0.001)	-0.0501*** (0.002)	-0.0568*** (0.000)	-0.0652** (0.024)	0.7859*** (0.002)
Gender				-0.0195* (0.052)	-0.0170** (0.037)	-0.0381** (0.034)	
Religiosity*Gender				0.0309 (0.238)	0.0247 (0.206)	0.0065 (0.314)	
Unemployment	0.0006* (0.051)	0.0007** (0.012)	0.0016** (0.016)	0.0006* (0.065)	0.0007** (0.016)	0.0016** (0.022)	-0.0088** (0.030)
Outstandingloan	-0.0384*** (0.000)	-0.0297*** (0.002)	-0.00029 (0.988)	-0.0382*** (0.000)	-0.0296*** (0.002)	-0.0000 (0.999)	0.229*** (0.001)
GINI Index	0.0001 (0.370)	0.0002 (0.237)	0.0001 (0.769)	0.0002 (0.352)	0.0002 (0.229)	0.0001 (0.70)	0.0027* (0.055)
Population	-0.0187 (0.517)	-0.0224 (0.370)	-0.0748 (0.163)	-0.017 (0.548)	-0.021 (0.398)	-0.0675 (0.210)	-0.328 (0.423)
Riskcoverage	-0.0001*** (0.004)	-0.0001*** (0.001)	-0.0009*** (0.000)	-0.0001*** (0.004)	-0.0001*** (0.001)	-0.0008*** (0.000)	0.0013* (0.095)
GNlperCapita	-0.0000 (0.773)	-0.0000 (0.734)	0.0000 (0.620)	-0.0000 (0.721)	-0.0000 (0.691)	0.0000 (0.728)	0.0000 (0.535)
L/Efficiency	-0.0000** (0.012)	-0.0000** (0.013)	0.0000 (0.329)	-0.0000** (0.017)	-0.0000** (0.017)	0.0000 (0.252)	-0.0000 (0.978)
Inflation	-0.0000	0.0000	-0.0005	-0.0000	-0.0000	-0.0006	0.0008

	(0.901)	(0.857)	(0.246)	(0.744)	(0.974)	(0.117)	(0.608)
Ruleoflaw	0.0024	0.0011	-0.0029	0.0023	0.0011	-0.0036	-0.0054
	(0.642)	(0.821)	(0.811)	(0.662)	(0.826)	(0.759)	(0.915)
Contract Cost	-0.0001	-0.0001	0.0003	-0.0002	-0.0002	0.0003	-0.0043*
	(0.332)	(0.398)	(0.481)	(0.260)	(0.321)	(0.639)	(0.079)
Cost per Borrower	-0.000*	-0.0000	0.0001	-0.0001*	-0.0001*	0.0000	-0.0002***
	(0.084)	(0.110)	(0.701)	(0.070)	(0.095)	(0.836)	(0.000)
Corruption	-0.0002*	-0.0002	0.0002	-0.00022	-0.0002	0.0002	-0.0001
	(0.095)	(0.154)	(0.453)	(0.100)	(0.161)	(0.348)	(0.949)
Depositors	0.0002	0.0001	0.0007	0.0002	0.0001	0.0007*	0.0025
	(0.395)	(0.620)	(0.053)	(0.421)	(0.620)	(0.056)	(0.227)
Size	-0.0029**	-0.0021	-0.0087***	-0.0030**	-0.00213	-0.0088***	0.0526***
	(0.035)	(0.125)	(0.004)	(0.035)	(0.125)	(0.003)	(0.000)
Outreach	YES	YES	YES	YES	YES	YES	YES
Year	YES	YES	YES	YES	YES	YES	YES
χ^2	-4.973***	-4.387***	-5.848***	-4.942***	-4.348***	-5.584**	27.70***
	(0.000)	(0.000)	(0.007)	(0.000)	(0.000)	(0.010)	(0.006)
N	5820	6068	6263	6068	6283	5820	5280
R-sq	0.07	0.061	0.041	0.073	0.064	0.055	0.069

Table 4
Further Analyses

The table reports regression estimates of loan losses (*writeoffratio*, *loanlossrate* and *Par30*) on the religious denominations, *Religiosity-Catholics* and *Religiosity-Protestants* (Columns 1-3). In Columns 4-6, the regressions show the results of effects of interaction between loan losses and religiosity (*Religiosity*Writeoffratio*, *Religiosity*Loanlossrate*, and *Religiosity*Par30*) on operational self-sufficiency (*OSS*). Column 7 shows the regression estimates of loan size (*loan size*) on the religiosity proxy, *Religiosity*. All the variables are defined in the Appendix A. Other control variables, not reported for brevity, are the same as in Table 3. All regressions include MFI-level controls, Country-level controls and year fixed effects. Standard errors are corrected for heteroscedasticity and are clustered at the MFI level, and *p-values* are in parentheses. * and *** show significance at the 10% and 1% level, respectively.

	Catholics Vs Protestants			Religiosity, Loan Losses and OSS			Religiosity and Loan Size
	(1) Writeoffratio	(2) Loanlossrate	(3) Par30	(4) OSS	(5) OSS	(6) OSS	(7) Loansize
Religiosity-Catholics	-0.0690*** (0.000)	-0.0629*** (0.000)	-0.0194* (0.079)				
Religiosity-Protestants	-0.1210*** (0.000)	-0.0990*** (0.000)	-0.0480** -0.018				
Religiosity				0.7938** (0.020)	0.7170** (0.040)	0.7789** (0.030)	-0.6444* (0.061)
Writeoffratio				-1.988*** (0.000)			
Loanlossrate					-2.1471*** (0.000)		
Par30						-0.7266*** (0.000)	
Religiosity*Writeoffratio				1.4773*** (0.001)			
Religiosity*Loanlossrate					1.5439*** (0.001)		
Religiosity*Par30						0.0751	

						(0.761)	
MFI-Level Controls	YES	YES	YES	YES	YES	YES	YES
Country-Level Controls	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES
χ^2	-4.597***	-4.026***	-7.500***	8.25***	7.81***	7.28***	55.56***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
N	5820	6068	6263	5405	5651	5812	6263
R-sq	0.076	0.066	0.052	0.022	0.021	0.022	0.575

Table 5

Robustness Tests-Religiosity, Loan Losses and Financial Crisis

The table reports regression estimates of loan losses (*writeoffratio*, *loanlossrate* and *Par30*) on the crisis period dummy, *Crisis*, religiosity proxy, *Religiosity* and its interaction with the crisis period dummy, *Religiosity*Crisis* as shown in Columns 1-3. Column 4-6 shows the results for the subsample without the crises period. All the variables are defined in the Appendix A. Other control variables, not reported for brevity, are the same as in Table 3. All regressions include MFI-level controls, Country-level controls and year fixed effects. Standard errors are corrected for heteroscedasticity and are clustered at the MFI level, and *p-values* are in parentheses. ** and *** show significance at the 5% and 1% level, respectively.

	Religiosity and Crises			Religioisty Without Crises Years			Survivorship Bias		
	(1) Writeoffratio	(2) Loanlossrate	(3) Par30	(4) Writeoffratio	(5) Loanlossrate	(6) Par30	(7) Writeoffrattio	(8) Loanlossrate	(9) Par 30
Crisis	0.0189*** (0.000)	0.0165*** (0.000)	0.0316*** (0.000)						
Religiosity	-0.0261*** (0.002)	-0.0401*** (0.000)	-0.0026** (0.016)	-0.0188*** (0.001)	-0.0228*** (0.000)	-0.0386** (0.011)	-0.0217*** (0.000)	-0.0121** (0.020)	-0.0285*** (0.006)
Religiosity*Crisis	-0.0033*** (0.003)	-0.0025*** (0.003)	-0.0121** (0.027)						
MFI-Level Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES
Country-Level Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
χ^2	5.330*** (0.000)	5.730*** (0.000)	6.46*** (0.000)	5.010*** (0.000)	4.11*** (0.000)	4.030** (0.023)	3.49*** (0.000)	3.17*** (0.000)	4.53*** (0.000)
N	5820	6068	6263	4730	4966	5146	3806	3980	4130
R-sq	0.071	0.074	0.055	0.072	0.067	0.055	0.069	0.056	0.049

Table 6
Robustness Tests- Geographical Clustering and Endogeneity

The table reports regression estimates of loan losses (*writeoffratio*, *loanlossrate* and *Par30*) on the religiosity proxy, *Religiosity* clustered by country (Columns 1-3), clustered by region (Columns 4-6) and the results for the 2SLS (Columns 7-9). All the variables are defined in the Appendix A. All regressions include MFI-level controls, Country-level controls and year fixed effects. Standard errors are corrected for heteroscedasticity and *p-values* are in parentheses. *, ** and *** show significance at the 10%, 5% and 1% level, respectively.

	Cluster By Country			Cluster By Region			Two-Stage Least Square		
	1 Writeoffratio	2 Loanlossrate	3 Par30	4 Writeoffratio	5 Loanlossrate	6 Par30	7 Writeoffratio	8 Loanlossrate	9 Par30
Religiosity	-0.0294*** (0.004)	-0.0429*** (0.003)	-0.0149** (0.011)	-0.0294*** (0.009)	-0.0429*** (0.000)	-0.0149* (0.081)			
<i>Religioisty</i> [^]							0.0344*** (0.002)	0.0571*** (0.000)	0.0232** (0.011)
MFI-Level Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES
Country-Level Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
N	5820	6068	6263	5820	6068	6263	5123	5901	5923
R-sq	0.07	0.061	0.041	0.073	0.064	0.055	0.069	0.060	0.039

Table 7

Robustness Tests: Diamond Star Greater than 3 and Alternative Estimation Technique

The table reports regression estimates of loan losses (*writeoffratio*, *loanlossrate* and *Par30*) on the religiosity proxy, *Religiosity* using MFIs with diamond ratings greater than 3 as shown in Columns 1-3. Column 4-6 shows the results of the random effects estimation. All the variables are defined in the Appendix A. Other control variables, not reported for brevity, are the same as in Table 3. All regressions include MFI-level controls, Country-level controls and year fixed effects. Standard errors are corrected for heteroscedasticity and are clustered at the MFI level, and *p-values* are in parentheses. ** and *** show significance at the 5% and 1% level, respectively.

	Diamond Greater 3			Random Effects		
	(1) Writeoffratio	(2) Loanlossrate	(3) Par30	(4) Writeoffraio	(5) Loanlossrate	(6) Par30
Religiosity	-0.0301*** (0.000)	-0.0122*** (0.000)	-0.0312*** (0.001)	-0.0151* (0.06)	-0.0076*** (0.000)	-0.0335*** (0.000)
MFI-Level Controls	YES	YES	YES	YES	YES	YES
Country-Level Controls	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES
χ^2	4.753*** (0.000)	5.543*** (0.000)	4.811*** (0.000)	251.69*** (0.000)	224.41** (0.000)	385.29*** (0.000)
N	4721	5231	5632	5820	6068	6263