

## INTERNATIONAL REAL ESTATE REVIEW

2022 Vol. 25 No. 2: pp. 237 – 265

# Does Religion Affect Mortgage Delinquency?

### **Lingxiao Li**

California State University Fullerton, College of Business and Economics. Email: lingli@fullerton.edu

### **Erdem Ucar**

California State University Fullerton, College of Business and Economics. Email: erucar@fullerton.edu

We provide evidence that religiosity deters mortgage delinquency. Religiosity is the percentage of the total county population who adheres to a religion. The results show that locations with a higher level of religiosity have a significantly lower mortgage delinquency rate after controlling for income, employment, education, population, etc. A one-standard-deviation increase in religiosity in a county leads to almost a 0.096 standard-deviation decrease in the mortgage delinquency rate, which corresponds to nearly 9.1% (12.3%) of the sample average (median) mortgage delinquency rate. The impact of religiosity increases during and after the global financial crisis period. Previous studies in the literature indicate that religiosity is related to a preference to save, higher aversion to risk as well as moral values towards mortgage default, all of which are linked to mortgage default decisions. This new evidence suggests the role of local religiosity in evaluating and modeling mortgage default risk.

### **Keywords**

Religiosity, Risk Aversion, Morality, Mortgage Delinquency

## 1. Introduction

Following the mounting mortgage default activities during the global financial crisis, analyses of the contributing factors of mortgage defaults have quickly become an area of academic interest. Previous studies (Doms et al., 2007; Gerardi et al., 2008; 2009) show that observable factors are important determinants of the mortgage decisions of borrowers, such as their loan terms, borrowing characteristics, and macroeconomic variables, with an emphasis on the economic considerations. Experian-Oliver Wyman (2009), FICO (2011), and Guiso et al. (2013) demonstrate that strategic default has risen sharply and prevents recovery from the housing crisis. A strategic default is the case when the borrower has the ability to keep the mortgage current but chooses not to do so. Recently, there has been a growing body of literature that focuses on the impact of emotional considerations that underlie the strategic default decision-making process of homeowners, such as morality, perception of lender characteristics, social herding, etc.

Religion affects beliefs and practices every day and serves as a critical factor to understand the decision-making process of individuals. Existing research provides evidence that religion influences the economic attitudes of households such as their thriftiness, risk preference, individual responsibility, planning horizons, and moral values towards unethical behavior (Keister, 2003; Guiso et al., 2003; Hilary and Hui, 2009; Christelis et al., 2010; Renneboog and Spaenjers, 2012; Grullon et al., 2010). All of the above factors could influence the mortgage decisions of households. However, in the current literature on mortgage default, religion has been largely ignored. With clear evidence that the economic attitudes and financial decisions of households differ with religious belief, we try to answer the question: does religion affect the mortgage delinquency outcomes of a household? In particular, we investigate the link between religiosity and the mortgage delinquency rate in a nearby neighborhood. Demographic variables (such as education and income) and background risks (such as age and employment) are traits that may correlate with both religion and mortgage decisions. We use them as control variables in our empirical analysis. Learning about mortgage defaults is interesting and important to academics, lenders, and policymakers. It improves the understanding of academics of policy transmission in the housing market during crisis periods, helps lenders improve the pricing of mortgage and mortgage-backed securities, and aids policymakers in developing effective foreclosure policy interventions.

Our empirical findings demonstrate an economically significant relationship between local religion and mortgage delinquency rates after controlling for income, employment, education, population, etc. A one-standard-deviation increase in the religiosity variable, which is the percentage of the total population of the county that adheres to a religion, leads to nearly a 0.096 standard-deviation decrease in the mortgage delinquency rate. This decrease

corresponds to almost 9.1% (12.3%) of our sample average (median) mortgage delinquency rate. Religiosity-related factors, as documented in the literature, such as more savings, higher individual responsibility, and moral value towards mortgage default, all deter mortgage default with a strategic motivation. Our findings also mirror the evidence that religiosity deters unethical corporate behaviors (Grullon et al., 2010).

The above results remain significant under alternative robustness checks. In the robustness tests, we examine our main results after controlling for additional demographic details and show that ethnic-demographic factors do not drive our findings. We also demonstrate that our findings are not driven by a particular location, such as any large state or any socio-economic characteristic of a large state. Moreover, we use a two-stage least squares (2SLS) estimation to address potential endogeneity concerns. We test two instrumental variables, and our results remain robust. Overall, the robustness tests provide supporting evidence that highlights the role of local religion in mortgage delinquency.

To test the impact of religion on mortgage delinquency under different market environments, we split the sample based on the 2007 global financial crisis and show that the effect of local religion differs between the pre- and post-financial crisis periods. In our sample, the impact of religiosity on mortgage delinquency has significantly increased in the post-crisis period (2007-2011) compared to the pre-crisis period (1999 to 2006). This finding supports our early argument that religion plays a significant role in strategic default, which has risen sharply during the crisis period (Experian-Oliver Wyman, 2009; FICO, 2011; Guiso et al., 2013). Since the magnitude of foreclosure waves has resulted in substantial consequences and prevents recovery of the housing market during the post-crisis period, the critical role of religion in mortgage delinquency cannot be ignored.

This study contributes to the existing literature in several ways. First, the study helps to provide a better understanding of mortgage decisions by presenting a new contributing factor to the mortgage delinquency outcome with strong empirical evidence – religiosity, which is associated with the saving habits, risk aversion, and moral values of borrowers towards mortgage default. The work contributes to the existing research that studies the emotional considerations of strategic default. Second, the study also complements the literature that analyzes the impact of religion on various economic and financial outcomes at the household and corporate levels. Mortgage default is a financially and emotionally influential decision for households, given that properties are the most significant wealth component for the majority of households. Thus, this study improves our understanding of this life-altering household decision. Third, as the first study to investigate the role of local religion on mortgage performance, our results have important implications for lenders. Under current fair lending regulations, lenders cannot use individual religious information in calculating predicted termination probabilities as a proxy for unobserved risk

factors when they participate in the decision of granting credit or setting the terms of that credit. Our results suggest that lenders could improve the modeling of mortgage default risk by including local religion measures as an important control variable. Religion in communities could also serve as an effective channel for communicating mortgage information such as loan modifications.

The remainder of the paper is organized as follows. In Section 2, we review the related literature on religion and corporate and household outcomes, as well as studies on strategic default. Section 3 summarizes the data used in the empirical analyses. In Section 4, we present and discuss the empirical analysis and results. Section 5 concludes the paper.

## **2. Literature Review**

Existing studies in the literature have documented the critical role of religion on economic outcomes at both the aggregate economic level and individual household level. Since Max Weber (1905) first identifies the significant role of religion in social change, scholars have correlated religion with fundamental institutions that drive economic prosperity and growth (La Porta et al., 1997; Stulz and Williamson, 2003). Guiso et al. (2003) use the World Values Surveys to document significant differences in economic attitudes between religious and non-religious groups, which could affect national-level economic growth. Previous studies also show that religious background plays an important role in economic beliefs and preferences by using household-level data. Both Keister (2003) and Guiso et al. (2003) show that religiosity emphasizes the importance of saving and thriftiness. Religiosity also encourages personal ethical attitudes and behaviors. Kennedy and Lawton (1998) provide evidence of a negative relationship between religiosity and the willingness to behave unethically. Weaver and Agle (2002) show that religious role expectations, internalized as a religious self-identity, can influence ethical behavior. Using survey data and defining religiosity as church attendance rather than taking courses in religion or similar subjects, Conroy and Emerson (2004) find that religiosity significantly reduces unethical behavior. Miller and Hoffmann (1995) and Hilary and Hui (2009) document a positive relationship between religiosity and risk aversion at the household level. Guiso et al. (2003) provide evidence that religious people exhibit a “greater sense of individual responsibility”. Studies also document that religion affects bequest motives and their planning horizon, which could influence their portfolio decisions (Christelis et al., 2010; Ameriks and Zeldes, 2004). Renneboog and Spaenjers (2012) provide empirical evidence on the significant differences in the economic attitudes and financial decisions of religious and non-religious households in terms of savings, investment decisions, and time horizons. Using data from the 2007 Taiwan Social Change Survey (TSCS), Liu (2010) shows that (1) risk preference has a small estimated net effect on religious affiliation,

but (2) the relationship between risk preference and frequency of religious participation is statistically significant. Noussair et al. (2013) study a representative sample of the Dutch population and find that more religious people (church membership or attendance) are more risk averse. The authors suggest that the link between risk aversion and religion is driven by the social aspects of church membership rather than the religious beliefs themselves. Other studies focus on local religion as a measure of regional risk-taking characteristics and show that higher local religiosity is associated with more risk-aversion or less-risk taking tendencies for corporate decisions (e.g., Hilary and Hui, 2009; Grullon et al., 2010; Ucar, 2016), such as having lower levels of risk exposure and investment rate and growth, engaging less in option backdating, and paying more dividends. Grullon et al. (2010) show that religiosity deters unethical corporate behavior. Firms headquartered in highly religious counties are less likely to backdate options, grant excessive compensation packages to their managers, practice aggressive earnings management, and be the target of class action securities lawsuits. Jiang et al. (2018) document that the culture of a firm, specifically, its religiosity, affects its cost of debt. Firms in higher-religiosity counties have higher credit ratings and lower debt costs, with a stronger impact on firms with greater information asymmetry and during recessions.

The widespread foreclosure crisis has motivated a growing body of literature, prompting a search for the factors that contribute to mortgage default risk. There are two types of mortgage defaults. Economic default means that a borrower is unable to continue paying the monthly mortgage payment. Strategic default refers to the case in which a borrower defaults due to an unwillingness to pay. Some studies focus on the impact of observable factors on mortgage default risk, such as loan terms, characteristics of the borrower, and macroeconomic variables (Doms et al., 2007; Gerardi et al., 2008; 2009). Others explore the role of possible agency problems between loan originators and investors (Agarwal et al., 2012; Elul, 2016; Ambrose et al., 2016). These studies focus on predicting mortgage delinquencies in terms of economic considerations. Previous studies that use option-based mortgage default models predict that borrowers should immediately exercise the default option when the market value of their mortgage exceeds the value of the underlying property. However, empirical evidence shows that a substantial number of borrowers are unlikely to default as 'ruthlessly' as the option theory predicts. Agarwal et al. (2020) hypothesize that borrowers have heterogeneous time preference, which is either a present-biased preference (overvaluing immediate outcomes), or a time-consistent preference (standard exponential discounting). The authors show that borrowers with a present-biased preference are more likely to accept back-loaded mortgages that minimize up-front costs, even though this increases their risk of going "underwater" and entering default when negative home price shocks occur. Chen et al. (2018) use Federal Housing Administration (FHA) modified loans to analyze their re-default risk. They show that modified loans tend to have much higher re-default risk and less sensitive re-default hazard to

traditional risk drivers, compared to non-modified loans. Moreover, the re-default risk initially declines with magnitude of the payment reduction associated with the modification received. However, as the payment reduction becomes substantial, the probability of re-default increases.

A growing body of literature is focusing on the underlying decision process for strategic default for both economic and emotional considerations. Seiler et al. (2012) find that realized shame and guilt are consistent with ex-ante expectations in strategic default. The key strategic default drivers include the expectation of the homeowner of future real estate price movements, frustration with the lender, moral evaluation of the decision to strategically default, loan knowledge, political ideology, gender, income, and age. State bankruptcy exemption levels and real estate laws only marginally explain strategic default. Seiler et al. (2014) show that homeowners adopt a strategic default proclivity consistent with that of their peers. The herding behavior appears stronger if a leader is involved. While if it is perceived as immoral behavior, such trend is weaker. Using the inequity aversion theory, Seiler (2014) provides evidence that the perceived characteristics of the lender affect the strategic default decisions of homeowners. They can be removed even with extremely modest loan modifications. The view about mortgage contracts is shifted by a liquidation clause (Seiler 2017). For strategic default, the focus shifts to morality, and people revert to the mortgage contract as strictly a promise to perform. Li et al. (2022) show that neighborhoods with higher social capital, which represents the norms and trusts common to a social network, have a lower mortgage delinquency rate, confirmed by Hasan et al. (2021) with consumer default data. Unlike the above studies, this paper focuses on how religion affects mortgage delinquency decisions. Previous studies present mixed evidence on the relation between religion and social capital. For instance, Alesina and La Ferrara (2002) and Bellemare and Kröger (2007) show no relationship between religious beliefs and the level of trust, while Guiso et al. (2003) find that the impact of religion on trust varies with religion group. Our results show that the significantly negative effects of religiosity on mortgage delinquency are not driven by social capital.

Past research has established the critical role of religion in various economic and financial outcomes and explored the contributing factors to mortgage default outcomes. However, the impact of religion on mortgage delinquency has mainly been neglected. Using micro level mortgage data, Conklin et al. (2021) first examine the relationship between religiosity and three types of mortgage fraud: inflated appraisals, owner-occupancy misreporting, and income falsification. The authors show that local levels of religious adherence are negatively related to the likelihood of appraisal inflation, less likely to misrepresent occupancy status, and positively related to low documentation. These findings help us to understand the negative relationship between religiosity and mortgage delinquency, as mortgage fraud contributes to a default outcome. Mortgage fraud could increase the risk of mortgage

delinquency. The scant research is surprising, given that rich literature has identified religion as an important factor that affects household decisions. Religion affects the household saving decisions, risk attitude, planning horizon, and moral values towards default, which could all influence their decisions on mortgage default. We document how religion affects mortgage delinquency decisions and show that the mortgage delinquency rate is lower in the areas with higher religiosity.

### 3. Data

Our analysis relies on a dataset that combines county-year level variables from various data sources. We follow the related literature when constructing the variables used in the empirical tests. The county-year level data cover about 2220 counties for the period of 1999-2011.<sup>1</sup> The primary variable of interest in our tests is *Religiosity*<sub>*t-1*</sub>, a measure of local religion. The source of county-level local religion variables used in this analysis is the Association of Religion Data Archives (ARDA),<sup>2</sup> which provides local level religious compositions based on religious adherents and report religious affiliations in a county. Following the approach consistently used in the related literature (Kumar, 2009; Kumar et al., 2011; Shu et al., 2012; Ucar, 2016; Adhikari and Agrawal, 2016b), we construct *Religiosity*<sub>*t-1*</sub> as the percentage of the population with religious affiliation in a sample county from the previous year.

Next, we consider the measure of the dependent variable, *MortgageDelinquency*. *MortgageDelinquency* is calculated as the percentage of a mortgage debt balance that is 90+ days delinquent for a given county in a sample year by using data from the Federal Reserve Bank of New York (FRBNY) Consumer Credit Panel / Equifax.<sup>3</sup> The data include first mortgages, home equity loans, and home equity lines of credit. Our sample does not cover all the U.S. counties but includes most of the counties because the FRBNY does

---

<sup>1</sup>Our sample covers the majority of the U.S. counties but not all due to data availability. For example, mortgage delinquency information is not available for counties with a population less than 10,000.

<sup>2</sup>The ARDA data has county-level religion information for 1990, 2000, and 2010. We use the linear interpolation method for the years without available local religion data. Using interpolation is a common practice in the literature in which demographic, religious, and cultural factors in finance and other related disciplines are used (e.g., Alesina and La Ferrara, 2000; Hilary and Hui, 2009; Kumar et al., 2011; Ucar, 2016, and Hasan et al., 2017). We also use the linear interpolation method for the other local census variables for the years without available data. Also note that some studies backfill data for the missing years instead of using linear interpolation (e.g., Gompers et al., 2003; Hilary and Hui, 2009; Hoi et al., 2019). When we use this alternative method and backfill the religion data for the missing years, we find very similar results in the unreported tests. These results can be provided upon request.

<sup>3</sup>We thank the FRBNY for providing the dataset.

not report mortgage delinquency for counties with populations less than 10,000 in constructing the dataset.<sup>4</sup>

To account for the compounding effects from the possible factors, we consider a wide range of control variables. *Unemployment* is from the website of the U.S. Bureau of Labor Statistics (BLS), which shows the unemployment rate (%) in a county. We construct *Change in Unemployment* to proxy the negative income shock that could adversely affect the ability of borrowers to continue mortgage payment and trigger mortgage delinquency. *MedianHouseValue* is the median house value in a sample county<sup>5</sup> and this variable is obtained from the U.S. censuses and the U.S. Census Bureau website. We construct *Change in MedianHouseValue* to proxy for negative equity, another trigger for mortgage delinquency. Homeowners may strategically walk away from substantially underwater properties for financial incentives, even with the ability to keep the mortgage current. The following control variables are lagged in the empirical tests. The existing literature has documented subprime loans that originated with lower FICO scores are more likely to default, thus controlling for other origination attributes. Consistent with this finding, we include the county level subprime population measured with FICO scores to capture the default risk. *SubprimeCredit<sub>t-1</sub>* is the percentage of the population with a credit score below 660 from the previous year, obtained from the website of the Federal Reserve Bank of St. Louis.<sup>6</sup> The following local factors are from the U.S. censuses and the U.S. Census Bureau website: *LocalSeniors<sub>t-1</sub>* is the percentage of individuals who are 65 years old or above in a county from the previous year; *Population<sub>t-1</sub>* is the population of a county from the previous year; and *Education* shows the percentage of individuals 25 years and over who hold a college degree in a county from the previous year.

The *Income<sub>t-1</sub>* variable is the county income in the previous year from the U.S. Bureau of Economic Analysis (BEA) website. We use the county-level per capita personal income data to proxy for local level wealth and the ability for continuous repayment on mortgages. Our empirical analysis also includes year fixed effects to control for time effects. *PoliticalAffiliation<sub>t-1</sub>* is the fraction of

---

<sup>4</sup>FRBNY also states that these measures “are based on the FRBNY Consumer Credit Panel which constitutes a 5% random sample of the US population of individuals who have credit reports with Equifax” ([https://www.newyorkfed.org/medialibrary/media/creditconditions/technical\\_notes.pdf](https://www.newyorkfed.org/medialibrary/media/creditconditions/technical_notes.pdf)).

<sup>5</sup>We use standardized income and median house value to adjust for inflation. Both the income and median house value variables are in dollar value in 2000. We use the annual CPI values from the website of the Federal Reserve Bank of Minneapolis (<https://www.minneapolisfed.org/community/financial-and-economic-education/cpi-calculator-information/consumer-price-index-and-inflation-rates-1913>).

<sup>6</sup>This variable is available at <https://geofred.stlouisfed.org/map/>. The website reports that the source of this measure is the Federal Reserve Bank of New York/Equifax Consumer Credit Panel (Federal Reserve Bank of New York and Equifax, Equifax Subprime Credit Population).



local Republican votes in Presidential elections in a county from the U.S. Census in the previous year. This variable measures the political ideology of the local area and tests whether self-identified liberals are more or less likely than their more conservative counterparts to default.

One may argue that certain ethnic minority groups are more likely to belong to particular religious affiliations. Some ethnic minorities have lower average incomes and economic disadvantages compared to other ethnic groups. If the economically disadvantaged ethnic groups belong to a specific religious affiliation, our religion variable might be a proxy for this socio-economic detail. To investigate this hypothesis, we also include the *Minority*<sub>*t-1*</sub> variable in our analysis, which is the fraction of people who belong to a minority (non-white) ethnic group in a county in the previous year.<sup>7</sup>

Table 1 gives the descriptives (mean, 25<sup>th</sup> percentile, median, 75<sup>th</sup> percentile, and standard deviation) for the variables outlined above, based on our panel which consists of county-year observations. The average mortgage delinquency rate is 2.49 % for the counties during our sample period. In other words, on average, almost 2.5% of the mortgage debt balances in a given county are 90+ days delinquent. The average religiosity is 50%. That is, nearly half of the population belongs to a religious group. The average *SubprimeCredit*<sub>*t-1*</sub>, which shows the fraction of a county population with a credit score below 660, is 33%. On average, the median household income of a sample county is about US\$25,810. The average county population is about 103,760. The average fraction of local senior citizens is 14% for our sample period. Over the sample period, around 19.1% of the county population are individuals 25 years and over who hold a college degree. The average county unemployment rate is about 6.06%. The median house value of a county for our sample is about, on average, US\$112,540. The average fraction of Republican votes, as measured by the political affiliation variable, is 55.6%. The average minority population is 20%.

### **Table 1** Summary Statistics

This table reports the summary statistics for our sample. *MortgageDelinquency* shows the percentage of mortgage debt balance that is 90+ days delinquent. *MortgageDelinquency* is from the FRBNY Consumer Credit Panel / Equifax. *SubprimeCredit*<sub>*t-1*</sub> is the “percentage of the population with a credit score below 660” in a county from the previous year. This variable is from the website of the Federal Reserve Bank of St. Louis. *Religiosity*<sub>*t-1*</sub> is the percentage of the total population of a county that adheres to a religion in the previous year. *Unemployment*<sub>*t-1*</sub> is the percentage of the unemployment rate (%) in a county

(Continued...)

---

<sup>7</sup>Consistent with the literature, we use interpolations of the data for the years without available data for the census variables as well as the other controls.

**(Table 1 Continued)**

in the previous year, and from the website of the Bureau of Labor Statistics. The following local control variables are from the US censuses and the US Census website. *Population*<sub>t-1</sub> shows county population in the previous year, and is scaled by 1000. *Education*<sub>t-1</sub> shows the fraction of individuals 25 years and over holding college degrees in a county in the previous year. *Income*<sub>t-1</sub> is the per capita personal income in a county in the previous year, and in \$000s. *MedianHouseValue*<sub>t-1</sub> shows the median house value in a given county in the previous year, and in \$1000s in this table. *PoliticalAffiliation*<sub>t-1</sub> is the fraction of local Republican votes in Presidential elections in a county in the previous year. *Minority*<sub>t-1</sub> is the fraction of people that belong to minority (non-white) ethnic groups in a county in the previous year. *LocalSeniors*<sub>t-1</sub> shows the fraction of individuals who are 65 years old or above in a county in the previous year.

Variable	Mean	25th percentile	Median	75th percentile	Std. Dev.	N
MortgageDelinquency (%)	2.49	1.02	1.85	3.25	2.36	26,099
Religiosity <sub>t-1</sub>	0.50	0.39	0.49	0.59	0.15	26,099
SubprimeCredit <sub>t-1</sub> (%)	33.01	27.20	32.20	38.58	7.72	26,099
Income <sub>t-1</sub> (000\$)	25.81	21.74	24.45	28.11	6.75	26,099
Education <sub>t-1</sub> (%)	19.10	12.72	16.68	23.22	8.83	26,099
Population <sub>t-1</sub> (000s)	103.76	17.70	31.98	80.26	276.37	26,099
Unemployment <sub>t-1</sub> (%)	6.06	4.30	5.50	7.20	2.58	26,099
MedianHouseValue <sub>t-1</sub> (\$000)	112.53	71.97	92.57	126.42	70.14	26,099
PoliticalAffiliation <sub>t-1</sub> (%)	55.60	48.18	56.30	64.15	12.38	26,099
Minority <sub>t-1</sub>	0.20	0.06	0.13	0.30	0.18	26,099
LocalSeniors <sub>t-1</sub>	0.14	0.12	0.14	0.16	0.04	26,099

## 4. Empirical Tests and Results

### 4.1. Baseline Analysis

In our baseline model, we investigate the degree that religiosity affects the mortgage delinquency rate. We estimate the following empirical model:

$$MortgageDelinquency = \alpha_0 + \alpha_1 Religiosity_{t-1} + \sum_{i=1}^n \beta_i Z_i + \varepsilon \quad (1)$$

The dependent variable is *MortgageDelinquency*, which reports the percentage of mortgage debt balance that is 90+ days delinquent for a given county in a sample year.  $Z$  is a vector of the control variables at the county level that we use in our empirical analysis. The control variables include *SubprimeCredit* <sub>$t-1$</sub> , *Income* <sub>$t-1$</sub> , *LocalSeniors* <sub>$t-1$</sub> , *Education* <sub>$t-1$</sub> , *Population* <sub>$t-1$</sub> , *PoliticalAffiliation* <sub>$t-1$</sub> , *Minority* <sub>$t-1$</sub> , *Change in Unemployment*, and *Change in MedianHouseValue*. We follow the related literature (e.g., Li et al., 2022) in constructing the variables in our analysis. Year fixed effects have been controlled as well.

Table 2 reports the estimates of the baseline analysis by using the regression model shown in Equation 1, along with some additional tests. Column 1 of Table 2 presents the baseline test results and reports a negative and statistically significant coefficient for *Religiosity* <sub>$t-1$</sub> , which suggests a negative relationship between the fraction of religious population and mortgage delinquency in a county. That is, people with a religious background are less likely to default on their mortgage compared to those without a religious background. The result is economically significant. A one-standard-deviation increase in *Religiosity* leads to almost a 0.096 standard-deviation decrease in the mortgage delinquency rate. This decrease corresponds to almost 9.1% (12.34%) of the sample average (median) mortgage delinquency rate.

Negative equity and inability to continue mortgage payments are two triggers for mortgage default. Religion could affect both factors. The existing literature has provided clear evidence that religion affects saving and investment decisions, risk preference, planning horizon, and moral values towards mortgage default, which could all influence the decisions of borrowers regarding mortgage default. For instance, Keister (2003) and Guiso et al. (2003) both show that religiosity is associated with a higher emphasis on the importance of saving, and more religious people tend to save more. The savings cushion distressed borrowers when they suffer negative shocks, such as unemployment, medical issues, or divorce, and have difficulty in continuing mortgage payments.

## **Table 2** Baseline Test and Additional Tests

This table shows our baseline results in Column 1, along with the other tests that include additional local effects in the other columns. Column 2 includes the *SocialCapital* <sub>$t-1$</sub>  variable in our main analysis. *SocialCapital* <sub>$t-1$</sub>  measures social capital for a given county in the U.S, which is from the county level social capital index constructed in Rupasingha et al. (2006). Column 3 includes Credit Insecurity <sub>$t-1$</sub>  and county level credit insecurity index. Column 4 includes Coincident Economic Index <sub>$t-1$</sub>  and controls for the state coincident economic index. Column 5 includes state fixed effects. The year and state fixed effects are not reported for brevity. Robust standard errors are used. T-statistics are reported in parentheses. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels respectively. Standard errors are clustered at the county-level.

(Continued...)

(Table 2 Continued)

Dependent Variable	(1)	(2)	(3)	(4)	(5)
	<b>Mortgage Delinquency</b>				
Religiosity <sub>t-1</sub>	-1.5436*** (-10.03)	-1.1105*** (-6.62)	-3.8949*** (-10.58)	-1.4925*** (-9.76)	-0.4898*** (-2.94)
SubprimeCredit <sub>t-1</sub>	0.0073 (1.47)	-0.0011 (-0.20)	-0.0074 (-0.56)	0.0069 (1.39)	0.0205*** (3.50)
Income <sub>t-1</sub>	-0.0011 (-0.16)	0.0046 (0.65)	-0.0331** (-2.42)	-0.0004 (-0.06)	-0.0101 (-1.52)
Education <sub>t-1</sub>	-0.0316*** (-7.20)	-0.0270*** (-6.06)	-0.0299*** (-3.04)	-0.0328*** (-7.43)	-0.0295*** (-7.02)
Population <sub>t-1</sub>	0.0010*** (3.08)	0.0007*** (2.87)	0.0023*** (2.99)	0.0010*** (3.07)	0.0006*** (2.68)
Change in Unemployment	0.2451*** (11.59)	0.2422*** (11.79)	0.3151*** (10.49)	0.2548*** (11.76)	0.2003*** (10.54)
Change in MedianHouse Value	-0.0568*** (-14.36)	-0.0576*** (-13.74)	-0.2284*** (-8.19)	-0.0587*** (-14.13)	-0.0705*** (-14.73)
Political Affiliation <sub>t-1</sub>	-0.0044** (-2.04)	-0.0109*** (-4.61)	0.0102** (2.34)	-0.0052** (-2.35)	-0.0136*** (-5.54)
Minority <sub>t-1</sub>	2.1991*** (9.74)	1.7455*** (8.37)	5.4807*** (9.56)	2.1500*** (9.55)	1.0915*** (4.64)
LocalSeniors <sub>t-1</sub>	3.4807*** (3.36)	4.6442*** (4.46)	10.2571*** (3.92)	3.2775*** (3.19)	0.2807 (0.35)
SocialCapital <sub>t-1</sub>		-0.2690*** (-5.03)			
Credit Insecurity <sub>t-1</sub>			-0.0351*** (-3.34)		
Coincident Economic Index <sub>t-1</sub>				-0.0166*** (-4.13)	
Constant	1.9051*** (5.36)	1.9337*** (5.66)	2.8031*** (3.16)	3.3960*** (6.63)	1.6750*** (3.92)
Year fixed effects	Yes	Yes	Yes	Yes	Yes
State fixed effects					Yes
Observations	26,099	25,978	8,709	26,087	26,099
R-squared	0.381	0.389	0.270	0.382	0.442

There is also evidence that religious people have “a great sense of individual responsibility” (Guiso et al., 2003), which could affect the moral values of distressed borrowers towards mortgage default. Religious people are shown to be more risk-averse (Hilary and Hui, 2009; Grullon et al., 2009; McGuire et al., 2012) and more likely to leave a bequest and have a longer planning horizon (Christelis et al., 2010). A better sense of individual responsibility, higher risk-aversity, and a longer planning horizon could influence the willingness of a borrower to repay and discourage strategic default.

After we comment on the results of the impact of religion, it is useful to discuss the effect of our control variables. The results, which are of independent interest, are reasonable and consistent with expectations. For example, Table 2 demonstrates a positive relationship between mortgage delinquency and *SubprimeCredit*<sub>*t-1*</sub>, the fraction of people with a credit score below 660. The mortgage literature has clear evidence that borrowers with lower FICO scores are more likely to default on their mortgage. Our findings provide consistent evidence that a neighborhood with a larger *SubprimeCredit*<sub>*t-1*</sub> population has a higher mortgage delinquency rate. We also show that the more educated are less likely to go into default. Consistent with both theories and previous studies, unemployment contributes to mortgage delinquency, as the loss of a job could trigger missing mortgage payments. Changes in median house value negatively affect mortgage delinquency, consistent with previous findings that negative equity may trigger mortgage default.

#### 4.2. Analysis with Additional Demographic Details and Location Effects

In this section, we re-examine the baseline analysis after controlling for an additional demographic factor and location effects. Some religious affiliations may be more likely to have cooperative actions and share common norms and trust in the social network, thus suggesting a higher level of social capital. Li et al. (2022) demonstrate that social capital negatively affects mortgage delinquency with both theoretical and empirical evidence. Hasan et al. (2021) conclude with similar results by using consumer default data. If people with higher levels of social capital belong to a particular religious affiliation, this suggests that our religion variable might be a proxy for social capital. To examine whether our results are driven by social capital, we include the *SocialCapital*<sub>*t-1*</sub> variable in our empirical model and run the following regression:

$$\begin{aligned} MortgageDelinquency = & \alpha_0 + \alpha_1 Religion_{t-1} \\ & + \alpha_2 SocialCapital_{t-1} + \sum_{i=1}^n \beta_i Z_i + \varepsilon \end{aligned} \quad (2)$$

Our social capital variable is from the county-level social capital index constructed in Rupasingha et al. (2006).<sup>8</sup> Rupasingha et al. (2006) use the principal component analysis to form their social capital by using several factors in measuring county-level social capital.<sup>9</sup> Their measure has been widely used in the finance literature and other disciplines (e.g., Jha and Chen, 2015; Jha and Cox, 2015; Gupta et al., 2016; and Hasan et al., 2017). Column 2 in Table 2 provides similar results to our baseline test results after controlling for *SocialCapital<sub>t-1</sub>*. There is a negative and statistically significant coefficient for *Religiosity<sub>t-1</sub>*. Economic significance also remains robust. A one-standard-deviation increase in *Religiosity<sub>t-1</sub>* leads to almost a 0.0697 standard-deviation decrease in the mortgage delinquency rate. This demonstrates that the negative impacts of *Religiosity<sub>t-1</sub>* on mortgage delinquency are not driven by social capital. The previous literature suggests that social capital includes some social norms, which rest on non-religious social factors. Our finding is consistent with this notion. In sum, Column 2 of Table 2 shows that our results are not driven by social capital.

Next, we examine whether *Religiosity<sub>t-1</sub>* is a proxy for other location effects. One might argue that various location-specific effects might drive our findings. To investigate this argument, we re-examine whether our main findings are robust to various local economic factors and location fixed effects and report the results in the other columns of Table 2. In Column 3 of Table 2, we include Credit Insecurity<sub>t-1</sub> to control for the county-level credit insecurity index<sup>10</sup>. In

---

<sup>8</sup>We thank Rupasingha et al. (2006) for making their social capital index publicly available on their website (<http://aese.psu.edu/nercrd/community/social-capital-resources>).

<sup>9</sup>Rupasingha et al. (2006) state that they use “data from the *Bureau of the Census, County Business Patterns, USA Counties on CD, National Center for Charitable Statistics, and the Regional Economic Information System*” in constructing the social capital index. They also use “the response rate for the Census Bureau’s decennial population and Housing Survey, the percentage of voters who voted in presidential elections, and per capita non-profit organizations obtained from National Center for Charitable Statistics” in constructing the social capital index. Rupasingha et al. (2006) use “associational density of civic, religious, and sports organizations, voter turnout rate, Census response rate, and per-capita non-profit organizations” when constructing the county-level social capital index.

<sup>10</sup>The credit insecurity variable is only available for 2007 and later for our sample period. The credit insecurity index data has county-level credit insecurity index information for 2007, 2012, and 2018. We use the linear interpolation method for the years without available credit insecurity index data for our sample years. This index is from the report titled “Unequal Access to Credit: The Hidden Impact of Credit Constraints (<https://www.newyorkfed.org/outreach-and-education/community-development/unequal-access-to-credit-hidden-impact-credit-constraints>)” by Kausar Hamdani, Claire Kramer Mills, Edison Reyes, and Jessica Battisto. The source website highlighted above states that “this Index incorporates an additional assessment of residents who are “credit constrained,” that is, unlikely to obtain credit at choice to manage emergencies, take advantage of opportunities, or invest in one’s future”.

Column 4 of Table 2, we control for state-level economic activity. Specifically, Column 4 includes the Coincident Economic Index<sub>t-1</sub> to control for the State Coincident Economic Index<sup>11</sup>. Similar to our previous results, the coefficient for the religiosity effect remains negative and significant. This finding suggests that local economic effects or location fixed effects do not drive the negative impact of local religiosity rate on mortgage delinquency.

One can suggest that neighboring regions or counties can be economically connected and may have similar economic fundamentals. If that is the case, one may argue that our main finding may not hold for the counties located along the state borders if our findings are driven by local economic fundamentals instead of local religiosity. To examine this and investigate whether local religiosity is the main driver of our results, we re-run our main analysis for the subsamples of state bordering counties and other counties that are not located along the state borders<sup>12</sup> in Table 3.

Column 1 shows the empirical results for the bordering counties, whereas Column 2 reports the findings for the other counties. Both columns have negative and statistically significant religiosity coefficients, which consistent with our main finding. Similar to the earlier tests, the coefficient for the religiosity effect remains negative and statistically significant for both the bordering and other counties and suggest a similar effect. Table 3 shows that the shared economic fundamentals of local economic effects do not drive the negative impact of the local religiosity rate on mortgage delinquency. Overall, both Tables 2 and 3 suggest that location effects, if any, do not drive the effect of the local religiosity rate on mortgage delinquency.

### 4.3. Analysis after Excluding Large States

One can argue that our results might be location driven due to their large population, and economic and other socio-economic characteristics; or that some states are particularly religiously affiliated. To investigate whether any specific location drives our results, we exclude some of the larger states and re-

---

<sup>11</sup> The State Coincident Economic Activity Index measures state level economic activity. It is from the Federal Reserve Bank of St. Louis website (<https://fred.stlouisfed.org/series/USPHCI>) and retrieved on November 25, 2021. The website states that “the Coincident Economic Activity Index includes four indicators: nonfarm payroll employment, the unemployment rate, average hours worked in manufacturing and wages and salaries. The trend for each state's index is set to match the trend for gross state product.”

<sup>12</sup> We thank an anonymous referee for suggesting this analysis. We also re-examine our main analysis for high- vs low-income subsamples and high- vs low-median house value subsamples as well as high- vs low-unemployment rate subsamples, in unreported tests. These results can be provided upon request. Our main result remains robust in the unreported subsample analyses—income, house value, and unemployment rate subsamples. This finding also highlights the negative effect of religiosity on mortgage delinquency.

run our baseline test. In particular, we drop the three largest states as well as New York and re-examine our findings in Table 4. This table excludes California, New York, Texas and Florida (CA, NY, TX, and FL) in Columns 1, 2, 3, and 4, respectively. All of the columns in Table 4 report negative and statistically significant *Religiosity*<sub>*t*-1</sub> coefficients. The economic significance of the results in all of the columns in Table 4 is similar to our previous findings. This table shows that our results remain robust after excluding the large states. In unreported tests, we re-examine our baseline analysis after excluding all four large states in the same test and still find very similar results<sup>13</sup>. This section demonstrates that our results are not driven by any particular location or large state.

**Table 3      Bordering Counties vs. Other Counties**

This table re-examines our main analysis for state bordering counties and other counties which are not located along the state borders. Column 1 reports the results for bordering counties, whereas Column 2 presents the results for other counties. The year and state fixed effects are not reported for brevity. Robust standard errors are used. T-statistics are reported in parentheses. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels respectively.

<b>Dependent Variable</b>	<b>(1)</b>	<b>(2)</b>
	<b>MortgageDelinquency</b>	
Religiosity <sub><i>t</i>-1</sub>	-1.1804*** (-5.31)	-1.7886*** (-8.70)
SubprimeCredit <sub><i>t</i>-1</sub>	0.0054 (0.79)	0.0066 (0.99)
Income <sub><i>t</i>-1</sub>	-0.0084 (-0.89)	0.0005 (0.05)
Education <sub><i>t</i>-1</sub>	-0.0338*** (-5.33)	-0.0314*** (-5.45)
Population <sub><i>t</i>-1</sub>	0.0014*** (2.87)	0.0008** (2.53)
Change in Unemployment	0.1929*** (7.22)	0.2792*** (9.22)
Change in MedianHouseValue	-0.0493*** (-6.95)	-0.0638*** (-14.17)
Political Affiliation <sub><i>t</i>-1</sub>	-0.0042 (-1.16)	-0.0037 (-1.38)
Minority <sub><i>t</i>-1</sub>	1.8770*** (5.97)	2.3975*** (8.02)
LocalSeniors <sub><i>t</i>-1</sub>	-0.8929 (-0.68)	5.4739*** (4.14)
Constant	2.6276*** (5.33)	1.6562*** (3.58)
Year fixed effects	Yes	Yes
Observations	9,844	16,255
R-squared	0.412	0.372

<sup>13</sup> These results can be provided upon request.



**Table 4** Analysis After Excluding Large States

This table re-examines our main analysis after excluding large states. This table excludes CA, NY, TX, and FL in Columns 1, 2, 3, and 4, respectively. Year fixed effects are not reported for brevity. Robust standard errors are used. T-statistics are reported in parentheses. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels respectively.

Dependent Variable	(1)	(2)	(3)	(4)
	<b>Mortgage Delinquency</b>			
Religiosity <sub>t-1</sub>	-1.4683*** (-9.42)	-1.6144*** (-10.42)	-1.5653*** (-10.11)	-0.9841*** (-7.45)
SubprimeCredit <sub>t-1</sub>	0.0170*** (3.44)	0.0097* (1.95)	0.0056 (1.07)	0.0042 (0.94)
Income <sub>t-1</sub>	-0.0061 (-0.85)	0.0023 (0.35)	0.0005 (0.07)	-0.0060 (-1.10)
Education <sub>t-1</sub>	-0.0274*** (-6.40)	-0.0319*** (-7.32)	-0.0320*** (-6.91)	-0.0362*** (-9.34)
Population <sub>t-1</sub>	0.0015*** (4.69)	0.0009*** (3.06)	0.0010*** (2.80)	0.0007*** (3.18)
Change in Unemployment	0.1950*** (10.15)	0.2444*** (11.57)	0.2563*** (11.68)	0.1788*** (9.94)
Change in MedianHouseValue	-0.0545*** (-10.66)	-0.0601*** (-18.34)	-0.0574*** (-13.86)	-0.0517*** (-15.49)
Political Affiliation <sub>t-1</sub>	-0.0036* (-1.66)	-0.0043** (-1.97)	-0.0007 (-0.29)	-0.0092*** (-4.58)
Minority <sub>t-1</sub>	1.6565*** (7.72)	2.1141*** (9.45)	2.5426*** (10.21)	1.7474*** (9.04)
LocalSeniors <sub>t-1</sub>	4.3876*** (4.31)	3.6406*** (3.48)	3.3705*** (3.01)	-1.0180 (-1.29)
Constant	1.4783*** (4.17)	1.7590*** (4.97)	1.6915*** (4.33)	2.8590*** (9.86)
Year fixed effects	Yes	Yes	Yes	Yes
Observations	25,451	25,367	24,383	25,379
R-squared	0.367	0.379	0.396	0.397

#### 4.4. Identification Test: Instrumental Variable Approach

In the corporate finance literature, researchers who analyze the impact of a local factor on corporate decisions are aware that the location choice of a firm can be endogenous, as companies might choose a particular location due to its specific local characteristics. Our analysis is on how local religion affects the local housing market. The location choice of a firm might be endogenous. However, it is not expected that large groups of people will move from one county to another to take advantage of specific local characteristics as firms do. Thus, this endogeneity argument might not be expected for our analysis.

One might argue that there can be an omitted variable that influences both current levels of local religion and mortgage delinquency, which might create an endogeneity concern. To address this point, we use a two-stage least square (2SLS) estimation with an instrumental variable (IV) approach in Table 5. We select the *Religiosity* measure for 1952 as an IV for the *Religiosity<sub>t-1</sub>* variable. The existing literature (e.g., Hilary and Hui, 2009; Kumar et al., 2011; Adhikari and Agrawal, 2016b) suggests the validity of using lagged religion as a reliable IV. Since past religious information is expected to correlate with the current level of the local religion, it is not likely to correlate with any current level variable that can affect mortgage delinquency in the current settings. Earlier studies (Hilary and Hui, 2009; Kumar et al., 2011) use local religiosity lagged by three years as an IV. Adhikari and Agrawal (2016b) improve this IV by employing the religiosity variable from 1952. It is the earliest possible county-level religiosity from the ARDA dataset. Our sample covers 1999 to 2011. The local religion variable from 1952 has a 47-year difference with the earliest year of our sample and a 59-year difference with the latest year of our sample. Considering this large difference between our IV with any sample observation, one can expect that our IV is not correlated with any omitted variable that affects mortgage delinquency in the current year and can be a good IV. Hilary and Hui (2009) and Adhikari and Agrawal (2016b) also use the county population lagged by three years as the second IV in their analysis. We improve this IV by using the county population from 1952 as our second IV, which provides a similar improvement highlighted in the first IV above.

The 2SLS approach in Table 5 provides results consistent with our earlier findings. Table 5 indicates a negative and statistically significant coefficient for *Religiosity<sub>t-1</sub>* after we use the IV approach. This demonstrates that our results remain robust after addressing the endogeneity concern. Moreover, in the unreported first-stage results, consistent with the related literature (e.g., Adhikari and Agrawal, 2016b), both IVs are statistically significant in predicting the current *Religiosity<sub>t-1</sub>* and meet the relevance criterion.<sup>14</sup>

#### 4.5. Before vs. After the Global Financial Crisis

In this section, we analyze whether the impact of religion on mortgage delinquency varies with different housing market conditions, which significantly change the expectations of homeowners of the future housing market and their risk attitude. The 2007 financial crisis helps us to gauge the effects of significant changes in the real estate market. A comparison between the effects pre- and post-financial crisis provides more insights into the impact of local religion on mortgage delinquency. In the following test, we include an indicator variable, *PostCrisis*, which is a dummy variable that takes the value of one if the year is 2007 or later and zero otherwise. We also include an interaction term, *Religiosity<sub>t-1</sub> × PostCrisis* in the test. This test in Equation 3

---

<sup>14</sup> The first-stage results can be provided upon request.

**Table 5 2SLS Analysis with IV Approach**

This table reports the results of the second stage of the 2SLS analysis with an IV. This analysis uses the county *Religiosity<sub>t-1</sub>* information from 1952 and the county population from 1952 as IVs. The dependent variable is Mortgage Delinquency. The year fixed effects are not reported for brevity. Robust standard errors are used. Z-statistics for the second stage of the 2SLS analysis are reported in parentheses. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels respectively.

Dependent Variable	MortgageDelinquency
Religiosity <sub>t-1</sub>	-1.5992*** (-5.96)
SubprimeCredit <sub>t-1</sub>	0.0081 (1.61)
Income <sub>t-1</sub>	0.0015 (0.21)
Education <sub>t-1</sub>	-0.0329*** (-7.27)
Population <sub>t-1</sub>	0.0009*** (3.06)
Change in Unemployment	0.2384*** (11.47)
Change in MedianHouseValue	-0.0568*** (-13.96)
Political Affiliation <sub>t-1</sub>	-0.0062** (-2.50)
Minority <sub>t-1</sub>	2.1386*** (9.71)
LocalSeniors <sub>t-1</sub>	3.0463*** (2.86)
Constant	4.5541*** (11.67)
Year fixed effects	Yes
Observations	25,827
R-squared	0.381

enables us to compare the impact of religiosity on mortgage delinquency in the pre-crisis period with the one in the post-crisis period. *Religiosity* highlights the effect in the pre-crisis period. *Religiosity x PostCrisis* helps to underline the impact in the post-crisis period.

$$\begin{aligned}
 \text{MortgageDelinquency} = & \alpha_0 + \alpha_1 \text{Religiosity}_{t-1} + \alpha_2 \text{PostCrisis} \\
 & + \alpha_3 \text{Religiosity}_{t-1} \times \text{PostCrisis} \quad (3) \\
 & + \sum_{i=1}^n \beta_i Z_i + \varepsilon
 \end{aligned}$$

Table 6 reports the results estimated in Equation (3). Both *Religiosity<sub>t-1</sub>* and *Religiosity<sub>t-1</sub> x PostCrisis* are negative and statistically significant. The negative

coefficient of *Religiosity<sub>t-1</sub>* supports the findings in our baseline model. A one-standard-deviation increase in *Religiosity<sub>t-1</sub>* leads to an almost 0.03 standard-deviation decrease in mortgage delinquency in the pre-financial crisis period. The negative coefficient for the interaction term suggests that there is an important difference in the effects between the pre- and post-financial crisis periods, with a more pronounced effect after the financial crisis. Estimations on the interaction term suggest that a one-standard-deviation increase in *Religiosity<sub>t-1</sub>* leads to about a 0.29 standard-deviation decrease in mortgage delinquency in the post-financial crisis period. This finding indicates that local religiosity has a much stronger effect after the financial crisis. Given the foreclosure waves during the crisis period, the above finding highlights the importance of incorporating local religion as a contributing factor in modeling mortgage default risk.

**Table 6 Pre- vs. Post-Financial Crisis Analysis**

The sample covers the years between 1999 and 2011. *PostCrisis* is an indicator variable that takes the value of one if the year is 2007 or later and zero otherwise. This table includes the *PostCrisis* dummy variable and its interaction with *Religiosity<sub>t-1</sub>*, which is *Religiosity<sub>t-1</sub>xPostCrisis*. The year fixed effects are not reported for brevity. Robust standard errors are used. T-statistics are reported in parentheses. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels respectively.

Dependent Variable	Mortgage Delinquency
Religiosity <sub>t-1</sub>	-0.4889*** (-3.89)
PostCrisis	3.8422*** (22.77)
Religiosity <sub>t-1</sub> x PostCrisis	-2.6182*** (-8.98)
SubprimeCredit <sub>t-1</sub>	0.0081 (1.63)
Income <sub>t-1</sub>	0.0005 (0.07)
Education <sub>t-1</sub>	-0.0327*** (-7.46)
Population <sub>t-1</sub>	0.0010*** (3.06)
Change in Unemployment	0.2341*** (11.43)
Change in MedianHouseValue	-0.0531*** (-13.78)

(Continued...)

(Table 6 Continued)

Political Affiliation $t-1$	-0.0036* (-1.65)
Minority $t-1$	2.2397*** (9.91)
LocalSeniors $t-1$	3.2856*** (3.18)
Constant	1.2884*** (3.56)
Year fixed effects	Yes
Observations	26,099
R-squared	0.388

#### 4.6. The Effect of Different Religious Affiliations

One may ask about whether different religions affect mortgage delinquency differently. To answer this question, we implement an additional analysis with a distinction between Catholics and Protestants to investigate any heterogeneity of the effect between Catholics vs. Protestants. The related literature suggests different preferences between Catholics and Protestants and shows consistent financial outcomes (e.g., Kumar, 2009, Kumar et al., 2011; Shu et al., 2012; Ucar, 2016; Adhikari and Agrawal, 2016a). For instance, this body of literature indicates that Catholics have more risk-taking tendencies and stronger gambling desires than Protestants. To investigate the heterogeneity between Catholics and Protestants, we construct a variable called *CP Ratio*; that is, the ratio of Catholics to Protestants in a county by using the ARDA dataset. We use the following empirical model to examine the differences between the two different religious affiliations:

$$MortgageDelinquency = \alpha_0 + \alpha_1 CPRatio_{t-1} + \sum_{i=1}^n \beta_i Z_i + \varepsilon \quad (4)$$

Table 7 reports a positive and statistically significant coefficient for the *CP Ratio* $_{t-1}$ . This finding indicates that as the fraction of Catholics (Protestants) increases, there is a higher (lower) level of mortgage delinquency. This is consistent with previous studies that suggest a lower (higher) risk-aversion for Catholics (Protestants). Table 7 also indicates that a one-standard-deviation increase in the *CP Ratio* $_{t-1}$  leads to almost a 0.03 standard-deviation increase in the mortgage delinquency rate. This economic impact is much lower than that of *Religiosity* $_{t-1}$  reported in our main analysis in Table 2.

**Table 7 Analysis of Different Religious Affiliations**

This table re-examines the baseline analysis for different religious affiliations. The main variable of interest is *CP Ratio*<sub>t-1</sub>, which is Catholic to Protestant ratio in a county from the previous year. The year fixed effects are not reported for brevity. Robust standard errors are used. T-statistics are reported in parentheses. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels respectively. Standard errors are clustered at the county-level.

Dependent Variable	Mortgage Delinquency
CP Ratio <sub>t-1</sub>	0.0467* (1.95)
SubprimeCredit <sub>t-1</sub>	0.0156*** (2.98)
Income <sub>t-1</sub>	-0.0064 (-0.92)
Education <sub>t-1</sub>	-0.0269*** (-6.06)
Population <sub>t-1</sub>	0.0009*** (3.00)
Change in Unemployment	0.2626*** (11.91)
Change in MedianHouseValue	-0.0545*** (-14.35)
Political Affiliation <sub>t-1</sub>	-0.0084*** (-3.90)
Minority <sub>t-1</sub>	1.7339*** (7.75)
LocalSeniors <sub>t-1</sub>	3.0238*** (2.85)
Constant	1.2101*** (3.14)
Year Fixed Effects	Yes
Observations	26,099
R-squared	0.374

Next, we re-run the *CP Ratio* test shown in Table7 for subsamples of local religiosity<sup>15</sup>. We divide our sample into two as high and low religiosity subsamples based on our sample median value of Religiosity<sub>t-1</sub> and re-examine the *CP Ratio* test for subsamples of high and low religiosity areas in Table 8. Column 1 reports the results for the high religiosity subsample, whereas Column 2 shows the findings for the low religiosity subsample.

---

<sup>15</sup> We thank the anonymous referee for suggesting this analysis.

**Table 8** Analysis of Different Religious Affiliations for Religiosity Subsamples

This table shows the analysis of different religious affiliations for different religiosity subsamples. The main variable of interest is  $CP\ Ratio_{t-1}$ , which is Catholic to Protestant ratio in a county from the previous year. We divide our sample into two as high and low religiosity subsamples based on the sample median value of  $Religiosity_{t-1}$  and re-examine the analysis of different religious affiliations for subsamples of high and low religiosity areas in Table 8. Column 1 reports the results for the high religiosity subsample whereas Column 2 shows the findings for the low religiosity subsample. The year fixed effects are not reported for brevity. Robust standard errors are used. T-statistics are reported in parentheses. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels respectively. Standard errors are clustered at the county-level.

Dependent Variable	(1)	(2)
	MortgageDelinquency	
$CP\ Ratio_{t-1}$	0.0491* (1.95)	0.2553*** (4.83)
SubprimeCredit <sub>t-1</sub>	0.0151*** (2.63)	0.0368*** (4.16)
Income <sub>t-1</sub>	-0.0159* (-1.84)	0.0059 (0.72)
Education <sub>t-1</sub>	-0.0157** (-2.55)	-0.0349*** (-6.36)
Population <sub>t-1</sub>	0.0005*** (2.82)	0.0017*** (5.35)
Change in Unemployment	0.1445*** (6.87)	0.3184*** (9.44)
Change in MedianHouseValue	-0.0492*** (-7.62)	-0.0628*** (-14.33)
Political Affiliation <sub>t-1</sub>	-0.0063** (-2.46)	-0.0009 (-0.29)
Minority <sub>t-1</sub>	1.3291*** (5.29)	1.8043*** (5.73)
LocalSeniors <sub>t-1</sub>	0.3604 (0.36)	6.2887*** (4.36)
Constant	1.5567*** (4.01)	-0.6093 (-1.00)
Year fixed effects	Yes	Yes
Observations	13,050	13,049
R-squared	0.343	0.426

Both columns have positive and statistically significant  $CP\ Ratio_{t-1}$  coefficients consistent with the previous table. Also, the economic significance of the  $CP\ Ratio_{t-1}$  coefficient in Column 1 is similar to that in Column 2. Overall, Tables 7 and 8 suggest that even though the heterogeneity among different religious affiliations proxied by the  $CP\ Ratio_{t-1}$  has some impact on mortgage delinquency, the economic effect of  $Religiosity_{t-1}$  is much more pronounced.

## 5. Conclusion

The existing literature has shown that religion has a significant impact on the economic attitude and financial decisions of households. However, this factor has not received attention in the growing literature on mortgage default risk. In this paper, we answer the question which asks whether religion affects mortgage delinquency. Previous studies have provided clear evidence that religion affects various economic and financial decisions such as saving and investment decisions, risk preference, planning horizon, and moral values towards mortgage default. We argue that all of these factors could affect mortgage default decisions. Our findings demonstrate a strong relationship between local religiosity and mortgage delinquency rates and provide the first evidence that local religion sheds additional light on mortgage delinquency.

Using new county-level data in the U.S. between 1999 and 2011, we empirically show that a one-standard-deviation increase in local religiosity, the percentage of the population with religious affiliations in the local community, leads to almost a 0.096 standard-deviation decrease in the mortgage delinquency rate. This decrease corresponds to nearly 9.1% (12.3%) of the sample average (median) mortgage delinquency rate. As documented by previous studies, religion affects saving and investment decisions, risk preference, and planning horizon, which could all influence the decisions of borrowers under financial distress. More religious people have a stronger tendency to save more, have more individual responsibility, and are more risk-averse. Saving habits may prevent financial distress in the event of a negative shock such as unemployment, medical issue, or divorce, thus affecting the ability of the borrower to repay. A better sense of individual responsibility, more risk-aversion, and a longer planning horizon could also influence the willingness of the borrower to repay and discourage strategic defaults. Thus, religiosity plays an important role in mortgage delinquency. Compared to the pre-crisis period, the effect of religiosity on mortgage delinquency is more pronounced after the financial crisis, when foreclosure waves accelerated and imposed a higher cost on society. The results remain robust and significant with alternative robustness tests.

Our results contribute to the growing mortgage literature by addressing mortgage delinquency from a new perspective: the impact of religiosity. The new evidence also complements research on the influence of religion on household decisions. The robust findings shed light on lending practices as well. The results suggest that religion is an important component that lenders should take into consideration when examining mortgage delinquency. A logical implication for lenders is to improve the model of the risk of pricing borrowers by incorporating the religion measure as a contributing risk factor. However, current fair-lending laws and regulations prohibit lenders from using religious affiliation to assess the risk profile of a borrower. Therefore, under fair-lending regulations, the risk level of a loan to a religious borrower is not



accurately estimated by lenders. Given our estimates, lenders could improve the pricing of a mortgage by incorporating local religion as a factor in the modeling of default risk. It is also crucial for policymakers to realize the significant role of local religion in preventing mortgage delinquency in crisis periods, during which negative foreclosure externality could further depress housing markets and trigger more default activities.

## References

Adhikari, B.K., and Agrawal, A. (2016a). Religion, Gambling Attitudes and Corporate Innovation. *Journal of Corporate Finance*, 37, 229–248. doi: <https://doi.org/10.1016/j.jcorpfin.2015.12.017>

Adhikari, B. K., and Agrawal, A. (2016b). Does Local Religiosity Matter for Bank Risk-Taking?. *Journal of Corporate Finance*, 38, 272–293. doi: <https://doi.org/10.1016/j.jcorpfin.2016.01.009>

Agarwal, S., Chang, Y., and Yavas A. (2012). Adverse Selection in Mortgage Securitization. *Journal of Financial Economics*, 105(3), 640–660. doi: <https://doi.org/10.1016/j.jfineco.2012.05.004>

Agarwal, S., Deng, Y., and He, J. (2020). Time Preferences, Mortgage Choice and Mortgage Default. *International Real Estate Review*, 23(2), 151–187. doi: <https://doi.org/10.53383/100298>

Alesina, A., and La Ferrara, E. (2000). Participation in Heterogeneous Communities. *The Quarterly Journal of Economics*, 115(3), 847–904. doi: <https://doi.org/10.1162/003355300554935>

Alesina, A., and La Ferrara, E. (2002). Who Trusts Others?. *Journal of Public Economics*, 85(2), 207–234. doi: [https://doi.org/10.1016/S0047-2727\(01\)00084-6](https://doi.org/10.1016/S0047-2727(01)00084-6)

Ambrose, B. W., Sanders, A. B., and Yavas A. (2016). Servicers and Mortgage-Backed Securities Default: Theory and Evidence. *Real Estate Economics*, 44(2), 462–489. doi: <https://doi.org/10.1111/1540-6229.12099>

Ameriks, J., and Zeldes, S. P. (2004). *How do household portfolio shares vary with age?*. Columbia University, Columbia Business School Working Paper. (Accessed: April 15, 2018).

Bellemare, C., and Kröger, S. (2007). On Representative Social Capital. *European Economic Review*, 51(1), 183–202. doi: <https://doi.org/10.1016/j.eurocorev.2006.03.006>

- Chen, J., Xiang, J., and Yang, T. (2018). Re-Default Risk of Modified Mortgages. *International Real Estate Review*, 21(1), 1-40. doi: <https://doi.org/10.53383/100253>
- Christelis, D., Jappelli, T., and Padula, M. (2010). Cognitive Abilities and Portfolio Choice. *European Economic Review*, 54(1), 18-38. doi: <https://doi.org/10.1016/j.euroecorev.2009.04.001>
- Conklin, J., Diop, M., and Qiu, M. (2021). Religion And Mortgage Misrepresentation. *Journal of Business Ethics*. doi: <https://doi.org/10.1007/s10551-021-04831-2>
- Conroy, S. J., and Emerson, T. L. N. (2004). Business Ethics and Religion: Religiosity as a Predictor of Ethical Awareness Among Students. *Journal of Business Ethics*, 50(4), 383–396. doi: <https://doi.org/10.1023/B:BUSI.0000025040.41263.09>
- Doms, M., Furlong, F., and Krainer, J. (2007). *Subprime Mortgage Delinquency Rates*. Federal Reserve Bank of San Francisco Working Paper No. 2007-33. (Accessed: August 4, 2018).
- Elul, R. (2016). Securitization and Mortgage Default. *Journal of Financial Services Research*, 49(2), 281-309. doi: <https://doi.org/10.1007/s10693-015-0220-3>
- Experian-Oliver Wyman (2009) Understanding Strategic Default in Mortgages Part I. Experian-Oliver Wyman Market Intelligence Report. Available at: <https://www.experian.com/assets/decision-analytics/reports/strategic-default-report-1-2009.pdf> (Accessed: July 26, 2018).
- FICO (2011). Predicting Strategic Default. White paper. (Accessed: November 16, 2018).
- Gerardi, K., Shapiro, A. H., and Willen, P. (2008). *Subprime Outcomes: Risky Mortgages, Homeownership Experiences and Foreclosures*. Federal Reserve Bank of Boston Working Paper No. 07-15. (Accessed: February 3, 2019).
- Gerardi, K., Lehnert, A., Sherlund, S. M., and Willen, P. (2009). *Making Sense of the Subprime Crisis*. Brookings Papers on Economic Activity, Forthcoming, Federal Reserve Bank of Atlanta Working Paper No. 2009-2. (Accessed: March 24, 2019).
- Gompers, P., Ishii, J., and Metrick, A. (2003). Corporate Governance and Equity Prices. *The Quarterly Journal of Economics*, 118(1), 107-156. doi: <https://doi.org/10.1162/00335530360535162>

Guiso, L., Sapienza, P., and Zingales, L. (2003). People's Opium? Religion and Economic Attitudes. *Journal of Monetary Economics*, 50(1), 225-282. doi: [https://doi.org/10.1016/S0304-3932\(02\)00202-7](https://doi.org/10.1016/S0304-3932(02)00202-7)

Guiso, L., Sapienza, P., and Zingales, L. (2013). The Determinants of Attitudes Towards Strategic Default on Mortgages. *Journal of Finance*, 68(4), 1473-1515. doi: <https://doi.org/10.1111/jofi.12044>

Gupta, A., Raman, K., and Shang C. (2016). *Social Capital and Corporate Innovation*. Bentley University Working Paper.

Grullon, G., Kanatas, G., and Weston, J. (2010). Religion and Corporate (Mis)Behavior. *Social Science Research Network (SSRN)*. doi: <http://dx.doi.org/10.2139/ssrn.1472118>

Hasan, I., Hoi, C.K., Wu, Q., and Zhang, H. (2017). Social Capital and Debt Contracting: Evidence from Bank Loans and Public Bonds. *Journal of Financial and Quantitative Analysis*, 52(3), 1017-1047. doi: <https://doi.org/10.1017/S0022109017000205>

Hasan I., Clark, B., Lai, H., Li, F., and Siddique, A. (2021). Consumer Defaults and Social Capital. *Journal of Financial Stability*, 53. doi: <https://doi.org/10.1016/j.jfs.2020.100821>

Hilary, G. and Hui, K. W. (2009). Does Religion Matter in Corporate Decision Making in America?. *Journal of Financial Economics*, 93(3), 455-473. doi: <https://doi.org/10.1016/j.jfineco.2008.10.001>

Hoi, C. K., Wu, Q., and Zhang, H. (2019). Does Social Capital Mitigate Agency Problems? Evidence from Chief Executive Officer (CEO) Compensation. *Journal of Financial Economics*, 133(2), 498-519. doi: <https://doi.org/10.1016/j.jfineco.2019.02.009>

Jha, A., and Chen, Y. (2015). Audit Fees and Social Capital. *The Accounting Review*, 90(2), 611-639. doi: <https://doi.org/10.2308/accr-50878>

Jha, A., and Cox, J. (2015). Corporate Social Responsibility and Social Capital. *Journal of Banking and Finance*, 60, 252-270. doi: <https://www.doi.org/10.1016/j.jbankfin.2015.08.003>

Jiang, F., John, K., Li, C. W., and Qian, Y. (2018). Earthly Reward to the Religious: Religiosity and the Costs of Public and Private Debt. *Journal of Financial and Quantitative Analysis*, 53(5), 2131-2160. doi: <https://www.doi.org/10.1017/S002210901800039X>

- Keister, L.A. (2003). Religion and Wealth: The Role of Religious Affiliation and Participation in Early Adult Asset Accumulation. *Social Forces*, 82(1), 175-207. doi: <https://doi.org/10.1353/sof.2003.0094>
- Kennedy, E. J., and Lawton, L. (1998). Religiousness and Business Ethics. *Journal of Business Ethics*, 17(2), 163-175. doi: <https://doi.org/10.1023/A:1005747511116>
- Kumar, A. (2009). Who Gambles in the Stock Market?. *The Journal of Finance*, 64(4), 1889-1933. doi: <https://doi.org/10.1111/j.1540-6261.2009.01483.x>
- Kumar, A., Page, J. K., and Spalt, O.G. (2011). Religious Beliefs, Gambling Attitudes, and Financial Market Outcomes. *Journal of Financial Economics*, 102(3), 671-708. doi: <https://www.doi.org/10.1016/j.jfineco.2011.07.001>
- La Porta, R., Lopez-de-Silanes, F., Shleifer, A., and Vishny, R. W. (1997). Trust in Large Organizations. *American Economic Review*, 87(2), 333-338.
- Li, L., Ucar, E., and Yavas, A. (2022). Social Capital and Mortgage Delinquency. *Journal of Real Estate Finance and Economics*, 64, 379-403. doi: <https://doi.org/10.1007/s11146-020-09775-4>
- Liu, E. Y. (2010). Are Risk-Taking Persons Less Religious? Risk Preference, Religious Affiliation, and Religious Participation in Taiwan. *Journal for the Scientific Study of Religion*, 49(1), 172-178. doi: <https://doi.org/10.1111/j.1468-5906.2009.01499.x>
- McGuire, S. T., Omer, T.C., and Sharp, N.Y. (2012). The Impact of Religion on Financial Reporting Irregularities. *The Accounting Review*, 87(2), 645-673. doi: <https://doi.org/10.2308/accr-10206>
- Miller, A.S., and Hoffmann, J.P. (1995). Risk and Religion: An Explanation of Gender Differences in Religiosity. *Journal for the Scientific Study of Religion*, 34(1), 63-75. doi: <https://doi.org/10.2307/1386523>
- Noussair, C. N., Trautmann, S. T., Van de Kuilen, G., and Vellekoop, N. (2013). Risk Aversion and Religion. *Journal of Risk and Uncertainty*, 47(2), 165-183. doi: <https://doi.org/10.1007/s11166-013-9174-8>
- Renneboog, L., and Spaenjers, C. (2012). Religion, Economic Attitudes, and Household Finance. *Oxford Economic Papers*, 64(1), 103-127. doi: <https://doi.org/10.1093/oenp/gpr025>

Rupasingha, A., Goetz, S. J., and Freshwater, D. (2006). The Production of Social Capital in US Counties. *Journal of Socio-Economics*, 35(1), 83-101. doi: <https://doi.org/10.1016/j.socec.2005.11.001>

Seiler, M. J., Seiler, V. L., Lane, M. A., and Harrison, D. M. (2012). Fear, Shame, and Guilt: Economic and Behavioral Motivations for Strategic Default. *Real Estate Economics*, 40(S1), 199-233. doi: <https://doi.org/10.1111/j.1540-6229.2012.00349.x>

Seiler, M. J., Lane, M. A., and Harrison, D. M. (2014). Mimetic Herding Behavior and the Decision to Strategically Default. *Journal of Real Estate Finance and Economics*, 49(4), 621-653. doi: <https://doi.org/10.1007/s11146-012-9386-8>

Seiler, M. J. (2014). The Effect of Perceived Lender Characteristics and Market Conditions on Strategic Mortgage Defaults. *Journal of Real Estate Finance and Economics*, 48(2), 256-270. doi: <https://doi.org/10.1007/s11146-012-9388-6>

Seiler, M. J. (2017). Do Liquidated Damages Clauses Affect Strategic Mortgage Default Morality? A Test of the Disjunctive Thesis. *Real Estate Economics*, 45(1), 204-230. doi: <https://doi.org/10.1111/1540-6229.12142>

Shu, T., Sulaeman, J., and Yeung, P. E. (2012). Local Religious Beliefs and Mutual Fund Risk-Taking Behaviors. *Management Science*, 58(10), 1779-1796. doi: <https://doi.org/10.1287/mnsc.1120.1525>

Stulz, R. M., and Williamson, R. (2003). Culture, Openness, and Finance. *Journal of Financial Economics*, 70(3), 313-349. doi: [https://doi.org/10.1016/S0304-405X\(03\)00173-9](https://doi.org/10.1016/S0304-405X(03)00173-9)

Ucar, E. (2016) Local Culture and Dividends. *Financial Management*, 45(1), 105-140. doi: <https://doi.org/10.1111/fima.12118>

Weber, M. (1905) *The Protestant Ethic and The Spirit of Capitalism*. London: Unwin.

Weaver, G. R., and Agle, B. R. (2002). Religiosity and Ethical Behavior in Organizations: A Symbolic Interactionist Perspective. *The Academy of Management Review*, 27(1), 77-97. doi: <https://doi.org/10.5465/amr.2002.5922390>