Essays on the economic impact of religiosity and family ties

Ji, Yaling

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**ESSAYS ON THE ECONOMIC IMPACT OF
RELIGIOSITY AND FAMILY TIES**

JI YALING
SCHOOL OF SOCIAL SCIENCES
2018

ESSAYS ON THE ECONOMIC IMPACT OF RELIGIOSITY AND FAMILY TIES

JI YALING

School of Social Sciences

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Executive Summary

This thesis seeks an understanding of how cultural factors may affect economic behavior and drive aggregate outcomes. It comprises 3 self-contained essays that explore the link between the strength of social institutions and economic issues, with the purpose of providing insights from an empirical angle to yield policy-relevant research outcomes. We focus on the dominance of two social institutions in this thesis – religion and family, both of which are historically common foundations of human cultures throughout the world. We investigate how variations in the level of religiosity and the strength of family ties may affect attitudes towards immigration, as well as the extent of financial inclusiveness.

In chapter 1, we look at the link between religiosity and attitudes towards immigration. Immigration is a contentious area in the public sphere today, with communities having increasingly polarized outlooks towards pro-immigration policies in many developed countries. The recent literature argues that non-economic social and cultural factors explain a substantial share of the variation in individual attitudes towards immigration. However, it is still unclear what these non-economic factors are. This chapter argues that the intensity of religious beliefs and the extent of the religious social network are important determinants of immigration attitudes. Using both individual and subnational regional analyses, we find robust evidence that stronger religious beliefs are linked to greater hostility towards pro-immigration policies. To deal with endogeneity concerns, we employ an instrumental variable that measures a subnational district's exposure to recent significant earthquakes.

Financial inclusion, conceptually defined as the access and usage of formal financial services, is widely linked to poverty alleviation and is a policy objective for many governments worldwide. In chapter 2, we explore the notion that the preference for specific sources of

finance stems from the extent of social capital that is available. More specifically, we argue that the strength of family ties determines the adoption and usage of services provided by financial institutions. Using both international and the U.S. data, we find significant evidence indicating that stronger family ties are linked to a lower ownership rate of financial accounts and usage of formal financial services. To identify exogenous variation in the strength of family ties, we employ an index representing the country's suitability for wheat cultivation at the cross-country level and we examine the effect of inter-generational transmission in the strength family ties through a sample of second-generation immigrants in the US.

Chapter 3 estimates the impact of religiosity on financial inclusiveness. We argue that the intensity of religious beliefs and practices can impose informal constraints on our preferences, which in turn affect the composition of incentives and financial choices within societies. Religiosity may also play a role in defining societal norms and influence the development of financial sector. Our results suggest that higher levels of religiosity are associated with lower adoption and usage of formal financial services today. This is observed across U.S. states and across different countries, even after accounting for important cultural and geographical factors as well as measures of economic development. We employ a measure of historical disease prevalence as the main instrumental variable in our analyses and conduct over-identification tests using exposure to natural hazards as additional instruments. At the country level, we also implement a bounds test by Conley, Hansen, and Rossi (2012) to check that the IV results are likely to hold in the case that the exclusion restriction condition is violated.

Chapter 1: Religiosity and Immigration Attitudes

1.1 Introduction

Immigration is a major policy issue in many regions of the world. The literature argues that both economic (labor market competition, taxes, and welfare programs) and noneconomic factors (neighborhood attachment, nationalistic, racial, religious) are important determinants of immigration policies (Mayda & Rodrik, 2005; Mayda, 2006; Dustmann & Preston, 2007; Facchini & Mayda, 2009; Bloom, Alikian & Courtemanche, 2015). Card, Dustmann & Preston (2012) argue that anti-immigrant sentiments due to the threat to compositional amenities (neighborhoods, schools, and workplaces) are 2 to 5 times more important in explaining the variation of individual attitudes toward immigration policies than are labor market- and tax-related concerns (see also Hainmueller & Hopkins, 2014). However, while the literature has largely focused on economic factors affecting attitudes on immigration, it has not rigorously studied important cultural aspects determinants using large individual survey data sets.

This paper contributes to the literature by investigating the role of religiosity for attitudes on immigration. Different religions are increasingly in conflict (Huntington, 1996; Pew Research Center, 2015), and it appears important to understand whether religious behaviors may affect immigration and globalization more generally. In this paper, we establish a link between religiosity and individual attitudes towards immigration policies across countries. Our empirical evidence suggests that individuals who exhibit greater religiosity exhibit a preference for stricter immigration policies. We deal with potential endogeneity issues using a measure of earthquake exposure as instrumental variable.

In the current literature, anti-immigration views are often explained as responses to threats to individual economic interests or social standing in the community (Hainmueller & Hopkins, 2014). Threats to economic interests may come largely from labor market competition, whereby migrants compete for jobs with the native population consistent with the factor-endowments model and the Stolper-Samuelson theorem (Scheve and Slaughter, 2001; Rodrik & Mayda, 2005; Mayda, 2006), or perceived rivalry over the provisions of public and welfare goods (Facchini & Mayda, 2009). However, the literature also identifies perceived threats to the social status or cultural domination, ethnocentrism, nationalism, and ideology as key determinants of attitudes towards immigration (e.g., Rodrik & Mayda, 2005; Card et al., 2012; Hainmueller, Hiscox & Margalit, 2015). Moreover, religiosity has been found to be associated with attitudes of prejudice (see, e.g., Allport, 1954; Hunsberger & Jackson, 2005). Chuah et al. (2016) use a trust game to show that the willingness to discriminate is positively associated with religiosity.

This paper explores how a heightened sense of religiosity may foster the perception of cultural threats from outsiders, which may in turn affect attitudes towards immigration. The social identity theory in psychology explains how social behavior may be affected by both interpersonal and intergroup identities (Tajfel & Turner, 1979). The arrival of migrants and the increased exposure to alternative customs and beliefs by the community may be viewed as a threat to a community's in-group identity. Based on the literature, we postulate that individuals or communities which are more religious are likely to derive a greater sense of their identity from their religious in-group. The main hypothesis to be tested is that more religious individuals and societies should favor greater restrictions on immigration inflows. Our analysis is conducted in two layers. First, we look at how differences in religiosity at the individual-level may affect attitudes towards immigration policy, using extensive survey data from the

World Values Survey. Next, we explore evidence from data aggregated across subnational districts from multiple countries. As individuals within the same district have a greater tendency to observe similar religious characteristics and economic conditions, the subnational analyses enable us to achieve more precise estimates compared to studies using cross-country data.

To our knowledge, this is the first paper to empirically examine the causality of religiosity on immigration attitudes across a wide sample of nations. As an instrument for religiosity, we derive a measure of earthquake exposure observed at the subnational district level. Earthquakes are one of the most destructive and unpredictable natural hazards (Smith, 2013). In psychology, religious coping theory contends that the process of turning to religion to cope with life's stressors is more common during difficult times as individuals seek answers and meaning to their traumatic experiences, as well as support (Pargament, 2001).¹ Bentzen (2015) uses subnational district data to show that global variations in religiosity can be attributed to differences in earthquake risks. She finds evidence of both short-term and long-term effect and argue that these differences in religiosity are likely to be passed through generations.²

¹ Most studies of religious coping suggest that a rise in religiosity occurs following difficult periods. The medical and psychology fields have established a correlation between distressing life events or severe illnesses and the use of religion as a coping mechanism (see Pargament (2001) and Smith, McCullough & Poll (2003) for surveys). Schuster et al. (2001) find that a large majority of Americans turned to religion in the weeks after the September 11, 2001, terrorist attacks even when they were not physically present during the occurrence. Updegraff, Silver & Holman (2008) discuss the use of religion as a means to seek answers following this attack.

² Belloc, Drago & Galbiati (2016) argue that historical occurrences of destructive earthquakes led to an increase in the construction of religious buildings in Italian cities (if ruled by bishops). Recent studies have documented empirical links between environmental shocks and the variability of long-term socio-cultural variables (Chaney, 2013; Galor & Özak, 2016).

As an instrument for religiosity, we use the population's physical exposure to severe earthquakes as measured by Modified Mercalli Intensity (MMI) of magnitude VIII and above during the past 20 years, following Belloc et al. (2016).³ These earthquakes cause severe ground shaking with at least moderate damage to resistant structures and buildings, and severe damage to more vulnerable structures. Existing research is inconclusive regarding the sustained long-term economic impact from earthquake episodes (Cavallo, Galiani, Noy & Pantano, 2013; Gignoux & Menéndez, 2016). The focus on physical exposure rather than vulnerability and coping capacity ensures that our instrument is unlikely to be driven by economic factors.⁴

This paper adds to a growing body of literature which documents various effects of culture on economic outcomes. These range from the impact of shared historical experiences on institutional and social infrastructure (Nunn, 2012) to how particular sets of beliefs and values may persistently drive individual or collective economic behavior (Alesina & Giuliano, 2015; Guiso, Sapienza & Zingales, 2006; Tabellini, 2008; Spolaore & Wacziarg, 2013; Guiso, Sapienza, & Zingales, 2016; Giuliano & Nunn, 2017). More specifically, this study is related to the literature on how religiosity shapes public attitudes towards, e.g., government, rule of law, democracy, trust, innovation, economic growth and development (Barro & McCleary, 2003; Guiso, Sapienza & Zingales, 2003; Berggren & Bjørnskov, 2011; Durlauf, Kourtellos &

³ The MMI scale is an intensity measure that is assigned to a given earthquake site. Intensity values are a reflection of the effects that are experienced in the location and constitute a more meaningful measure to most people as compared with magnitude scales.

⁴ While it is plausible for adverse life events to cause a rise in religiosity, the bulk of these experiences may be endogenous to the individual's economic situation (Soares, 2004). The impacts of many disasters, regardless of whether these are naturally-occurring or man-made, are likely to vary with the disaster-preparedness or sociopolitical stability of the community, with their response to such disasters further linked to their economic development. For instance, while extreme weather may cause droughts and floods, their severity may be mitigated by appropriate infrastructure such as dams or river defenses.

Tan, 2012; Woodberry, 2012; Bénabou, Ticchi & Vindigni, 2015; Campante & Yanagizawa-Drott, 2015).

The paper proceeds as follows. Section 1.2 describes the data and its construction, while Sections 1.3 and 1.4 report and discuss the empirical strategies and results, respectively. Section 1.5 concludes. A list of all variables is provided in the appendix.

1.2 Data

In this section, we explain the derivation of our main variables. We derive our main variables from the World Values Survey (WVS). This is a series of questionnaires that categorizes and quantifies human values and beliefs in over 90 countries, with a representative sample of at least 1000 respondents aged 18 years and older from each country. The surveys from which we draw our dataset were collected over 2 waves, from 1999 to 2009. Note that we pursue two empirical strategies; at the individual level and at the subnational regional level. The data is formatted accordingly. Moreover, in all analysis we exclude countries that are or were previously linked to communist or socialist regimes. Religious thinking is often suppressed in transition economies, especially those ruled by communist regimes (Barro & McCleary, 2003).

To measure religiosity, we include the responses to three separate questions related to religious participation and the respondents' dedication to their religion. These are: (1) "How important is God in your life?" (reported on a scale from 1 to 10); (2) "How important is religion in your life?" (reported in four categories – "very important", "important", "somewhat important", and "not at all important"); and (3) "How often do you attend religious services?" (reported in eight categories from "more than once a week" to "never"). We construct the variables first by linearly transforming the response from each individual to a number between

0 and 1, with a larger number denoting greater importance of God or religion and higher frequency of religious attendance. These form our three religiosity variables *R1: importance of God*; *R2: importance of religion*; and *R3: religious attendance*, respectively. Finally, we standardize and project these variables onto their first principal component to calculate a general *REL* variable for each respondent, which encompasses the different aspects of how we assess religiosity.

As dependent variable, we use the question that addresses the respondent's *attitudes towards immigration*. Respondents can answer either: "let anyone come"; "as long as jobs available"; "strict limits"; or, "prohibit people from coming". These four responses are linearly scaled in descending order from 1 to 0, respectively, with 1 representing a more permissive attitude towards immigration policies. Finally, for both our dependent and independent variables, we aggregate the observations for each variable across the subnational region to derive the corresponding region-level measures.

For the IV analysis, we utilize an *earthquake exposure* measure observed at the subnational region level. To derive this measure, we obtain raw data on all occurrences of "significant earthquakes" from the Significant Earthquake Database, the U.S. National Geophysical Data Center. These are defined as earthquakes that have either caused deaths, have caused damages above \$1 million or more, have local magnitudes of at least 7.5, have at least 10 on the MMI, or have caused tsunamis to occur. The identification strategy relies on the religious coping theory. The literature (both medicine and psychology) finds a correlation between distressing life events or severe illnesses and religiosity as a coping tool (for surveys, see Pargament, 2001; Smith, McCullough & Poll, 2003). We argue that individuals who live in areas that have experienced a significant earthquake in recent history are likely to be more religious (see also Bentzen, 2015).

Using data on significant earthquakes, we compute the distance in kilometers from the centroid of the WVS region to the epicenter of the nearest earthquake. We invert these distance values such that a larger number reflects greater exposure to earthquakes. For the individual-level analysis, we include occurrences in the preceding 20 years before the start of each wave. For the cross-sectional region-level estimates, we utilize the average exposure during the period 1961 to 1998. In our robustness checks, we also consider shorter periods of earthquake exposure of 10 and 15 years. A summary list of all variables and their sources is provided in Table A.1 in the Appendix.

1.3 Evidence from individual level data

1.3.1 Estimation equation and baseline estimates

Using the World Values Survey, we first explore the relationship between religiosity and attitudes towards immigration at the individual level. Our baseline specification is as follows:

$$Immigration_{i,c,t} = \beta_0 + \beta_1 religiosity_{i,c,t} + X'_{i,c,t} \beta_2 + \lambda_{ethnic,c} + \delta_t + \varepsilon_{i,c,t} \quad (1.1)$$

where $immigration_{i,c,t}$ represents the WVS survey response of individual i , from country c , at time t . $Religiosity_{i,c,t}$ indicates one of our four individual-level religiosity variables: $R1$, $R2$, $R3$ and REL (the first principal component of $R1$, $R2$, $R3$). $X_{i,c,t}$ is a vector of individual-level controls. These include the individual's religion and other demographic information such as gender, age, age squared, marital status, income and education. λ_{ethnic} and δ_t are the respective fixed effects for the individual's ethnic identity within the country and the year in which the interview was conducted. $\varepsilon_{i,c,t}$ is the individual-specific error term.

Table 1.1 reports our baseline estimates for the individual-level analysis using ordinary least squares (OLS). We present our estimates as standardized beta coefficients to ease the comparisons of magnitudes. Across all columns, we include a set of individual control variables, ethnic identity dummy variables at the country level and year dummy variables to account for the combined effects of individual, country, ethnic and year attributes. Ethnic identities within the same country can be important determinants of several cultural attributes (Desmet, Ortuño-Ortín & Wacziarg, 2017), and including these fixed effects allow us to control for time-specific and other area effects which may drive differences in behavior and values. In addition, as individuals within the same region have a tendency to exhibit similar religious characteristics and experience comparable economic conditions, the potential for within-region correlation of the residuals exist. To address this, we cluster all standard errors at the region level.

In columns (1) and (2), the estimated coefficients for R1 (importance of God) and R2 (importance of religion) are negative and statistically significant at least at the 1 percent level. These estimates are consistent with our hypothesis that individuals associated with higher levels of religiosity and a stronger sense of religious identity harbor more antagonistic attitudes towards outsiders and outside influences. In terms of magnitudes, a one standard deviation rise in *REL* is associated with a 0.009 to 0.035 standard deviation decline in pro-immigration attitudes. These estimates are quite sizable relative to other variables in the model. R3 (religious attendance) shows a negative coefficient estimate but is not significant at the 10 percent level. This suggests that religious customs and participation are not strongly correlated with individuals' attitudes towards immigration within our OLS estimation models. Among the individual-level controls, only the secondary and tertiary education dummies are significant, with positive signs consistent with Hainmueller et al. (2015).

Table 1.1 World Values Survey (OLS estimates)

	(1)	(2)	(3)	(4)
R1: Importance of God	-0.029*** (-3.627)			
R2: Importance of religion		-0.035*** (-4.499)		
R3: Religious attendance			-0.009 (-1.051)	
REL (1 st PC of R1, R2, R3)				-0.037*** (-3.551)
employed	-0.002 (-0.494)	-0.002 (-0.484)	-0.002 (-0.465)	-0.002 (-0.491)
gender	0.003 (0.645)	0.003 (0.815)	0.001 (0.274)	0.004 (0.843)
married	0.003 (0.571)	0.003 (0.640)	0.003 (0.582)	0.003 (0.684)
age	-0.035 (-1.534)	-0.035 (-1.552)	-0.035 (-1.514)	-0.035 (-1.515)
age squared	0.022 (0.994)	0.024 (1.052)	0.021 (0.921)	0.023 (1.036)
secondary education	0.015* (1.926)	0.015* (1.915)	0.015* (1.959)	0.015* (1.915)
tertiary education	0.067*** (7.889)	0.067*** (7.823)	0.068*** (7.961)	0.067*** (7.886)
Religious denomination F.E.	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes
Country - Ethnic F.E.	Yes	Yes	Yes	Yes
R-squared	0.110	0.110	0.109	0.110
Number of observations	82806	82806	82806	82806

Notes: This table reports the individual-level OLS results using the World Values Survey. The dependent variables measure how the respondent feels towards immigration policies, with higher values indicating a preference for more relaxed immigration policies. R1, R2, R3 and REL (1st PC of R1, R2, R3) are different measures of individuals' religiosity.

The coefficient values correspond to standardized beta coefficients. The standard errors are clustered at the region level, and figures in the parenthesis indicate t-statistics. *, ** and *** denote significance at the 10, 5 and 1 percent levels, respectively.

Our outcome measure has only four possible responses, which may be a possible concern. As an initial robustness analysis, we therefore repeat the analysis in Table 1.1 using an ordered logistic regression. The results are reported in Table 1.A.4 in the appendix. The results are robust to using this alternative estimation technique.

1.3.2 Heterogeneous effects

We explore potential heterogeneity within our sample by looking at how religiosity may affect different subsamples of the population. These estimates are presented in Table 1.2. In columns (1) and (2), we restrict our samples to females and males, respectively, and estimate how religiosity is linked to immigration attitudes using the full set of controls. Our results suggest that religiosity has a slightly greater negative effect on the attitude towards immigration for women compared to men.

Table 1.2. World Values Survey (OLS estimates): Heterogeneous effects across subsamples

<i>Sample restricted to:</i>	(1) <i>Female</i>	(2) <i>Male</i>	(3) <i>Low Income Individual</i>	(4) <i>Middle Income Individual</i>	(5) <i>High Income Individual</i>	(6) <i>Countries with net migration inflow</i>	(7) <i>Countries with net migration outflow</i>
Dependent variable	Attitudes towards immigration						
REL (1 st PC of R1, R2, R3)	-0.023** (-2.385)	-0.017* (-1.783)	-0.000 (-0.028)	-0.029*** (-2.707)	-0.041*** (-2.868)	-0.028* (-1.869)	-0.022* (-1.830)
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year F.E	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country - Ethnic F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.124	0.127	0.129	0.150	0.124	0.116	0.119
Number of observations	58979	56422	36042	42941	24389	37249	38939

Notes: This table reports the individual-level OLS results using the World Values Survey with samples restricted accordingly. R1, R2, R3 and REL (1st PC of R1, R2, R3) are different measures of individuals' religiosity.

The coefficient values correspond to standardized beta coefficients, and figures in the parenthesis indicate t-statistics. *, ** and *** denote significance at the 10, 5 and 1 percent levels, respectively.

Next, we divide the full sample into three income subdivisions within a country (top 30 percent; next 40 percent; lowest 30 percent) and examine how the effects of religiosity may be affected across the different income brackets. We find that the effects of religiosity on the attitude towards immigration have greater significance and magnitudes for higher income

brackets, despite an overall negative correlation between religiosity and income levels. The level of religiosity among low income individuals appears to have no effect on immigration attitudes. Finally, we split the sample based on whether the countries experience net migration inflows or outflows. Religiosity is linked with attitudes towards immigration in both sets of countries. Our findings suggest that religiosity plays a bigger role in driving the perceptions of women and those who are wealthier, while males and those with lower incomes may derive their perception from other factors.

1.3.3 IV analysis

Omitted variables may challenge the causal interpretations of our strategy. Thus, we utilize an IV approach, and the results are reported in Table 1.3. Our IV measures the exposure to earthquakes. It is the minimum distance (inverted values) from the centroid of the region that the respondent originates from to the nearest earthquake occurring in the past 20 years. The specifications employed here are similar to the fully specified OLS models in the first two tables. All standard errors are clustered at the region level.

The first stage estimates indicate that earthquake exposure is positively correlated with the measures of religiosity, with the corresponding F-statistics for excluded instruments greater than 10 for all religiosity variables. The second stage estimates suggest that all four religiosity variables have a negative impact on attitudes towards immigration. The coefficient estimates are statistically significant at least at the 1 percent level. The magnitudes of the second stage estimates are larger in absolute value than the OLS estimates, implying a positive bias within the OLS estimates.

Next, we add in potentially confounding regressors that may drive attitudes towards immigration policies in Table 1.4. We first include a variable that is an interaction term between

the respondent's education and the country's GDP per capita. Together with the education attainment controls in the baseline specification, this allows us to capture the indirect skill composition of the respondent relative to the country. We also consider a measure of how strongly the respondent identifies as a citizen of the country (*nationalism*), whether either parent is an immigrant (*parent immigrant*), whether the respondent prefers not to be neighbors with immigrants or foreign workers (*monoculturalism*), whether the respondent prefers not to be neighbors with people of another race (*racism*), whether the respondent is a member of the dominant religion in the country as well as country fixed effects. Throughout these specifications, the effect of religiosity remains significant.

Table 1.3. World Values Survey (2SLS estimates)

<i>Panel A: Second-stage results</i>				
IV:	Region-level earthquake exposure			
Dependent Variable: Attitudes towards immigration	(1)	(2)	(3)	(4)
R1: Importance of God	-0.477*** (-3.131)			
R2: Importance of religion		-0.539*** (-3.258)		
R3: Religious attendance			-0.558*** (-3.139)	
REL (1 st PC of R1, R2, R3)				-0.439*** (-3.283)
Baseline controls	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes
Country – Ethnic F.E.	Yes	Yes	Yes	Yes
<i>Panel B: First-stage results</i>				
Dependent variable:	R1	R2	R3	REL
Earthquake exposure	0.206*** (7.237)	0.182*** (5.618)	0.176*** (4.275)	0.224*** (5.982)
R-squared	0.458	0.476	0.413	0.583
Number of regions	466	466	466	466
Number of observations	58502	58502	58502	58502
1 st stage F stat	52.375	31.565	18.279	35.788
Anderson-Rubin Wald test (Chi-sq.)	9.63 (p=0.00)	9.63 (p=0.00)	9.63 (p=0.00)	9.63 (p=0.00)

Notes: This table reports the individual-level 2SLS results using the World Values Survey. Panel A reports the second stage results. The dependent variables measure how the respondent feels towards immigration policies, with higher values indicating a preference for more relaxed immigration policies. R1, R2, R3 and REL (1st PC of R1, R2, R3) are different measures of individuals' religiosity.

The coefficient values correspond to standardized beta coefficients. The standard errors are clustered at the region level, and figures in the parenthesis indicate t-statistics. *, ** and *** denote significance at the 10, 5 and 1 percent levels, respectively.

Table 1.4. World Values Survey (2SLS estimates): Controlling for other effects

Dependent Variable: Attitudes towards immigration	(1)	(2)	(3)	(4)	(5)	(6)	(7)
REL (1 st PC of R1, R2, R3)	-0.351** (-2.459)	-0.576** (-3.426)	-0.573** (-4.521)	-0.389** (-3.336)	-0.393** (-3.293)	-0.405** (-3.069)	-0.845** (-2.425)
Education x GDP	0.056* (2.125)						
Nationalistic		0.018 (1.539)					
Parent immigrant			0.004 (0.290)				
Monoculturalism				-0.094*** (-11.061)			
Racism					-0.054*** (-5.694)		
Dominant religion						-0.063*** (-4.603)	
Country F.E.							Yes
Baseline controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country – Ethnic F.E.	Yes	Yes	Yes	Yes	Yes	Yes	No
R-squared	0.083	0.060	0.055	0.086	0.080	0.075	0.0
Number of regions	466	289	256	463	463	466	466
Number of observations	54483	26939	23434	57258	57424	58502	58502
1 st stage F stat	33.740	17.533	25.353	44.775	45.039	33.133	23.017
Anderson-Rubin Wald test (Chi-sq.)	5.46 (p=0.02)	11.55 (p=0.00)	14.34 (p=0.00)	9.57 (p=0.00)	9.4 (p=0.00)	8.9 (p=0.03)	9.63 (p=0.00)

Notes: In columns (1) to (6), we account for the effects of the individual's education relative to the country's GDP, nationalistic attitudes, whether either parent is an immigrant, monoculturalism, racism, dominant religion and country fixed effects, and report the corresponding IV estimates. *REL* is instrumented using a measure of the distance to the nearest earthquake in the region.

The coefficient values correspond to standardized beta coefficients. Figures in the parenthesis indicate t-statistics. *, ** and *** denote significance at the 10, 5 and 1 percent levels, respectively.

1.4 Evidence using subnational region data

In this section, we study the link between aggregate measures of religiosity and attitudes towards immigration at the WVS subnational region or district level. The estimating equation is specified as follows:

$$Immigration_i = \beta_0 + \beta_1 religiosity_i + X_i' \beta_2 + \lambda_c + \varepsilon_i \quad (1.2)$$

where $immigration_i$ represents the aggregated survey response of all individuals from each region or administrative district in the WVS sample. $Religiosity_i$ refers to religiosity measures *R1*, *R2*, *R3* and *REL* (1st PC of *R1*, *R2*, *R3*), aggregated at the regional level. X_i is a vector of region-level geographical controls, which may affect the region's accessibility and

climate and influence its development conditions. These include a dummy variable indicating whether the region is landlocked, the distances to the nearest coast and navigable river, average levels of precipitation and temperature observed, the average elevation of the region, as well as a measure of the suitability of the soil conditions for agriculture. We also include λ_c as continent fixed effects. ε_i is the error term.

Table 1.5. World Values Survey region-level (OLS estimates)

Dependent Variable:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Attitudes towards immigration								
R1: Importance of God	-0.137** (-2.197)				-0.151 (-1.351)			
R2: Importance of religion		- 0.222*** (-3.590)				-0.236** (-2.157)		
R3: Religious attendance			- 0.195*** (-2.971)				-0.211** (-2.259)	
REL (1 st PC of R1, R2, R3)				- 0.198*** (-3.264)				-0.240** (-2.334)
Landlocked					-0.068 (-0.800)	-0.062 (-0.738)	-0.066 (-0.789)	-0.063 (-0.753)
Distance to coast					0.128 (1.495)	0.102 (1.183)	0.195** (2.178)	0.136 (1.611)
Distance to river					0.184** (2.107)	0.100 (1.441)	0.102 (1.472)	0.104 (1.501)
Precipitation					0.150 (1.516)	0.140 (1.476)	0.151 (1.555)	0.152 (1.567)
Temperature					0.105 (1.154)	0.077 (0.853)	0.058 (0.695)	0.074 (0.841)
Elevation					-0.204** (-2.481)	-0.182** (-2.179)	-0.243*** (-2.954)	-0.207** (-2.568)
Soil suitability					0.028 (0.317)	0.033 (0.380)	0.034 (0.401)	0.036 (0.412)
Continent F.E	No	No	No	No	Yes	Yes	Yes	Yes
R-squared	0.019	0.049	0.038	0.039	0.213	0.206	0.212	0.209
Number of observations	219	229	229	229	219	229	229	229

Notes: This table reports the WVS region-level OLS estimates. The dependent variable is derived from the WVS and measures the attitude towards immigration policies within the region, with higher values indicating a preference for more relaxed immigration guidelines. The religiosity variables are also derived from the WVS. Columns 1 to 4 show the bivariate estimates, while those in columns 5 to 8 are conditional on a range of geographic controls and religious denomination.

The coefficient values correspond to standardized beta coefficients. Figures in the parenthesis indicate t-statistics. *, ** and *** denote significance at the 10, 5 and 1 percent levels, respectively.

Table 1.6. World Values Survey region-level (2SLS estimates)

<i>Panel A: Second-stage results</i>						
Dependent Variable: Attitudes towards immigration	(1)	(2)	(3)	(4)	(5)	(6)
R1: Importance of God	-1.735*** (-4.246)					
R2: Importance of religion		-1.896*** (-3.970)				
R3: Religious attendance			-3.536** (-2.084)			
REL (1 st PC of R1, R2, R3)				-2.077*** (-3.956)	-3.450** (-2.197)	-0.914** (-2.037)
Landlocked	-0.018 (-0.152)	0.003 (0.026)	0.011 (0.048)	-0.002 (-0.019)	0.052 (0.297)	-0.032 (-0.387)
Distance to coast	-0.130 (-1.053)	-0.147 (-1.130)	1.107** (2.323)	0.122 (1.134)	0.223 (1.275)	0.026 (0.331)
Distance to river	0.125 (0.985)	-0.076 (-0.575)	-0.262 (-0.770)	-0.059 (-0.401)	-0.237 (-0.885)	0.072 (0.675)
Precipitation	0.438*** (2.799)	0.377** (2.401)	0.862* (1.950)	0.498*** (2.731)	0.580** (1.995)	0.302** (2.316)
Temperature	0.523*** (3.611)	0.665*** (3.516)	1.068** (1.968)	0.684*** (3.502)	1.100** (2.292)	0.045 (0.403)
Elevation	-0.031 (-0.278)	0.090 (0.665)	-0.599** (-2.387)	-0.105 (-0.890)	-0.067 (-0.362)	0.018 (0.234)
Soil suitability	0.119 (1.043)	0.122 (1.001)	0.248 (1.123)	0.150 (1.261)	0.255 (1.373)	-0.150* (-1.825)
Muslim					0.943* (1.798)	
Protestant					0.253 (1.297)	
Catholic					0.681** (1.984)	
Continent F.E.	Yes	Yes	Yes	Yes	Yes	No
Subcontinent F.E.	No	No	No	No	No	Yes
<i>Panel B: First-stage results</i>						
Dependent variable:	R1	R2	R3	REL	REL	REL
Earthquake exposure	0.231*** (5.058)	0.215*** (4.455)	0.115** (1.993)	0.196*** (4.279)	0.137** (2.253)	0.237*** (3.233)
R-squared	0.728	0.722	0.485	0.684	0.707	0.862
Number of observations	219	229	229	229	229	229
1 st stage F stat	25.584	19.844	3.973	18.309	5.077	10.453
Anderson-Rubin Wald test (Chi-sq.)	41.63 (p=0.00)	44.11 (p=0.00)	44.11 (p=0.00)	44.11 (p=0.00)	41.89 (p=0.00)	5.94 (p=0.02)

Notes: This table reports the region-level 2SLS results using the World Values Survey. Panel A reports the second stage results. The dependent variable measures the attitude towards immigration policies within the region, with higher values indicating a preference for more relaxed immigration policies. R1, R2, R3 and REL (1st PC of R1, R2, R3) are instrumented using the calculated distance to the nearest earthquake (inverted values).

The coefficient values correspond to standardized beta coefficients. The standard errors are clustered at the region level, and figures in the parenthesis indicate t-statistics. *, ** and *** denote significance at the 10, 5 and 1 percent levels, respectively.

The OLS estimates are presented in Table 1.5. In columns (1) to (4), we run bivariate regressions of each of our explanatory religiosity variables on the dependent variable without the inclusion of any controls. Columns (5) to (8) include the full set of climatic and geographical controls. These may drive immigration outcomes and attitudes by influencing the general accessibility or the development of trade and agriculture.

We find consistent evidence that attitudes towards immigration appears to be more hostile in regions with higher religiosity scores. The estimated coefficients for the religiosity measures are negative and statistically significant at the 5 percent level, with the exception of R1. In our fully specified models in columns (5) to (8), a one standard deviation increase in the four religiosity variables brings about a 0.15 to 0.24 standard deviation fall in the outcome.

Table 1.6 presents our IV estimates. In columns (1) to (4), the specifications are similar to the fully specified OLS models in Table 5. We add dominant religion and subcontinent dummies in columns (5) and (6), respectively. Panel A presents the second-stage while panel B presents the first-stage results. The second-stage estimates indicate that all four religiosity variables have negative effects on the outlook towards immigration. These estimates are all statistically significant at least at the 5 percent level, and their magnitudes are notably larger in absolute values in comparison with the corresponding estimates in the earlier OLS models. This may suggest the presence of measurement errors and a positive bias within the OLS estimates. The first stage estimates show that earthquake exposure is positively related with our measures of religiosity, consistent with our hypothesis of religious coping mechanisms. The first stage F-test statistics on excluded instruments exceed the rule-of-thumb value of 10, with the exception of column (3) and the specification with the dominant religion dummies in column (6). In addition, the Anderson-Rubin test, which is valid under weak identification,

rejects the null hypothesis that the coefficients of the endogenous regressors in the structural equations are jointly equal to zero.

1.5 Conclusion

In this paper, we provide evidence that religiosity negatively affects attitudes towards immigration. We argue that more religious individuals or communities are likely to derive a greater sense of their identity from their religious in-group, and this may accentuate potential differences between themselves and perceived outsiders. We postulate that we are more likely to witness hostility towards pro-immigration policies among individuals and in areas that are highly religious. We find that religiosity is negatively associated with individuals' attitudes towards immigration. We find similar effects at the subnational region level.

To identify causality, we utilize a measure of subnational region-level earthquake exposure as an instrumental variable. We contend that the occurrence of abrupt environmental disasters such as severe earthquakes may drive the population towards higher levels of religiosity. Our IV results support a causal interpretation of our findings.

1.6 Appendix

Table 1.A.1. Description of variables and data sources

Variable	Description	Source
<i>A. Individual level</i>		
Attitude towards immigration	Rescaled score (0-1) based on WVS sample question on attitudes towards immigration policies: What is your opinion about people from other countries coming here to work? Higher values indicate greater tolerance	World Value Survey 1981-2014 Longitudinal
R1: Importance of god	Rescaled score (0-1) based on WVS sample question: How important is God in your life? Higher values denote greater importance	World Value Survey 1981-2014 Longitudinal
R2: Religious attendance	Rescaled score (0-1) based on WVS sample question: How often do you attend religious services? Higher values denote more frequent attendance	World Value Survey 1981-2014 Longitudinal
R3: Importance of religion	Rescaled score (0-1) based on WVS sample question: How important is religion in your life? Higher values denote greater importance	World Value Survey 1981-2014 Longitudinal
REL	First principal component of all 3 religiosity measures	World Value Survey 1981-2014 Longitudinal
Income	Rescaled score (0-1) of individuals' household incomes relative to income groups of the country, incomes include all wages, salaries, pensions and other income sources, self-assessed. Higher values denote higher income strata	World Value Survey 1981-2014 Longitudinal
Gender	Dummy variable of 1 for female individuals and 0 for male individuals	World Value Survey 1981-2014 Longitudinal
Married	Dummy variable of 1 for individuals who are either married or cohabiting with another, and 0 otherwise	World Value Survey 1981-2014 Longitudinal
Age	Age of individual	World Value Survey 1981-2014 Longitudinal
Age-squared	Squared value of age of individual	World Value Survey 1981-2014 Longitudinal
Primary education	Dummy variable of 1 for individuals who have either no formal education, incomplete or complete primary level education, and 0 otherwise	World Value Survey 1981-2014 Longitudinal
Secondary education	Dummy variable of 1 for individuals who have either incomplete or complete secondary level education, and 0 otherwise	World Value Survey 1981-2014 Longitudinal
Tertiary education	Dummy variable of 1 for individuals who have either incomplete or complete university level education, and 0 otherwise (excluded group)	World Value Survey 1981-2014 Longitudinal
Earthquake exposure	Minimum distance from the centroid of the WVS region to the nearest earthquake that has occurred within 20 years prior to the start of the wave	NGDC
Education*GDP	Individual's education level (rescaled score (0-1)) X GDP per capita of the first year in each wave	World Value Survey 1981-2014 Longitudinal, World Development Indicators
Nationalistic	Dummy variable of 1 for individuals who strongly identify themselves as citizens of the country	World Value Survey 1981-2014 Longitudinal

Parent immigrant	Dummy variable of 1 for individuals who have either parents as immigrants	World Value Survey 1981-2014 Longitudinal
Monoculturalism	Dummy variable of 1 for individuals who do not want to have immigrants/foreign workers as neighbors	World Value Survey 1981-2014 Longitudinal
Racism	Dummy variable of 1 for individuals who do not want to have people of other races as neighbors	World Value Survey 1981-2014 Longitudinal
Dominant religion	Dummy variable of 1 for individuals who identify with/belong to the largest religious group in the country	World Value Survey 1981-2014 Longitudinal
<i>B. WVS region level</i>		
Attitude towards immigration	Aggregated and rescaled score (0-1) based on World Values Survey sample question: What is your opinion about people from other countries coming here to work? Higher values indicate greater tolerance	World Value Survey 1981-2014 Longitudinal
R1: Importance of god	Aggregated and rescaled score (0-1) based on World Values Survey sample question: How important is God in your life? (Waves 1 to 3)	World Value Survey 1981-2014 Longitudinal
R2: Religious attendance	Aggregated and rescaled score (0-1) based on World Values Survey sample question: How often do you attend religious services? (Waves 1 to 3)	World Value Survey 1981-2014 Longitudinal
R3: Importance of religion	Aggregated and rescaled score (0-1) based on World Values Survey sample question: How important is religion in your life? (Waves 1 to 3)	World Value Survey 1981-2014 Longitudinal
REL	First principal component of all 3 religiosity measures	World Value Survey 1981-2014 Longitudinal
Catholic	Dummy variable of 1 if the dominant religion in the WVS region is Catholicism	World Value Survey 1981-2014 Longitudinal
Protestant	Dummy variable of 1 if the dominant religion in the WVS region is Protestantism	World Value Survey 1981-2014 Longitudinal
Muslim	Dummy variable of 1 if the dominant religion in the WVS region is Islam	World Value Survey 1981-2014 Longitudinal
Distance to coast	Mean distance to coast (km)	G-Econ Database
Distance to river	Mean distance to nearest navigable river (km)	G-Econ Database
Landlocked	Dummy variable of 1 if a country is fully enclosed by land, and 0 otherwise	CIA World Fact Book
Precipitation	Average precipitation, average 1980-2008	G-Econ Database
Temperature	Average temperature, average 1980-2008	G-Econ Database
Elevation	Elevation in km	G-Econ Database
Soil suitability	Soil suitability component of agriculture suitability	Ramankutty et al. (2002)
Earthquake exposure	Distance from the centroid of the WVS region to the nearest significant earthquake (average values from 1961-1998)	NGDC

Table 1.A.2. Descriptive Statistics (WVS Individual level)

Variable	Obs	Mean	Std.Dev.	Min	Max
Attitude towards immigration	82806	.506	.279	0	1
R1: Importance of god	82806	.831	.279	0	1
R2: Religious attendance	82806	.615	.362	0	1
R3: Importance of religion	82806	.781	.313	0	1
REL	82806	.258	.744	-1.879	.969
Employed	82806	.311	.463	0	1
Gender	82806	.506	.5	0	1
Married	82806	.616	.486	0	1
Age	82806	39.11	15.799	15	99
Age-squared	82806	1779.175	1435.445	225	9801
Secondary education	82806	.492	.5	0	1
Tertiary education	82806	.216	.411	0	1
Education*GDP	77258	5958.436	9582.447	0	48662.44
Nationalistic	31366	.562	.496	0	1
Parent immigrant	27612	.084	.277	0	1
Monoculturalism	80976	.22	.415	0	1
Racism	81157	.173	.378	0	1
Earthquake exposure	58502	0	0	0	.002

Table 1.A.3. Descriptive Statistics (WVS Region level)

Variable	Obs	Mean	Std.Dev.	Min	Max
Attitude towards immigration	229	.502	.104	.218	.867
R1: Importance of god	219	.795	.208	.18	1
R2: Religious attendance	229	.733	.22	.178	1
R3: Importance of religion	229	.54	.188	.133	.934
REL	219	.312	.815	-1.955	1.515
Landlocked	229	.511	.501	0	1
Distance to coast	229	295.773	303.987	0	1735.169
Distance to river	229	550000	590000	0	2560000
Precipitation	229	879.574	717.17	0	4497.965
Temperature	229	15.576	8.078	-3.014	27.796
Elevation	229	192.866	206.239	0	1278.522
Soil suitability	229	.595	.239	.134	1.002
Earthquake exposure	229	.001	0	0	.002

Table 1.A.4. World Values Survey (Ordered logistic and ordered probit estimates)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
R1: Importance of God	-0.194*** (-3.496)				-0.120*** (-3.682)			
R2: Importance of religion		-0.252*** (-4.672)				-0.143*** (-4.632)		
R3: Religious attendance			-0.057 (-0.945)				-0.037 (-1.095)	
REL (1 st PC of R1, R2, R3)				-0.254*** (-3.464)				-0.153*** (-3.652)
Employed	-0.018 (-0.557)	-0.018 (-0.544)	-0.017 (-0.513)	-0.018 (-0.557)	-0.008 (-0.422)	-0.008 (-0.412)	-0.007 (-0.391)	-0.008 (-0.419)
Gender	0.020 (0.706)	0.027 (0.933)	0.010 (0.339)	0.027 (0.919)	0.011 (0.659)	0.014 (0.834)	0.005 (0.285)	0.015 (0.864)
Married	0.020 (0.622)	0.022 (0.692)	0.020 (0.631)	0.023 (0.731)	0.009 (0.502)	0.010 (0.572)	0.009 (0.515)	0.011 (0.617)
Age	-0.249 (-1.525)	-0.255 (-1.552)	-0.248 (-1.515)	-0.248 (-1.511)	-0.146 (-1.573)	-0.148 (-1.593)	-0.145 (-1.554)	-0.145 (-1.554)
Age squared	0.155 (0.974)	0.168 (1.052)	0.145 (0.911)	0.164 (1.025)	0.095 (1.048)	0.101 (1.108)	0.089 (0.975)	0.100 (1.092)
Secondary education	0.082 (1.476)	0.081 (1.462)	0.083 (1.497)	0.081 (1.463)	0.064** (2.047)	0.063** (2.035)	0.065** (2.081)	0.063** (2.036)
Tertiary education	0.446*** (7.128)	0.444*** (7.075)	0.452*** (7.199)	0.447*** (7.130)	0.276*** (7.929)	0.275*** (7.864)	0.280*** (8.005)	0.276*** (7.925)
Religious denomination F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country - Ethnic F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Threshold1	(-7.100)***	(-7.031)***	(-6.556)***	(-6.361)***	*** (-7.368)	*** (-7.222)	*** (-6.738)	*** (-6.514)
Threshold2	(1.467)	(1.539)	(1.993)**	(2.167)**	(1.828)	(1.981)	(2.434)	(2.629)
Threshold3	(9.659)***	(9.725)***	(10.198)***	(10.387)***	(10.663)	(10.817)	(11.286)	(11.489)
Number of observations	82806	82806	82806	82806	82806	82806	82806	82806

Notes: This table reports the individual-level results from the World Values Survey using ordered logistic regression in columns (1) to (4) and ordered probit regression in columns (5) to (8). The coefficient values correspond to standardized beta coefficients. The standard errors are clustered at the region level, and figures in the parenthesis indicate t-statistics. *, ** and *** denote significance at the 10, 5 and 1 percent levels, respectively.

Chapter 2: The Strength of Family Ties and Financial Inclusiveness

2.1 Introduction

Financial inclusion, or the access and usage of formal financial services, has been widely linked to economic development and alleviation of poverty (Beck, Demirgüç-Kunt, and Martinez Peria, 2005; Guiso, Sapienza and Zingales, 2004). While the current literature has focused largely on institutional and economic factors such as legal rights, explicit costs and proximity as key drivers of financial inclusion (Allen, Demirgüç-Kunt, Klapper and Martinez Peria, 2016), we understand little about the effect of social bonds in driving its processes. In this paper, we focus on the usage portion of financial inclusion and explore the role of family ties in explaining the extent of the adoption and usage of financial services. While the wider usage of banking services is a policy objective for many governments worldwide, increasing income levels and access to finance may not necessarily translate into sustained increase in usage of financial services across all segments of the population. We aim to contribute to the understanding of what may encourage the use or disuse of financial services.

We argue that in today's context, the intention to use banking services should be explored relative to alternative forms of informal services. Besides formal finance, informal forms of finance have also been found to play an important role in providing credit to households and firms at the lower end of the spectrum or in developing countries (Allen, Qian and Qian, 2005, Ayyagari, Demirgüç-Kunt and Maksimovic, 2010). In practice, much of informal finance appears in the form of relationship-based financing, relying heavily on family and social bonds in the provision of credit to firms and households. And we postulate that

cultural traits pertaining to family structure and values can be vertically transmitted across generations and can influence the motivation and the intent of individuals to use the services provided by formal financial institutions.

Existing theoretical research suggests that strong family networks may reduce the demand of formal financial services by increasing the relative costs of providing and consuming them compared to informal finance. This can come about in a few ways. First, strong family ties may make it less costly to provide credit informally by facilitating risk sharing amongst members of the family. A strong family network can reduce agency problems associated with credit provision and can allow effective monitoring and enforcement of repayments even without the use of strict banking protocols (Allen, Qian and Xie, 2018; Lee and Persson, 2016). Kinship bonds may also be valued as social collateral in informal financial dealings and strong kinship networks may reduce opportunities for cooperation outside the family network and erode trust in the financial systems. Furthermore, strong family networks may allow individuals to smooth their consumption in the event of idiosyncratic income shocks by facilitating and encouraging resource pooling and transfers (Angelucci, De Giorgi and Rasul, 2017; Karaivanov and Townsend, 2014), and this may also reduce the demand for formal financial services.

In our study, we hypothesize that stronger family ties should dampen the use of formal finance. To test this, we begin by analyzing the effect of family ties on various measures of the usage of financial services across countries. We derive measures of the strength of family ties using aggregated data from the World Values Surveys (WVS) and financial usage measures from the Global Financial Inclusion Database. We control for measures of financial development in our analyses and demonstrate that the effect of family ties on the usage of financial services remains significant. We also explore their relationship at the individual level,

where we derive our financial usage data from the 2015 Federal Deposit Insurance Corporation (FDIC) Survey of Unbanked and Underbanked Households in the US.

A fundamental challenge to our empirical identification is that the strength of family ties is likely to be endogenous with respect to the usage of financial services, as unobserved factors may simultaneously correlate with both the strength of family ties and financial usage. For instance, those who own and use financial accounts regularly may be located far away from their family members due to work commitments, while areas with frequent usage of formal financial services may be associated with greater financial independence and a lower inclination to turn to the family for assistance. This consideration suggests a downward bias in our OLS estimates which may reduce the validity of our findings. We adopt a few strategies to deal with such concerns in our study.

At the cross-country level, we demonstrate that our results are robust to omitted variable bias using a technique advanced by Altonji, Elder and Taber (2005) and further developed by Oster (2014). This approach assesses the relative stability of the estimated coefficients against changes in the values of R-squared as control variables are added to the models. To identify exogenous variation in the strength of family ties, we also use wheat suitability as an instrument, as measured by the share of arable land that is suitable for wheat cultivation. This is motivated by the recent work of Ang and Fredriksson (2017), who document a negative relationship between wheat cultivation and the strength of family ties. For the U.S. analysis using individual-level data, we adopt an identification approach similar to that of Alesina and Giuliano (2010, 2011) and Ongena and Popov (2016). Specifically, using data from the first- and second-generation immigrants in the US, we assign individuals with a country-level measure of family ties that is linked to their respective countries of ancestry, and we analyze its effect on the usage of formal financial services. This enables us to observe second-

generation immigrants from various cultural backgrounds who grew up experiencing the same institutional environment and allows us to distinguish the cultural effects from other institutional and economic effects of our study.

This paper contributes to a strand of literature linking the power of the family to economic outcomes. The family unit has long been regarded as a fundamental aspect of societies. Notable scholars like Weber (1930) and Banfield (1958) have argued that cultures with very family-oriented values can lead to a reduction in trust and cooperation within the society and create an ethos of amoral familism. They argue that such values and practices have a detrimental effect on economic development. More recently, a growing number of studies have also provided evidence on the impact of family structures. In particular, cultures associated with stronger family ties are found to dampen political participation and civic engagement (Alesina and Giuliano, 2011), encourage more rigid labor market regulations and less favorable employment outcomes (Alesina, Algan, Cahuc and Giuliano, 2015; Alesina and Giuliano, 2010), and also discourage the establishment of corporation-based institutions (Grief, 2006; Greif and Tabellini, 2017). At the broader level, this paper also contributes to a large body of work documenting the effects of cultural factors on economic outcomes (see Alesina and Giuliano (2015) and Nunn (2012) for an overview).

The rest of the paper proceeds as follows. In section 2.2, we begin by summarizing the theoretical underpinnings linking family ties to the usage of financial services. We describe the construction and sources of the primary variables in section 2.3. Sections 2.4 and 2.5 discuss the empirical specifications and the results from our cross-country and individual-level estimates, respectively. Section 2.6 concludes. A full list of the variables used in our estimation and their definitions is included in the appendix.

2.2 Conceptual link between family ties and financial inclusiveness

The effects of cultural characteristics on economic outcomes have been shown to persist over a long period of time (Giuliano & Nunn, 2017; Guiso, Sapienza, & Zingales, 2016; Spolaore & Wacziarg, 2013). Here, we look at how social ties can reduce the intention to use products and services provided by financial institutions. We argue that this intention to adopt and use formal financial services should be assessed relative to alternative services, or lack thereof, and the strength of family ties may affect this in a few ways.

First, we look at the effect of family ties on the costs of operating and providing formal financial services relative to informal financing. Strong social ties can facilitate informal financing by providing investors with information, monitoring advantages and allowing creditors to overcome problems associated with asymmetric information that is common in financial systems, making them more cost-effective to operate. As compared with formal banking channels, informal financing often operates on a localized scale and involves less administration. We argue that in societies with strong family ties, informal or relationship-based creditors can also take advantage of information-sharing within the kinship network. Such creditors are also likely to be better informed about the personal circumstances of the borrower and local conditions, which enables them to enforce state-contingent contracts and more effective peer enforcement for potential loan repayments (Stiglitz, 1990).

Second, strong family ties can increase the perceived costs and availability of formal financial services by borrowers. In the case of informal financing, social liabilities can mitigate moral hazard by exerting a social cost in the case of a default. Individuals are also more likely to pool risks with fellow members of their network (Feigenberg, Field and Pande, 2013) and

borrowers of formal finance often make use of such social capital as “collateral” in their financial dealings. These social collaterals may stem from existing kinship ties and are typically indicative of the value of the social relationship between the creditor and the borrower. Furthermore, members of a close-knit family may exhibit altruistic tendencies in their lending behavior and are more likely to allow fellow members easier access to funds (Lee and Persson, 2016). Hence, we argue that in a society with strong family ties and correspondingly high social capital, informal loans are likely to be perceived as having favorable terms and may be more readily available as compared with attaining credit through formal avenues.

Third, we argue that resource pooling amongst family members is more prevalent in societies with strong family ties. Resource transfers within family networks allow members to smooth consumption, especially in the face of negative income shocks. Furthermore, resource pooling by extended family networks can help members overcome their individual credit constraints and facilitate higher potential returns for the members (Angelucci et al., 2017). Unlike those with a weaker kin network, individuals in such societies are thus likely to have less incentives to resort to formal financial services.

Lastly, people who experience strong kinship networks may also have less trust towards formal financial systems (Weber, 1930; Banfield, 1958). Those with strong family ties may have lower capacities to interact with people outside of the family network. This may lead to greater uncertainty towards the outside world and skepticism towards the motives of financial service providers. Furthermore, those who experience stronger social ties may have a perception that complaints or issues related to recourse are inconvenient and costly as compared to informal financing, where issues are commonly dealt through direct interactions within the social networks.

2.3 Data

We describe the main variables used in this study and their sources in this section. First, we present the derivation of our explanatory variables – measures of the strength of family ties across countries. Next, we discuss our dependent variables in the two layers of our analyses – across countries and across individuals in the US. Descriptive statistics are reported in Tables 2.A.2 and 2.A.3 in the appendix.

To measure the strength of family ties across a large sample of countries, we follow an approach commonly adopted in the literature (see, e.g., Alesina and Giuliano, 2010, 2011, 2015; Ang and Fredriksson, 2017). This approach utilizes several proxies that are constructed from the WVS as measures of the strength of family ties. The WVS is a series of surveys across 90 countries with nationally representative samples consisting of at least 1000 respondents with a minimum age of 18 in each country. The questionnaires contain information on the respondents' personal values and beliefs as well as their demographics and are collected over 6 waves, from 1981 to 2014.

To measure family ties, we consider the responses to the following 3 survey questions. These are: 1) an assessment on the importance of family in their lives (reported on a scale from 1 to 4), 2) whether the respondent agrees with either statement (or neither): i) “one does not have the duty to respect and love parents who have not earned it” versus ii) “regardless of what the qualities and faults of one’s parents are, one must always love and respect them”, and the final question 3) whether the respondent agrees with either statement (or neither): i) “parents have a life of their own and should not be asked to sacrifice their own well-being for the sake of their children” versus ii) “it is the parents’ duty to do their best for their children even at the expense of their own well-being.”. The responses are rescaled to a figure between 0 and 1 with

a larger number indicating stronger family ties. We take the average value of these figures across the sample of each country throughout all available waves to derive the measures at the country level. We label these variables as: *F1: importance of family*, *F2: love and respect for parents*, and *F3: parental duties*, respectively. We standardize and extract the first principal component of the original variables to derive our overall measure, the *FT* variable.

Figure 2.1: Strength of family ties and prevalence of financial accounts – Distribution map

Notes: Maps showing the country-level distribution of family ties and the usage of formal financial services. The first map depicts the distribution the usage of formal financial services in 2014, using data from the Global Findex. The second map depicts the distribution of the strength of family ties between 1981 to 2014, using aggregated data from the World Values Survey – the *FT* variable. Larger values correspond to darker shades and denote stronger family ties and higher usage of formal financial services respectively.

The dependent variables in our cross-country analyses are derived from the World Bank’s Global Financial Inclusion (Global Findex) database. The data are collected from surveys over 148 countries and cover the adoption and usage of formal and informal financial

services in 2014. For this paper, we consider 5 different indicators for the adoption and usage of financial services. Our main indicator (*financial account*) is a measure of the prevalence of financial accounts within a particular country and is defined as the percentage of the population sample with “an account at a bank, credit union, cooperative, post office, or microfinance institution”. To measure the usage of services provided by financial institutions, we also include the following measures – *saved money*: the percentage of the population sample who has made a deposit with using a financial account in the past year and *borrowed money*: the percentage of the population sample who has borrowed money from a financial institution in the past year. Lastly, we look at possible sources of finance using the following variables – *emergency source of funds: savings*: the percentage who has turned to savings as the main source of funds in an emergency and *emergency source of funds: friends and families*: the percentage who has turned to friends and family as the main source of funds in an emergency. While the first three measures capture the usage of formal financial services, our last variable, *emergency source of funds: friends and family*, measures the usage of informal financial services. Consequently, we expect a positive association between the strength of family ties and the last measure.

Next, we turn to the US data for our individual-level analysis. We focus on the US for two reasons. First, that our identification strategy involves a selection of second-generation immigrants and the heterogeneity of the immigration population in the US allows us to use a more balanced sample in the estimation. The US has been home to the largest number of international migrants over the past few decades (United Nations, DESA-Population Division and UNICEF, 2014). The recent growth of foreign-born population has also been fueled by the influx of immigrants from various resource-poor countries, which has led to a relatively diverse mix of cultures and ethnicities. Second, focusing on the US allows us to control for a range of

historical, legal and institutional which vary substantially across countries. It would also be interesting to see if the results also hold for a country that enjoys one of the most sophisticated financial systems in the world.

Here, we utilize data from the 2015 Federal Deposit Insurance Corporation (FDIC) Survey of Unbanked and Underbanked Households. This is a supplement to the Current Population Survey (CPS) in the US and comprises a large and nationally representative sample with detailed information on households' banking status and demographics. It also includes data on the country of origin of each respondent and that of his or her parents.

In our analyses, we employ three main measures of the adoption and usage of formal financial services. These are 1) *financial account*: whether the respondents or anyone in their households own a saving or checking account, 2) *pays bills with check*: whether the respondent uses check as the most common method for paying bills in the past 12 months, and 3) *save in bank*: whether the respondent kept their savings in a bank in the past 12 months. Unlike the cross-country analyses, we exclude the usage of financial services for borrowing purposes as a dependent variable because the predominant form of loans amongst US households is mortgage financing, an area that has been heavily dominated by formal financial institutions. Instead, we try to capture the functional need for payment transfers using the variable *pays bills with check*.

2.4 Evidence from cross-country data

2.4.1 Estimation equation and baseline estimates

We first analyze the relationship between the strength of family ties and measures of the usage of formal financial services at the country level, and estimate the following equation:

$$fin_i = \beta_0 + \beta_1 family\ ties_i + X_i' \beta_2 + \lambda_{sc} + \varepsilon_i \quad (2.1)$$

where fin_i represents each of the country-level measures of the usage of services provided by financial services. $Family\ ties_i$ refers to one of our four variables that measures the strength of family ties within the country: $F1$, $F2$, $F3$ and FT (the latter is the first principal component of $F1$, $F2$, $F3$). X_i is a set of country-level geographical controls, which may affect the country's accessibility and climate and influence its development conditions. They include the average level of rainfall, mean elevation, terrain ruggedness, distance to coast and agricultural suitability. λ_{sc} is a dummy variable denoting the subcontinental region to which the country belongs. ε_i is the country-specific error term. Our coefficients of interest (both here and in subsequent equation) are β_1 , unless otherwise stated.

Table 2.1 reports the results for the four measures of family ties using the percentage of financial account holders within the country as the dependent variable. In our analyses, we focus primarily on the ownership of accounts. This is because account ownerships are typically associated with savings and monetary transactions and these purposes tend to be more widely demanded and comparable across countries (Allen et al., 2016). Columns 1 to 4 present the estimates from bivariate regressions of each explanatory variable (the importance of family ($F1$), the extent of love and respect for parents ($F2$), the importance of parental duties to their offspring ($F3$), the first principal component of $F1$, $F2$, $F3$ (FT)) on the dependent variable with no control variables. We include the full set of controls in columns 5 to 8. The estimates are presented as beta coefficients to allow economically meaningful comparisons of the results.

The OLS estimates are consistent with our hypothesis that strong family ties are associated with a lower adoption of formal finance. The coefficient estimates are negative and statistically significant at least at the 5% percent level for all specifications, which suggests a negative link between the strength of family ties and the prevalence of financial accounts across countries. The magnitudes of the coefficients of interest are also sizable as compared with that

of the other variables in the models – a one standard deviation increase in the strength of family ties is associated with 0.2 to 0.55 standard deviations fall in the percentage of those with financial accounts in our fully specified models. The larger magnitudes of the coefficients of *F2* and *F3* suggest that close parental ties are more strongly associated with lower adoption of financial accounts, perhaps by fostering social interaction and the pooling of risks and resources within the family. Figure 2.2 illustrates the partial link between the different measures of family ties and the prevalence of financial accounts across countries, corresponding to column 5 to 8 of Table 2.1.

Table 2.1 – Family ties and prevalence of financial accounts (OLS estimates)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	<i>Dependent variable: Financial account</i>							
F1: importance of family	-0.328*** (-3.756)				-0.201** (-2.121)			
F2: love and respect for parents		-0.697*** (-8.105)				-0.549*** (-4.891)		
F3: parental duties			-0.439*** (-4.826)				-0.418*** (-3.008)	
FT (1 st PC of F1, F2, F3)				-0.563*** (-6.726)				-0.418*** (-4.976)
Landlocked					-0.199 (-1.506)	-0.199* (-1.817)	-0.198 (-1.416)	-0.221* (-1.845)
Precipitation					-0.001 (-0.012)	-0.038 (-0.298)	-0.045 (-0.350)	0.074 (0.650)
Distance to coast					-0.206 (-1.448)	-0.063 (-0.465)	-0.289* (-1.789)	-0.152 (-1.070)
Elevation					-0.007 (-0.061)	0.004 (0.033)	-0.043 (-0.251)	-0.019 (-0.167)
Agricultural suitability					-0.228** (-2.378)	-0.046 (-0.387)	-0.364*** (-3.219)	-0.177** (-2.022)
Terrain ruggedness					-0.082 (-0.873)	-0.054 (-0.466)	-0.024 (-0.196)	-0.104 (-1.374)
Subcontinental region F.E.	No	No	No	No	Yes	Yes	Yes	Yes
R-squared	0.107	0.486	0.193	0.317	0.538	0.625	0.546	0.626
Number of observations	80	60	60	80	80	60	60	80
δ for $\beta = 0$ (Oster's coefficient stability test)					2.41	1.09	2.16	1.70

Notes: This table reports the cross-country OLS results of the prevalence of having financial accounts on measures of the strength of family ties. The prevalence of having financial accounts is measured by the percentage of those with a banking account within the country. The coefficient values correspond to standardized beta coefficients and figures in the parenthesis indicate t-statistics. *, ** and *** denote significance at the 10, 5 and 1 percent levels respectively.

Intuitively, as we compare our bivariate specifications with the specifications containing the full set of controls, we observe relatively small changes in the coefficient estimates even as the values of R-squared increase drastically. This suggests that we are adequately controlling for the drivers of financial inclusion in our models. To provide a more rigorous check on the robustness of the results to potential omitted variable bias, we adopt the coefficient stability test from Oster (2017). Here, we consider an upper bound of R_{max} to be 1.3 times the value of the R-squared on our model with the full set of controls. In her study, Oster (2017) derives this cutoff value from an analysis of randomized papers published in the 5 top Economics journals between 2008 and 2013, and this value represents an upper bound that validates 90 percent of the results in these papers. Then, we calculate the corresponding δ value which represents the ratio of how important the unobservables will have to be, relative to the observables, to eliminate the effect of our explanatory variable. The values of δ in our models are calculated to be greater than 1 in all but one (the benchmark value suggested in Oster (2017)), and this implies that unobservables are likely to have a limited effect in driving the significance of our results.

2.4.2 Robustness checks

2.4.2.1 Using alternative dependent variables

In Table 2.2, we consider the effect of the strength of family ties on other measures of the usage of formal financial services and sources of finance across countries. In columns 1 and 2, our dependent variables are the percentage of the population who have saved money in a financial institution in the past year and the percentage of those who have borrowed money from a financial institution, respectively. We examine the extent to which the population turn to their own savings or their friends and family for help in columns 3 and 4, respectively. Hence,

column 4 captures the extent to which the strength of family ties is linked to the usage of informal financing. We only use the *FT* variable in our robustness checks to conserve space.

Figure 2.2: Strength of family ties and prevalence of financial accounts – Added variable plots

Notes: The plots depict the conditional relationship between the various measures of the strength of family ties and the prevalence of financial accounts measured at the country-level. They include added-variable plots with partial regression lines corresponding to columns 5 to 8 of Table 2.1.

Here, we find that the strength of family ties is negatively associated with the percentage of those who have saved or borrowed money from financial institutions. The estimated coefficient for the saving model is statistically significant at least at 1 percent, while that of the borrowing model is significant at the 10% level. The magnitude of the coefficient associated with saving is also similar in magnitude to our baseline specification in column 8 of

Table 2.1, both of which are much larger as compared to that from the borrowing model. This suggests that although the adoption and usage of formal financial services is negatively linked with the strength of family ties, the effect is less apparent on borrowing behavior. Moreover, there is significantly negative correlation between family ties and the percentage of those who primarily turn to savings, and a significantly positive link to the percentage of those who primarily turn to friends and family. These findings are largely consistent with our premise that stronger family ties may be associated with an inclination towards more informal sources of finance, and away from formal sources of finance.

Table 2.2 – Robustness checks – Using alternative dependent variables

	(1) Saved money in financial institution	(2) Borrowed money from financial institution	(3) Emergency source of funds: savings	(4) Emergency source of funds: Friends and family
FT (1 st PC of F1, F2, F3)	-0.448*** (-4.637)	-0.204* (-1.685)	-0.428*** (-3.445)	0.348*** (3.006)
Landlocked	-0.071 (-0.747)	-0.068 (-0.600)	-0.083 (-0.660)	0.160 (1.269)
Precipitation	0.102 (1.096)	0.132 (1.025)	0.024 (0.203)	-0.014 (-0.109)
Distance to coast	-0.251** (-2.180)	-0.194 (-1.036)	-0.218** (-2.072)	0.132 (1.168)
Elevation	-0.084 (-0.816)	0.048 (0.308)	-0.056 (-0.480)	0.123 (1.078)
Agricultural suitability	-0.353*** (-3.195)	-0.131 (-0.893)	-0.310*** (-2.895)	0.244** (2.139)
Terrain ruggedness	-0.022 (-0.302)	-0.023 (-0.243)	-0.030 (-0.339)	0.073 (0.720)
Subcontinental region F.E.	Yes	Yes	Yes	Yes
R-squared	0.635	0.389	0.530	0.443
Number of observations	80	80	80	80
δ for $\beta = 0$ (Oster's coefficient stability test)	2.05	1.94	1.68	2.36

Notes: This table reports the cross-country OLS results of the usage and sources of finance on the strength of family ties. These other measures are 1) the percentage of those who have saved money into a financial institution, 2) the percentage of those who have borrowed from a financial institution, the percentage of those who turn to 3) their savings, and 4) friends and family during a financial emergency.

The coefficient values correspond to standardized beta coefficients and figures in the parenthesis indicate t-statistics. *, ** and *** denote significance at the 10, 5 and 1 percent levels respectively.

2.4.2.2 Controlling for other effects

In Table 2.3, we conduct further checks by controlling for the effects of other factors and using an instrumental variable. As with our earlier models, we include geographical controls and subcontinental region fixed effects in all specifications and consider the prevalence of financial accounts as the dependent variable.

First, we account for a series of other factors which may be linked with unobserved drivers of financial inclusion in columns 1 to 7. In columns 1 to 3, we control for the financial sector development of the country by including the ratio of the country's private credit by deposit banks to its GDP, the number of ATMs per 100,000 adults and the number of commercial bank branches per 100,000 adults, respectively. This allows us to check that the effects on adoption of financial services are not merely driven by the extent of financial sector depth and financial breadth. In columns 4 and 5, we account for the country's real GDP per capita (log) and years of schooling, respectively. This ensures that our results are unlikely to be confounded by income and educational factors. Finally, religion factors and overall trust levels have been found to drive financial development. Since the reliance of family networks may also deter members from trusting people outside of the family and influence the choice of religion adherence, we control for several dominant religions in column 6, overall trust levels and religiosity in columns 7 and 8 respectively. We also control for perceptions of corruption in column 9. Our results are robust to the inclusion of these additional controls, with the estimated coefficients being significant at 1% for all models.

In columns 10 and 11, we estimate the effects of the strength of family ties using an instrumental variable technique. One concern with the evidence presented thus far is that the strength of family ties may not be exogenous with respect to the adoption and usage of financial

services. Whether a family is closely knit may be driven by some unobserved factors that are correlated with the error terms in equation (1). For instance, more affluent individuals who own and use financial accounts regularly may be more likely to live further away or interact less with their family members due to work commitments. Regions with high usage of formal financial services may also see greater financial independence, and such communities may be less prone to turn to family for assistance. These arguments may undermine our inferences as they suggest a downward bias in our estimates. To control for the endogenous determination of family ties, we employ the wheat suitability ratio – defined as the proportion of arable land that is suitable for wheat cultivation – as the instrument. Our identifying assumption is that the geographic dispersion of agricultural suitability of wheat is unrelated to the adoption of financial services apart from its effect through the strength of family ties.

Following Ang and Fredriksson (2017), we argue that places that are historically more suited to cultivating wheat, as opposed to other common crops, are likely to develop weaker family ties. Traditionally, wheat has a shorter growing season as compared with other common crops in the Old World. Wheat was commonly cultivated by women, while men were responsible for cattle-care and could be away from their families for periods of time. Ang and Fredriksson (2017) argue that this meant that families had less need for constant cooperation and were less inter-dependent in places where wheat was predominantly grown, which subsequently shaped family values and culture. They empirically document that the negative effect of wheat suitability on the strength of family ties persists even after the communities had become urbanized and progressed beyond their agricultural roots.

In column 8, the second-stage estimates indicate that the strength of family ties has a negative effect on the adoption of financial services, with the estimated coefficient being significant at least at the 5% level. The corresponding first-stage estimates in column 9 confirm

that wheat suitability is negatively linked to the strength of family ties. This is in line with our hypothesis that regions that were historically most suited to wheat cultivation developed a culture with less interdependence within its families. Wheat suitability is also a reasonably strong IV for family ties in our model, with the corresponding first stage F-statistic taking on a value comfortably larger than the commonly accepted benchmark of 10.

Table 2.3 – Robustness checks – Other effects and IV

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	<i>Dependent variable: Financial Account</i>									<i>IV: 2nd stage</i>	<i>IV: 1st stage</i>
FT (1 st PC of F1, F2, F3)	-0.333*** (-4.802)	-0.354*** (-4.834)	-0.450*** (-6.039)	-0.206*** (-3.255)	-0.383*** (-4.089)	-0.295*** (-2.753)	-0.340*** (-3.791)	-0.313*** (-3.490)	-0.220*** (-3.059)	-0.356** (-2.273)	
Private credit by deposit-taking banks to GDP											
ATMs per 100,000 adults		0.487*** (4.236)									
Bank branches per 100,000 adults			0.321*** (3.874)								
Real GDP per capita (log)				0.876*** (14.666)							
Years of schooling					0.370*** (3.323)						
Catholic						0.295** (2.016)					
Muslim						-0.080 (-0.593)					
Protestant						0.219** (2.389)					
Trust							0.166 (1.478)				
Religiosity								-0.305*** (-2.709)			
Corruption									0.546*** (6.130)		
Wheat											-0.539*** (-3.852)
Baseline controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Subcontinental region F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R ²	0.758	0.738	0.698	0.865	0.681	0.683	0.685	0.665	0.744	0.623	0.463
No. of observations	79	78	77	79	71	80	66	80	66	80	80
δ for $\beta = 0$ (Oster's coefficient stability test)	1.36	1.55	2.09	1.51	1.37	0.96	1.18	1.11	0.79		
1st-stage F-statistic											14.838
Anderson-Rubin Wald test (Chi-sq.)											4.44 (p=0.035)
Stock-Wright LM S statistic											7.34 (p=0.00)

Notes: This table reports the results from our robustness analyses. The dependent variable measures the prevalence of financial accounts within each country. We control for measures of the depth and breadth of the financial system, income, education, religion, trust, religiosity and corruption in columns 1 to 9. In columns 10 and 11, we conduct an IV analysis with the *FT* variable instrumented using the average wheat suitability.

The coefficient values correspond to standardized beta coefficients. The standard errors are clustered at the region level, and figures in the parenthesis indicate t-statistics. *, ** and *** denote significance at the 10, 5 and 1 percent levels, respectively.

2.5 Evidence from US survey data

2.5.1 Estimation equation and baseline estimates

In this section, we explore the link between family ties and the usage and prevalence of formal financial services within the United States. Using a sample of primarily second-generation immigrants within the US, we utilize the variation in the strength of family ties linked to their country of ancestry to identify its impact on the usage of financial services. Since second-generation immigrants have never lived in their country of ancestry and are likely to have experienced the same institutions, this approach allows us to ascribe any ancestry-level variations in the usage of formal financial services to cultural factors that are transmitted from one generation to the next, instead of other economic and institutional differences.

Our estimating equation is specified as follows:

$$Fin_{i,a} = \beta_0 + \beta_1 family\ ties_a + X_i' \beta_2 + \lambda_a + \delta_c + \varepsilon_{i,a} \quad (2.2)$$

where $Fin_{i,a}$ represents each of the individual-level measures of the usage of formal financial services – whether the individual owns a financial account, 2) whether the individual has paid his or her bills mostly using a check in the past year, 3) whether the individual has saved money in a financial institution over the past year. These are binary survey responses from individual i with country of ancestry a . $Family\ ties_a$ refers to the overall measure of the strength of family ties within the country of ancestry as derived in the previous segment: FT (the first principal component of $F1$, $F2$, $F3$). X_i is a set of individual-level controls. These include the individual's age, age squared, gender, employment status, education and income levels. λ_a and δ_c are dummy variables denoting the individual's country of ancestry and the county that the

individual resides in. $\varepsilon_{i,a}$ is the error term. We estimate the following using a linear probability model, as a significant number of observations are omitted when our fixed effects are included in a logistic model. For the second-generation immigrants, we consider the individual's country of ancestry primarily as the country that his or her mother was born in, in line with studies indicating a stronger transmission of home cultures from adult females as compared to adult males (Casey and Dustmann, 2010; Phinney, Horenczyk, Liebkind and Vedder, 2001). However, we check that the results hold if we use fathers' countries of ancestry in our robustness analysis.

Table 2.4 – Ancestral family ties and the usage of financial services within the US

	<i>Second-generation immigrants</i>			<i>First-generation immigrants</i>		
	(1)	(2)	(3)	(4)	(5)	(6)
	Financial account	Pay bills with check	Save in bank	Financial account	Pay bills with check	Save in bank
FT – mother	-0.328** (-2.175)	-0.800*** (-7.916)	-0.441*** (-4.087)			
FT				-0.106** (-2.061)	-0.453*** (-3.184)	-0.197** (-2.500)
Age	-0.316*** (-3.093)	0.007 (0.071)	-0.370** (-2.526)	-0.104* (-1.654)	-0.052 (-0.741)	-0.075 (-0.731)
Age-squared	0.440*** (4.407)	0.181* (1.787)	0.380*** (2.584)	0.213*** (3.400)	0.189*** (2.669)	0.151 (1.473)
Female	0.008 (0.604)	-0.018 (-1.173)	0.023 (1.091)	0.028** (2.620)	0.007 (0.548)	0.024 (1.313)
Employed	0.059*** (3.309)	-0.041** (-2.202)	0.066* (2.416)	0.042*** (3.269)	0.028* (1.938)	0.049** (2.271)
Education – below high school	-0.159*** (-6.897)	-0.012 (-0.605)	-0.057** (-2.076)	-0.168*** (-11.253)	-0.032** (-1.984)	-0.048* (-1.939)
Education – high school	-0.037** (-2.530)	-0.002 (-0.111)	-0.038 (-1.579)	-0.023** (-2.170)	0.001 (0.070)	0.001 (0.029)
Low income	-0.261*** (-13.941)	-0.064*** (-3.004)	-0.123*** (-4.071)	-0.200*** (-15.473)	0.035* (1.873)	-0.111*** (-4.573)
Middle income	-0.009 (-1.029)	-0.015 (-0.749)	0.025 (1.035)	-0.003 (-0.361)	0.099*** (5.638)	0.017 (0.839)
Country of ancestry F.E. (mother)	Yes	Yes	Yes			
Country of ancestry F.E.				Yes	Yes	Yes
County F.E.	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.172	0.115	0.111	0.209	0.094	0.121
Number of observations	4648	4022	2320	7625	6146	3178

Notes: This table reports the individual-level OLS results of measures of the usage of formal financial services on the strength of family ties within the US. These measures are 1) whether the individual has an account with a financial institution, 2) whether the individual pays bills primarily using checks, 3) whether the individual has saved in a bank. The strength of family ties is measured at the country of ancestry level and represents the overall measure of the strength of family ties as derived in the cross-country analyses.

Table 2.4 reports our baseline results. Columns 1 to 3 presents our estimates from a sample of second-generation immigrants, and we also examine estimates from a sample of first-generation immigrants in columns 4 to 6. Our independent variable is the overall measure of the strength of family ties from the birth country of the respondents' mothers in columns 1 to 3, and that of the birth country of the respondent in columns 4 to 6. We analyze the impact on whether the respondent had owned any financial account, whether the respondent had mostly paid bills using a check and whether the respondent had saved money in a bank, all within the 12 months prior to the interview. We include the full set of individual controls, country of ancestry fixed effects and county fixed effects in our models.

Throughout the specifications, our coefficients of interest take on negative values with a significance of at least 5% level. This implies that individuals linked to countries with stronger family ties are less likely to participate in formal financial transactions. When we compare the effects of family ties across the first and second-generation migrants, the magnitudes of the coefficients of interest are substantially larger on the second-generation immigrants. This supports the premise of our identification strategy, that cultural differences that stem from countries of ancestry are likely to be more significant in driving variation in the outcomes for the second-generation immigrants. The larger magnitude also indicates that intergenerational transmission of family ties is likely amongst the second-generation immigrants, while other factors linked to the economies or institutions are likely to have played a larger role in the case of the first-generation immigrants.

2.5.2 Robustness checks

First, we exclude individuals with one parent from the US and those with Mexico as their country of ancestry to check if our results are robust to sample selection. Native Mexicans

make up the largest immigrant group and excluding these individuals allows us to achieve a more balanced sample. These estimates are reported in Table 2.5. We also compare our estimates using both mothers' and fathers' countries of ancestry. The results remain largely consistent with earlier findings and the effects of using the countries of ancestry of either parent are relatively similar both in the significance and the magnitudes of the estimated coefficients. The effects of family ties on the prevalence of financial account and whether the individual paid bills by mostly using checks are significant at the 1% level. However, the estimates are no longer significant when we consider the specification with the prevalence of saving in a bank as the dependent variable.

Table 2.5 – Individual-level US estimates – robustness to sample selection

	<i>Mother's country of ancestry</i>			<i>Father's country of ancestry</i>		
	(1) Financial account	(2) Pay bills with check	(3) Save in bank	(4) Financial account	(5) Pay bills with check	(6) Save in bank
FT – mother	-0.374*** (-3.180)	-0.678*** (-6.878)	-0.093 (-0.818)			
FT - father				-0.219*** (-2.997)	-0.600*** (-8.413)	-0.142 (-1.362)
Age	-0.395** (-2.036)	0.124 (0.764)	-0.305 (-1.432)	-0.270 (-1.481)	-0.003 (-0.016)	-0.278 (-1.174)
Age-squared	0.474** (2.493)	0.070 (0.441)	0.281 (1.267)	0.373** (2.011)	0.170 (1.008)	0.311 (1.289)
Female	-0.014 (-0.657)	-0.014 (-0.590)	0.027 (0.837)	-0.018 (-0.860)	-0.008 (-0.356)	0.011 (0.327)
Employed	0.059** (2.079)	-0.073** (-2.518)	0.103** (2.443)	0.044 (1.641)	-0.007 (-0.229)	0.020 (0.478)
Education – below high school	-0.114*** (-2.892)	-0.002 (-0.054)	0.041 (1.364)	-0.128*** (-3.454)	0.021 (0.770)	-0.068* (-1.735)
Education – high school	-0.026 (-1.058)	0.016 (0.657)	0.019 (0.527)	-0.025 (-0.987)	0.014 (0.564)	-0.053 (-1.471)
Low income	-0.194*** (-5.939)	-0.010 (-0.332)	-0.031 (-0.727)	-0.193*** (-6.131)	-0.003 (-0.087)	-0.089** (-1.982)
Middle income	0.004 (0.251)	-0.007 (-0.232)	0.019 (0.524)	-0.003 (-0.221)	0.017 (0.579)	0.042 (1.158)
Country of ancestry F.E. (mother)	Yes	Yes	Yes			
Country of ancestry F.E. (father)				Yes	Yes	Yes
County F.E.	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.136	0.148	0.202	0.155	0.145	0.163
Number of observations	2083	1829	1061	2182	1909	1091

Notes: This table reports the individual-level OLS results of measures of the usage of financial services on the strength of family ties within the US. We remove observations with the US and Mexico as countries of ancestry and we compare our results of either parents' country of ancestry.

A potential concern with the earlier estimates is that the measure of *FT* could capture some omitted country of ancestry characteristics. In table 2.6, we control for some key observable characteristics of the country of ancestry which may drive the effect on financial inclusion. First, we control for differences in the usage of financial services in the countries of ancestry, as these differences could drive the adoption and usage of formal finance amongst the second-generation immigrants in our sample. We include the country-level measures of the prevalence of financial accounts, the prevalence of borrowing from and the prevalence of

Table 2.6: Individual-level US estimates – controlling for observable characteristics from the country of ancestry

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	<i>Dependent variable: Financial Account</i>							
Family ties – mother	-0.066*** (-2.770)	-0.061*** (-3.247)	-0.052** (-2.339)	-0.042* (-1.878)	-0.055*** (-2.652)	-0.060*** (-2.691)	-0.046** (-2.186)	-0.041* (-1.918)
Financial account penetration	-0.009 (-0.338)							
Prevalence of borrowing		0.022 (1.139)						
Prevalence of saving			0.018 (0.751)					
Private credit by deposit to GDP				0.059** (2.188)				
ATMs per 100,000 adults					0.060*** (2.591)			
Log GDP						0.014 (0.519)		
Years of schooling							0.050* (1.755)	
Trust								0.032 (1.293)
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country of ancestry F.E. (mother)	No	No	No	No	No	No	No	No
County F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.112	0.113	0.112	0.088	0.088	0.086	0.090	0.113
Number of observations	2058	2058	2058	1898	1893	1899	1888	1835

Notes: This table reports the individual-level OLS results of measures of the usage of financial services on the strength of family ties within the US. We control for some key observable characteristics of the country of ancestry. The coefficient values correspond to standardized beta coefficients and figures in the parenthesis indicate t-statistics. *, ** and *** denote significance at the 10, 5 and 1 percent levels respectively.

saving at financial institutions. These are reported in columns 1 to 3. Next, we control for measures of financial breadth and depth in columns 4 and 5. The coefficients are still significant at least at the 10% level and this demonstrates that the observed effect is unlikely to be driven by existing patterns of usage and financial development in the countries of ancestry. Finally, we control for income, education and overall trust level in columns 6 to 8. If countries with weaker family ties are also wealthier, have higher educational achievements as well as higher levels of trust, a greater adoption of formal finance seen amongst the second-generation immigrants from these countries could reflect these differences. We continue to exclude individuals with one US parent and those with Mexico as their country of ancestry. Throughout the specifications, our estimates remain significant, although the magnitude of the estimates has fallen as compared with earlier estimates.

2.6 Conclusion

In this paper, we explore the role of family ties on the usage of formal financial services. We argue that communities and individuals with stronger family ties may be more likely to turn to friends and family or other informal avenues of finance, as opposed to a bank or financial institution. And we provide empirical evidence of a negative link between the strength of family ties and the usage of formal financial services both at the cross-country and individual level.

Here, we use aggregated data from the World Values Survey to derive our family ties measures and financial inclusion data from the Global Findex (at the cross-country level) and 2015 FDIC Survey of Unbanked and Underbanked Households within the US. Across countries, we show that the strength of family ties is an important determinant of the extent of financial inclusion, and our results remain consistent after controlling for income, institutional and other

cultural attributes. To deal with endogeneity concerns, we use wheat suitability as an IV for the strength of family ties at the cross-country level. We also analyze the effects from a sample of second-generation immigrants in the US and find evidence that the strength of family ties negatively affects the extent to which individuals use and adopt formal financial avenues.

Our study sheds light on the understanding of what drives the use or disuse of financial services. The findings suggest that cultural practices and norms play an important role in driving usage patterns of financial services and it is necessary to examine these together with other institutional drivers of financial inclusion. More research needs to be done for us to understand the exact mechanism through which the strength of family ties may affect the usage of formal finance. This is a relevant issue for many policymakers worldwide and knowledge of such market gaps may initiate effective policy options.

2.7 Appendix

Table 2.A.1. Description of variables and data sources

Variable	Description	Source
<i>A. Country level</i>		
F1: importance of family	Aggregated and rescaled score (0-1) based on WVS sample question: How important is family in a person's life? Higher values denote greater importance.	WVS
F2: love and respect for parents	Aggregated and rescaled score (0-1) based on WVS sample question on whether parents should always be loved and respected. Higher values denote greater agreement.	WVS
F3: parental duties	Aggregated and rescaled score (0-1) based on WVS sample question on whether parents should always do their best for their children even at the expense of their own well-being. Higher values denote greater agreement	WVS
FT	First principal component of F1, F2, F3, overall measure of the strength of family ties	WVS
Financial account	Percentage of those with an account at a financial institution (age 15+) – 2014	Global Findex Database (2014)
Saved money	Percentage of those who saved at a financial institution in the past year (age 15+) – 2014	Global Findex Database (2014)
Borrowed money	Percentage of those who borrowed from a financial institution in the past year (age 15+) – 2014	Global Findex Database (2014)
Emergency source of funds: savings	Percentage of those who use their savings as a primary source of funds in an emergency (2014)	Global Findex Database (2014)
Emergency source of funds: Friends and family	Percentage of those who turn to friends and family as a primary source of funds in an emergency (2014)	Global Findex Database (2014)
Catholic	Percentage of Catholics in each country, year 1980	McCleary and Barro (2006)
Protestant	Percentage of Protestants in each country, year 1980	McCleary and Barro (2006)
Muslim	Percentage of Muslims in each country, year 1980	McCleary and Barro (2006)
Distance to coast	Mean distance to coast (km)	G-Econ Database
Landlocked	Dummy variable of 1 if a country is fully enclosed by land, and 0 otherwise	CIA World Fact Book
Precipitation	Average precipitation, average 1980-2008	G-Econ Database
Agricultural suitability	Average agricultural suitability of land based on climatic and soil conditions	Michalopoulos (2012)
Terrain ruggedness	Population-weighted measure of average terrain ruggedness	Nunn and Puga (2012)
Elevation	Elevation in km	G-Econ Database
Log GDP	Log GDP per capita in 2000	World Development Indicators
Years of tertiary education	Average years of tertiary schooling for those age 15 onwards, in the first available year of each wave	Barro and Lee (2013)
Private credit by deposit to GDP	Amount of credit to the private sector by domestic money banks as a share of GDP	IMF

ATMs per 100,000 adults	Automated Teller Machines per 100,000 adults	IMF, Financial Access Survey
Bank branches per 100,000 adults	Commercial bank branches per 100,000 adults	IMF, Financial Access Survey
Trust	Fraction of those who believe that most people can be trusted	WVS
Religiosity	Fraction of those who identify as religious	WVS
Corruption	Estimated score denoting the extent to which public power is exercised for private gain	WGI
Wheat	The share of arable land that is suitable or very suitable for wheat cultivation.	GAEZ (2000)
<i>B. FDIC – individual level within the US</i>		
Financial account	Dummy variable of 1 for individuals who have a saving or checking account and 0 otherwise	FDIC
Pays bills with check	Dummy variable of 1 for individuals who pay their bills mostly using checks in the past 12 months, and 0 otherwise	FDIC
Save in bank	Dummy variable of 1 for individuals who have deposited money in a financial institution in the past 12 months, and 0 otherwise	FDIC
Female	Dummy variable of 1 for female individuals and 0 for male individuals	FDIC
Employed	Individuals with labor force status as employed	FDIC
Age	Age of individual	FDIC
Age-squared	Squared value of age of individual	FDIC
Education – below high school	Dummy variable of 1 for individuals who hold less than a high school diploma, and 0 otherwise	FDIC
Education – high school	Dummy variable of 1 for individuals who hold a high school diploma but without college education, and 0 otherwise	FDIC
Low income	Dummy variable of 1 for households with total family income below US\$ 30,000 in the past year, and 0 otherwise	FDIC
Middle income	Dummy variable of 1 for households with total family income between US\$ 30,000 and US\$ 100,000 in the past year, and 0 otherwise	FDIC
FT (- mother/- father)	Country level <i>FT</i> variable of the county of origin of the individual (or the individual's mother/ father)	WVS
Financial account penetration	Country level <i>financial account</i> variable of the country of origin of the individual's mother	Global Findex (2014)
Prevalence of FI borrowing	Percentage of those who have borrowed from a financial institution in the past year – mother's country of origin	Global Findex (2014)
Prevalence of FI saving	Country level <i>saved money</i> variable of the country of origin of the individual's mother	Global Findex (2014)
Years of schooling	Average years of schooling for those age 15 onwards in the country of origin of the individual's mother	Barro and Lee (2013)
Trust	Country level <i>trust</i> variable of the country of origin of the individual's mother	WVS

Table 2.A.2 – Descriptive statistics (cross-country)

Variable	Obs	Mean	Std.Dev.	Min	Max
Financial account	80	58.24	29.801	6.448	100
Saved money in financial institution	80	24.414	20.113	.861	78.41
Borrowed money from financial institution	80	13.328	7.041	.419	32.516
Emergency source of funds: savings	80	31.746	18.537	4.522	79.742
Emergency source of funds: friends and family	80	42.024	17.081	10.181	77.089
F1: importance of family	80	.905	.062	.681	.986
F2: love and respect for parents	60	.84	.109	.501	.993
F3: parental duties	60	.731	.133	.419	.939
FT (1 st PC of F1, F2, F3)	80	.042	.748	-1.807	1.143
Landlocked	80	.225	.42	0	1
Precipitation	80	79.064	53.662	2.911	233.933
Distance to coast	80	.402	.446	.02	2.206
Elevation	80	176.985	199.223	14.518	1096.503
Agricultural suitability	80	.466	.257	.004	.956
Terrain ruggedness	80	.658	.52	.042	3.178
Private credit by deposit-taking banks to GDP	79	53.954	47.256	4.223	185.486
ATMs per 100,000 adults	78	54.146	50.799	.319	282.494
Bank branches per 100,000 adults	77	20.553	16.916	1.598	89.632
Real GDP per capita (log)	79	8.754	1.179	6.268	10.691
Years of schooling	71	8.073	2.597	1.269	12.706
Catholic	80	29.753	35.837	0	96.9
Muslim	80	24.454	36.513	0	99.5
Protestant	80	11.033	20.626	0	97.8
Trust	66	.256	.155	.056	.693
Wheat	80	.142	.204	0	.771

Table 2.A.3 – Descriptive statistics (individual-level in the US)

Variable	Obs	Mean	Std.Dev.	Min	Max
Financial account	5453	.94	.238	0	1
Pay bills with check	4734	.638	.481	0	1
Save in bank	2705	.878	.327	0	1
FT (mother)	6870	-.014	.625	-2.765	1.143
Age	8062	41.778	21.775	15	85
Age-squared	8062	2219.481	2130.129	225	7225
Female	8062	.516	.5	0	1
Employed	8062	.513	.5	0	1
Education – below high school	8062	.199	.399	0	1
Education – high school	8062	.248	.432	0	1
Low income	8062	.317	.465	0	1
Middle income	8062	.443	.497	0	1
Financial account (mother)	7307	69.175	27.735	6.448	100
Saved money in financial institution (mother)	7307	16.258	6.556	.419	40.513
Borrowed money from financial institution (mother)	7307	34.664	19.869	.861	78.41
Private credit by deposit-taking banks to GDP (mother)	7210	93.052	71.572	4.223	185.486
ATMs per 100,000 adults (mother)	5166	64.756	52.478	.319	206.506
Real GDP per capita (log) (mother)	7210	9.586	1.036	6.168	11.143
Years of schooling (mother)	7248	9.411	2.556	2.286	12.706
Trust (mother)	6485	.289	.124	.035	.693

Chapter 3: Religiosity and Financial Inclusiveness

3.1 Introduction

The use of cultural characteristics to explain economic behavior and events is not a recent occurrence. From Adam Smith who argues that religion and culture play an important role in affecting our value judgments, to Max Weber (1930) who credits the early successes in the development of capitalism to the virtues of the Protestant ethics, notable intellectuals have long weighed in on the various dimensions of culture and how they affect the economic being and society. This paper focuses on one characteristic of culture – the importance and prevalence of religion in people’s lives, or religiosity – and how it affects the extensiveness in the reach of financial systems.

Despite modern society's seemingly unrelenting march towards secularism and scientific logic, the past decades have brought about a marked resurgence in interest towards the notions of religion and religiosity. Religion is an important cultural denominator that has shaped several aspects of societies. And religious differences – both in terms of religious denominations as well as religiosity, are among obvious examples illustrating the effects of cultural influences on economic outcomes. Religious beliefs and the extent to which individuals live in accordance with these beliefs can shape their attitudes, and in turn affect their preferences and behaviors (Guiso, Sapienza and Zingales, 2003). These influences will no doubt extend to perceptions on finance and the economy, and as such, have the potential to sway individual and collective attitudes towards the fundamentals of financial sector developments. Furthermore, the dominance of religious establishments may also affect societal norms and institutional infrastructure, thereby indirectly impacting the development and

efficacy of our formal institutions and policies. This paper aims to uncover aspects of this religiosity-finance nexus from the angle of the usage and lateral outreach of financial services – financial inclusiveness.

Although it is widely established that a well-functioning financial system is an important driver of economic growth, the implications arising from financial market distortions have raised much concern over the distribution of benefits and trade-offs from financial sector expansions. While financial development is most commonly measured using financial depth⁵, these measures may reveal inadequate information regarding the beneficiaries of financial development. An economy in which a small group of wealthy investors is responsible for the bulk of all financial activities may be classified as having a well-developed financial sector but can fall short in terms of its lateral outreach. In such an economy, the benefits of financial progress are likely to be concentrated in a smaller portion of the population as opposed to one with a wider and more inclusive financial sector. A broader financial system is more likely to benefit the poor and other disadvantaged groups (Guiso, Zingales and Sapienza, 2004), and a grasp of what drives financial inclusiveness allows us to better understand the development of financial markets from a distributive angle.

Cultural factors have been found to determine financial sector growth. In their seminal work, Stultz and Williamson (2003) find that religion has a strong effect on the extent of creditor protection in a country. Related work on financial inclusiveness has also revealed that besides the more tangible supply constraints, reported demand-driven barriers to the access and usage of financial services include cultural characteristics such as religious motivations and

⁵ Financial depth is a representation of the relative size of the financial market or sector in the economy and is commonly approximated using the ratio of private credit to GDP.

social trust (Allen et al., 2016). Moreover, the extension of financial services often entails factors beyond bottom-line considerations. Historically, early attempts at financial outreach to the poor were largely guided by philanthropy and altruism rather than being entirely profit-driven. Hence, cultural factors may have a role in encouraging the development and the spread of the financial sector. And this provides further motivation to our use of cultural characteristics in explaining variations in financial inclusiveness.

In this paper, we empirically investigate how religiosity can affect the outcome of financial inclusion from the demand-side – as measured by the adoption and usage of financial services. We first look at how differences in religiosity may affect the extensiveness of the financial system across different states in the U.S. Considering that different states are likely to share common historical and legislative factors which may affect their financial environment, we exploit the spatial variations in levels of religiosity by taking into account the effects of both historical and contemporary measures of religiosity. Next, we look at evidence from aggregate cross-country data of financial usage and measures of religiosity to examine the overall effect of religiosity in the broader global context. To identify causality, we employ a measure of historical disease prevalence as the main instrumental variable in our analyses and conduct over-identification tests using exposure to natural hazards as additional instruments. Additionally, we perform a bounds test using the approach by Conley, Hansen, and Rossi (2012), and investigate whether the IV results hold if there are violations of the exclusion restriction condition at the country level. Our results are robust to these checks.

In light of the rising interests in religiosity, this paper contributes by performing a broad investigation into the effects of religiosity on the financial environment. Consistent with existing theories from psychology and anthropology, the findings reveal that religiosity has a significant impact on financial and economic aspects of society. Religiosity is found to have a

negative effect on the inclusiveness of financial systems in current societies. The results complement those from recent studies validating the importance of both religiosity and religious practices in affecting various aspects of economic development. These include innovation (Bénabou, Ticchi, and Vindigni, 2015), social trust (Berggren and Bjørnskov, 2011), economic attitudes (Guiso et al., 2003) and broader level economic growth and performances (Barro and McCleary, 2003; Campante and Yanagizawa-Drott, 2015; Durlauf, Kourtellos, and Tan, 2012). In a similar vein, this study also adds to our understanding of cultural effects on economic outcomes, an area that has garnered considerable interest in recent years (see Alesina and Giuliano (2015) for a survey on culture and its impact on institutions and Nunn (2012) for an overview of culture and historical economic development).

The rest of the paper proceeds as follows. In section 3.2, we begin the analysis by discussing the conceptual framework behind the linkages between religiosity and financial outcomes. Section 3.3 presents a summary of the related literature. Section 3.4 describes the data and empirical framework, together with the identification strategy. The empirical estimates are reported in Section 3.5, where we also discuss the key insights from this study. And section 3.6 concludes. A full list of the variables used in our estimation and their definitions is included in the Appendix.

3.2 Conceptual link between religiosity and financial inclusiveness

We consider two perspectives when discussing religiosity and its conceptual linkage with financial inclusiveness along two perspectives.

3.2.1 Religiosity and its Effect of Individuals' Values and Motivations

The first perspective considers how religious beliefs and cultural systems can bring about tangible differences in economic behavior by affecting our decision-making heuristics or rules-of-thumb. Religious beliefs impose informal constraints on preferences and behaviors which in turn affect our choices and the composition of incentives within societies (North, 1990).

Does religiosity create fundamental differences in the way we perceive our lot in life or make it less onerous to be poor? Theories in psychology argue that the religious framework provides a locus of control over our lives and lets individuals attribute meanings in various contexts and under different objectives, while religiosity affects the extent to which individuals use the framework to define their experiences. Stronger religious beliefs tend to underline individuals' powerlessness amidst life's uncertainties and adversities, thereby affecting their desire to take personal action over situations and experiences. Hence, from an attribution theory perspective, religiosity may deemphasize personal accountability towards economic outcomes. These values can indirectly translate to lower financial aspirations, which can then hinder the financial progress of the society.

Religious beliefs can influence the attitudes towards economic materialism and financial achievements, which then drive consumption patterns and the usage of financial services. The focus on possession and acquisition of material goods juxtaposes with many conventional religious principles that recognize and emphasize non-material realities. Hence, in more secular communities, market-driven ideals and systems are likely to be better integrated into the social order. Such communities may be more accepting towards monetary

goals and rewards, which entails a social and economic system that places greater value on financial services.

3.2.2 Religiosity and its influence on social infrastructures

Next, we consider religiosity in the context of the society and explore its role as a core driver of social and institutional environments. In historical environments, stronger religious influences allowed for greater social capital which fosters economic cooperation and progress, and religiosity may have served as an impetus in the spread of early economic and financial systems.

In the area of banking and finance, historians have documented a close association between religion and the development of financial systems. Prior to the advent of nation-states, banking systems were often embedded in a larger and more extensive set of religious institutions. Ancient Babylonian and Greek temples functioned as both banks and places of worship, where pre-modern agricultural societies could seek spiritual and financial refuge during times of hardship (MacDonald and Gastmann, 2004). Historical records showed that Sumerian and Greek temples encompassed extensive mints and treasury systems in which records of civilian debt were kept and credit was extended beyond immediate social networks to specialized creditors. Hence, organized religious establishments may have also played a crucial role in the development of several early financial systems.

In many societies today, complex forms of social infrastructure have developed beyond religious establishments and eroded their authority as regulatory bodies (Norenzayan, 2013; Norris and Inglehart, 2011). The development of secular political and legal systems allowed the rule of law to gradually replace religious principles and practices in the enforcement of

commitments and our ways of life. On the other hand, strong social institutions can facilitate prosocial norms and increase cooperation, thereby lowering the transaction costs associated with bargaining, enforcement and information sharing within the economy. Therefore, we can postulate that less religious societies more likely to be associated with secular institutions.

Furthermore, a religious community may accord fewer resources towards economically-productive activities and experience lower economic output (Barro and McCleary, 2003). These can range from the resources used in the construction of places of worship to the time spent by the community on religious ceremonies and events. Less religious societies can also be more willing to embrace scientific disciplines over religious doctrines, encouraging greater adoption and dissemination of innovation and technology. This may in turn promote the advancement towards more established institutional and financial systems.

3.3 Related literature

There are two broad strands of literature that are pertinent to this paper: financial inclusiveness, and religiosity in economics.

3.3.1 Financial inclusiveness – Access and usage of financial services

This paper is related to the stream of literature that analyzes the determinants of financial progress at the macroeconomic level. In the financial development literature, well-known strands of works point to the legal and institutional structure, as well as initial endowments and historical factors as crucial factors for the development and configuration of financial systems (Acemoglu, Johnson and Robinson, 2001; Djankov, McLiesh, and Shleifer, 2007; La Porta, Lopez-de-Silanes, Shleifer and Vishny, 1998). Cultural factors have also been

found to determine financial sector growth. Stulz and Williamson (2003) explore the role of specific religions as a determining factor in cross-country differences in creditor rights. They find empirical evidence that countries with their primary religion as Catholicism have considerably weaker creditor protection than other countries. Furthermore, they find support that while trade openness alleviates the effect of religion on creditor rights; religion as cultural proxies has greater explanatory power over investor rights than a country's legal origins.

Unlike financial development, financial inclusiveness is characterized by the lateral reach of the financial sector and defined both in terms of direct access and the usage of financial services. Initial studies on financial access and usage are show that these are positively related with income levels both at the country and individual-level (Beck, Demirguc-Kunt and Peria, 2007; Demirgüç-Kunt and Klapper, 2013; Honohan, 2008). Allen et al. (2016) further establish a correlation between perceived barriers to account ownership and attributes of financial access relating to the costs and ease of access, while Demirgüç-Kunt and Klapper (2013) find a significant link between the overall degree of account penetration and aggregate measures of financial depth across countries. There are, however, noticeable variations at the fringes of the relationship between financial depth and inclusion, which indicate that although both are intrinsically linked, each represents a different aspect of financial development that can be explored.

Financial inclusiveness varies significantly across countries both by levels of economic development and between different income groups within countries. Common localized barriers to account ownership include affordability, religious reasons and other issues related to market inadequacies, such as the lack of documentation and difficulties in physical access to banks and financial services. Using supply-side financial access indicators, Beck et al. (2007) evaluate whether established country-level determinants of financial depth are linked to the

aggregate statistics from banking regulators, as well as to barriers in banking services. While institutional quality, credit information, and initial endowments remain positively correlated with the levels of financial access, the amount of creditor rights protection, religion and legal origin of a country are less likely to be associated with their measures of financial access. In addition, they find that their aggregate indicators provide a good estimate of the overall usage of financial services by households and firms within a country. Honohan (2008) combines the accounts statistics from commercial banks and microfinance institutions, together with data from household surveys to derive a composite measure of household financial access. Likewise, he finds that the degree of financial access is positively correlated with institutional quality and mobile phone penetration while negatively linked with poverty levels.

3.3.2 Religiosity and its influence on preferences and economic outcomes

In a survey of religion in economics, Iannaccone (1998) discusses the early empirical literature documenting the relationship between religion and economic outcomes, in which religious affiliations have been linked to variations in wages, school attendance, criminal behavior and health. Several of these initial studies fail to establish a causal correlation and adequately address the endogeneity of economic variables to religious factors.

Other studies have associated religiosity with some aspects of economic attitudes and subsequent outcomes. Using a more comprehensive empirical model, Guiso et al. (2003) find that religious beliefs tend to encourage trust, thriftiness and greater individual responsibility, qualities deemed pro-market and largely conducive to economic growth. In another study of religiosity and trust, Berggren and Bjørnskov (2011) find that higher religiosity brings about a

lower level of social trust. However, this negative effect can be attributed to the tensions brought about by religious fractionalization within the society. Religiosity has also been positively related to risk aversion both at the individual and firm level. In their study using U.S. county-level data, Hilary and Hui (2009) argue that religiosity and the associated fear of uncertainty translates to differences in organizational behavior, whereby firms based in more religious counties have an inclination towards lower risk appetites, lower rates of investments and poorer long-term growth.

Religiosity has also been studied alongside several macroeconomic factors as academics try to understand the motivations and disincentives behind religious participation, which can help explain broad trends in religiosity. Using religiosity as a factor driving macroeconomic outcomes, Bénabou et al. (2015) show that levels of religiosity are negatively correlated with how innovative a country or state is. At the individual level, they also find that religious people are more likely to exhibit negative attitudes towards scientific and technological progress, risk taking, and new ideas. In addition, the religious are less inclined towards inculcating the values of imagination, independence and determination in children, qualities often associated with critical thinking and creativity. In a country-specific study using U.S. county data, Lipford and Tollison (2003) find indications of bi-causality between religious involvement and income levels. In particular, they argue that church memberships can influence individual preferences and deter material pursuits, leading to lower earnings. In a similar study by Rupasingha (2009), religious adherence, as measured by the percentage of believers, is found to negatively impact economic growth across different counties.

On to cross-country studies on religiosity and economic growth, Barro and McCleary (2003) show that church attendance correlates negatively with overall economic development, although the intensity of religious beliefs is positively linked with growth. They use

instruments representing the religious involvement by the state and measures of religious diversity in an attempt to establish a causal link. Durlauf et al. (2012) apply Bayesian model-averaging techniques to the work of Barro and McCleary (2003) and argue to the contrary – that there is no statistically robust evidence supporting the effects of religious beliefs on economic growth. In an empirical study involving both cross-country and within-country evidences, Noland (2005) finds that religion matters for economic growth, although the evidence does not support consistent effects from the specific religions. Finally, Campante and Yanagizawa-Drott (2015) utilize variations in the length of daily fasting periods during Ramadan as a proxy for religious practices and find that religious practices have a negative impact on economic performance across their sample of Muslim countries.

3.4 Empirical framework and data

In this section, we describe the empirical framework and the key variables used our empirical estimations. Our analysis of the impact of religiosity on financial inclusiveness is conducted in two layers – the U.S. cross-state analysis and cross-country analysis. We present the baseline estimation equations of each, as well as the identification strategy employed. A summary list of all variables and their sources is provided in Table 3.A.1 of the Appendix.

3.4.1 Cross-state analysis in the US

Our first analysis examines the variation in religiosity using U.S. cross-state data. This allows us to examine the effects of religiosity across an area in which there are several common historical, legal and other country-specific factors.

We employ both contemporary and historical measures for our explanatory variables. The *R1: religious participation and values* variable represents a contemporary state-level index of religious participation and values derived from a series of measures reported in the US Religious Landscape Survey conducted by the PEW Forum on Religion and Public Life in 2008. The survey involves 35,000 Americans from all states and covers questions regarding their religious associations, practices and views. To construct the index, Fincher and Thornhill (2012) used eight items from the survey: 1) the portion of respondents with a religious affiliation and who believe that their religion is the way to an eternal life, 2) the portion of those who believe in only one correct way to interpret religious teachings, 3) the portion of those who attend religious services at least once a week, 4) the portion of those who worship at least once a day, 5) the portion of those who worship more than seldom but receive a definite answer to their prayers at least once a month, 6) the portion of those who regard religion as very important, 7) the portion of those who are absolutely certain that they believe in God, and 8) the portion of those who believe that holy scriptures are the words of God and should be taken as literal truths. The data from each item is arcsine transformed, standardized and added across the different categories for each state.

Next, our historical religiosity measure is derived from part of a census survey conducted by the U.S. Census in 1890 which includes religious membership information, number of religious organizations, number of religious buildings used for worship, amongst others. Our variable of interest, *R2: church edifices in 1890*, is a standardized measure of the number of buildings owned and used for worship within a state in the year 1890. To incorporate elements of both measures in an overall *REL* variable, the two variables are projected onto their first principal component for each state.

The dependent variables are derived from the Federal Deposit Insurance Corporation (FDIC) national surveys of 2013. These are part of a nationwide initiative to assess the financial inclusiveness of the U.S. banking system and to evaluate the share of the population who are underbanked or those failing entirely to participate in the financial system. We utilize two measures for our analysis – *financial account* and *savings and checking*. The *financial account* variable denotes the percentage of those within the state who possess any account(s) at a federally insured depository institution, while the *savings and checking* variable denotes the percentage of those within the state who own both savings and checking account(s) at a federally insured depository institution.

Our U.S. cross-state estimation equation is specified as follows:

$$fin_i = \beta_0 + \beta_1 religiosity_i + GEO'_i \beta_2 + \varepsilon_i \quad (3.1)$$

where fin_i represents one of the two dependent variables *financial account* or *savings and checking* observed in state i . $Religiosity_i$ represents one of the three explanatory variables – $R1$, $R2$ and REL . GEO'_i denotes a vector of U.S. state-level geographical controls. Since all fifty states share similar religious compositions and legal factors, we control for a set of geographical endowments that may affect the development of the financial landscape – a dummy variable denoting whether the state is fully enclosed by land, measures of the distance to major navigable river, mean elevation, annual precipitation and indicators of terrain slope conditions. ε_i is the state-specific disturbance term. Equation (3.1) (and subsequent equations in this chapter) are estimated using OLS, and our coefficients of interest (both here and in subsequent equations) are β_1 , unless otherwise stated.

3.4.2 Cross-country analysis

In our next analysis, we utilize cross-country evidence to explore variations in modern day religiosity and its impact on financial inclusiveness.

Our explanatory variables are derived from the World Values Survey (WVS) – a series of empirically-based questionnaires classifying human values and beliefs across different regions.

The surveys contain information pertaining to the different roles that religion plays in the individuals' lives, as well as their involvement in activities associated with religion. To validate the legitimacy of these self-reported measures, we consider three different measures representing religious participation and dedication. In particular, the religiosity variables considered are determined by the answers to the following questions: 1) “How important is God in your life?” (scored on a scale from 1 to 10), 2) “How important is religion in your life?” (scored on a scale from 1 to 4 from “very important” to “not at all important”), and 3) “How often do you attend religious services?” (scored on a scale from 1 to 8 from “more than once a week” to “never”). Each response is linearly transformed to a figure of between 0 and 1, with a higher number representing greater involvement or importance accorded to religion, its associated figure(s) and activities.

In our baseline specification, we compile the three variables over the six waves from 1981 to 2014 and take the average reading across each country. These form the variables *R1: importance of God*, *R2: importance of religion* and *R3: religious attendance* respectively. In the repeated cross-country analysis, the average reading of *R1*, *R2* and *R3* are taken across each country for each of the six waves. To derive the overall *REL* variable, the three variables are

standardized and the average of their first principle components is calculated for each corresponding country (and each wave for the repeated cross-country analysis). This allows us to encapsulate the different dimensions of the WVS variables within one variable.

The dependent variables are obtained from the Global Financial Inclusion (Global Findex) database by the World Bank. Collected from surveys conducted by World Bank and Gallup World Poll, and featuring over 150,000 adults from 148 countries, this database captures the usage of financial services from the demand-side, offering a look into self-reported bank account ownership, how individuals save and borrow, as well as self-reported reasons behind financial exclusion. We consider three variables as our measures of the outcome of financial inclusiveness: 1) financial institution account ownership – *financial accounts* which is the percentage of the population sample with ‘an account at a bank, credit union, cooperative, post office, or microfinance institution’, 2) usage of formal accounts for savings – *saved at financial institution*, which is the percentage of the population sample who have ‘saved or put aside any money’ in the past year using an ‘account at a bank, credit union, microfinance institution, or another financial institution’, and 3) usage of formal accounts for borrowing – *borrowed from financial institution*, which measures the percentage of the population sample who have borrowed money from an ‘account at a bank, credit union, microfinance institution, or another financial institution’. The variables are derived from the most recent values of the two available periods, 2011 and 2014. Figure 3.1 provides visual representations of how religiosity and financial inclusiveness are spatially distributed and illustrate the substantial variations across the countries in the sample. Darker shades denote higher corresponding levels of religiosity or financial inclusiveness.

Our cross-country estimation equation is specified as follows:

$$fin_i = \beta_0 + \beta_1 religiosity_i + RC_i' \beta_2 + LO_i' \beta_3 + GEO_i' \beta_4 + \varepsilon_i \quad (3.2)$$

where fin_i refers to either of our three country-specific dependent variables: *financial accounts*, *saved at financial institution* and *borrowed from financial institution*, $religiosity_i$ refers to either of our four country-specific religiosity variables – $R1$, $R2$, $R3$ and REL , RC_i refers to a vector of religious composition controls to mitigate the effects of specific religious denominations on our analysis, LO_i refers to a vector of legal origin dummies, GEO_i refers to our standard set of geographical controls, and ε_i is the country-specific disturbance term.

3.4.3 Identification strategy

To deal with the potential endogeneity concerns from our OLS estimates resulting from simultaneous correlations or omitted variables, we make use of instrumental variables that are correlated with the level of religiosity from an individual or community but are not likely to be associated with the financial behavior or financial landscape. Historical pathogen prevalence (Fincher and Thornhill, 2012; Murray and Schaller, 2010) is utilized as the main instrument in our IV analyses. The identifying assumption is that variations in historical pathogen prevalence of communities are exogenous to the conditions that affect financial developments, which plausibly satisfies the exclusion restriction for our estimations, conditional on the controls employed.

To establish the relevance of our instrument, we refer to Fincher and Thornhill (2012)'s work which shows that variations in parasite-stress levels account for cross-cultural differences in religiosity. They argue that in areas with high levels of parasite stress or where diseases are

Figure 3.1: Religiosity and prevalence of financial accounts – Distribution map

Notes: Maps showing the relationship between religiosity and financial inclusiveness. The first map depicts the distribution of religiosity across countries between 1981 to 2014, using aggregated data from the World Values Survey – the *REL* variable. The second map depicts the prevalence of financial accounts across countries between 2011 and 2014, using data from the Global Findex database – the *financial accounts* variable. Larger values correspond to darker shades and denote higher levels of religiosity and financial inclusiveness respectively.

prevalent, there is a greater propensity for the community to avoid outsiders and exhibit in-group associative sociality. This allows the community to avoid excessive contact with external parasitic threats, thereby hampering the spread of potentially infectious diseases. Religiosity is a measure of the in-group associative sociality amongst communities. Many religions command the existence of a certain supreme order, with values and customs being established

based on that order. Religion can thus act as a barrier between the religious communities and outsiders, with religious participations and ways of life signalling an individual's allegiance and his commitment to the religious community. Furthermore, attribution theories of religion argue that religion often acts as a coping mechanism as it enables people to address their personal limitations through a system of beliefs that transcends the individual. In doing so, it provides a source of comfort and solace in times of adversity and periods of illnesses. Therefore, in areas with higher parasitic threats and prevalence of diseases, stronger religious beliefs and participation are likely to be observed.

In the U.S. cross-state analysis, we obtain the data from Fincher and Thornhill (2012)'s study for the pathogen variable. Their state-specific index is derived using data from Morbidity and Mortality Weekly Report's "Summary of Notifiable Diseases, United States" from the Centers for Disease Control (CDC) for the years 1993 to 2007. The annual numbers of infectious disease cases are adjusted by the reported population sizes and the average z-score is calculated for each state over the 15 years. And in the cross-country analysis, the instrumental variable *pathogen* is a disease prevalence index derived from old epidemiological atlases and calculated for 230 regions around the world (Murray and Schaller, 2010). The index captures the mean prevalence assessments based on the frequency and severity of nine diseases: leishmanias, schistosomes, trypanosomes, leprosy, malaria, typhus, filariae, dengue, and tuberculosis.

We employ additional instruments - measures of natural hazard exposure - in conducting over-identifying tests for our IV models. The rationale behind these additional instruments also stems from the religious attribution theory in social psychology. It lies in the idea that religion may act as a coping mechanism during times of adversity, representing a source of strength and control for those who experience loss and trauma from natural disasters.

This is empirically tested in studies by Belloc, Drago, and Galbiati (2016) and Bentzen (2015), both of which draw the link between the spatial distribution of earthquakes and religious displays across cities and sub-national districts. Their findings suggest that communities of quake prone areas tend towards higher overall levels of religiosity, as seismic incidences invoke religious feelings and increase the construction of religious buildings.

In the U.S. state-level analysis, we use the *weather hazard* variable as the measure of the disaster exposure of different states. This is a measure of the average annualized hazardous weather damages incurred by the state from 1995 to 2004. The data is obtained from the National Oceanic and Atmospheric Administration (NOAA)'s National Weather Service (NWS), and the raw data is adjusted for the population size and GDP of each state. In the cross-country analysis, the *earthquake exposure* variable is derived from the UNEP/GRID-Europe database, and represents the estimated annual physical exposure (per one million inhabitants) to earthquakes of MMI categories higher than five from 1973 to 2007 (Peduzzi, Chatenoux, Dao, Herold, and Giuliani, 2011).

3.5 Empirical results

In this section, we discuss our findings on the influences of religiosity on the financial environment. We begin by using U.S. cross-state analyses to explore how spatial variations in levels of religiosity can affect the access and usage of financial services within the United States. Next, we analyze the evidence across different countries and discuss how contemporary disparities in financial inclusiveness can be influenced by variations in religiosity. We then replicate the analysis using repeated cross-country data. In all our analyses, we first discuss our OLS results, before supplementing the evidence by identifying causality inference using IV analyses.

3.5.1 Religiosity and Financial Inclusiveness using U.S. cross-state data

We begin by examining cross-state differences in financial inclusiveness using U.S. data. The nationally representative sample of the U.S. cross-state analysis enables us to eliminate several historical and legislative factors which may potentially affect the validity of our results. Table 3.1 reports the OLS state-level estimates of equation (3.1). The estimates are reported as standardized beta coefficients and columns (1) to (3) report the findings based on the different religiosity variables without the inclusion of any controls, while columns (4) to (6) report the combined results of religiosity and the set of control variables employed.

We utilize a religious values index derived from the PEW survey as a contemporary measure of religiosity (reported in columns (1) and (4)), and another measure of the number of religious buildings in 1890 (reported in columns (2) and (5)). We also include a combined religiosity variable that captures both measures (reported in columns (3) and (6)). The results in the latter columns condition the baseline specifications on a set of geographical covariates which may affect separately state-level financial access and usage. For instance, whether a state is landlocked, its topographical landscape and its distance to major rivers can shape the economic development of the state and ultimately its financial landscape through its impact on the state's connectedness which may in turn determine trade and other institutional factors.

Table 3.1 reports the OLS estimates using the percentage of those with both savings and checking accounts as our financial inclusiveness outcome variable. We augment the analysis using the percentage of those with any financial account as an additional dependent variable, this set of results is reported in Appendix Table 3.A.2. Both sets of estimates indicate that all religiosity measures remain negatively correlated with measures of financial

inclusiveness and are highly significant at least at 1 percent, even with the inclusion of the geographical controls. Panel A in Figure 3.2 plots the negative and statistically significant partial relationship between religiosity and financial inclusiveness at the state level, corresponding to column 6 of Table 3.1.

Table 3.1 - U.S. State-level - religiosity and prevalence of having both savings and checking accounts (OLS estimates)

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable: Financial accounts						
R1: religious participation and values	-0.672*** (-4.920)			-0.649*** (-5.009)		
R2: church edifices in 1890		-0.570*** (-4.175)			-0.566*** (-4.130)	
REL (1 st PC of R1, R2)			-0.704*** (-7.415)			-0.669*** (-6.898)
Landlocked				0.058 (0.614)	-0.132 (-1.036)	-0.038 (-0.353)
Distance to major rivers				0.072 (0.818)	0.113 (1.116)	0.100 (1.115)
Elevation				0.126 (0.733)	-0.164 (-0.792)	-0.074 (-0.407)
Precipitation				0.134 (1.115)	0.104 (0.735)	0.117 (0.910)
Terrain slope				0.024 (0.150)	0.146 (0.685)	0.090 (0.504)
R-squared	0.452	0.324	0.495	0.533	0.380	0.533
Number of observations	49	49	49	49	49	49

Notes: This table reports the U.S. state-level OLS results of the prevalence of having both savings and checking accounts on measures of religiosity. Columns 1 to 3 show the bivariate estimates, while those in columns 4 to 6 are conditional on a range of geographical controls. The coefficient values correspond to standardized beta coefficients and figures in the parenthesis indicate t-statistics. *, ** and *** denote significance at the 10, 5 and 1 percent levels respectively.

While the negative links documented in the OLS estimates are consistent with our priors, these correlations may be accounted for by omitted determinants of financial extensiveness which are also linked to levels of religiosity. In addition, there is potential causality from the financial environment to religiosity, whereby communities that are less focused on financial aspects in day-to-day activities may engage more in religious participation and beliefs. Hence, to test the causal implications of religiosity, we use measures of pathogen prevalence as instruments for our religiosity variables. This is dependent on the assumption that pathogenic

threats are plausibly excludable from our models of financial inclusiveness, conditional on reasonably extensive sets of controls.

Table 3.2 - U.S. State-level - religiosity and prevalence of having both savings and checking accounts (2SLS estimates)

	(1)	(2)	(3)	(4)	(5)	(6)
<i>Panel A: Second stage results</i>						
Dependent variable: Financial accounts						
R1: religious participation and values	-0.959*** (-4.393)			-0.818*** (-6.802)		
R2: church edifices in 1890		-1.026*** (-4.361)			-1.433*** (-3.814)	
REL (1 st PC of R1, R2)			-0.876*** (-5.411)			-0.917*** (-6.492)
Landlocked				0.089 (0.842)	-0.247 (-1.279)	-0.031 (-0.282)
Distance to major rivers				0.074 (0.812)	0.184 (1.024)	0.113 (1.067)
Elevation				0.117 (0.752)	-0.658* (-1.894)	-0.160 (-0.873)
Precipitation				0.137 (1.204)	0.075 (0.382)	0.115 (0.885)
Terrain slope				0.009 (0.061)	0.242 (0.880)	0.092 (0.537)
R-squared	0.369	0.117	0.466	0.505	0.0	0.477
<i>Panel B: First stage results</i>						
Dependent variable	R1	R2	Religiosity	R1	R2	Religiosity
Pathogen	0.540***	0.505***	0.592***	0.762***	0.435***	0.680***
R-squared	0.292	0.255	0.350	0.470	0.360	0.438
Number of observations	49	49	49	49	49	49
1 st Stage F-statistic	18.115	19.854	29.329	43.342	9.786	29.286

Notes: This table reports the U.S. state-level IV results of the prevalence of having both savings and checking accounts on measures of religiosity. Measures of religiosity are instrumented using state-level pathogen prevalence. Panel A reports the second stage estimates using the dependent variable – prevalence of those having both savings and checking accounts, while panel B reports the first stage estimates. Columns 1 to 3 show the bivariate estimates, while those in columns 4 to 6 are conditional on a range of geographical controls.

The coefficient values correspond to standardized beta coefficients and figures in the parenthesis indicate t-statistics. *, ** and *** denote significance at the 10, 5 and 1 percent levels respectively

Table 3.2 displays the IV estimates for the cross-state analysis. The first stage estimates reveal that historical pathogen prevalence is positively correlated with religiosity, and the IV religiosity coefficients have distinctly larger magnitudes than those of the OLS. The first stage F-test statistics also imply that, in most cases, the historical pathogen measures are reasonably strong and relevant instrumental variables for religiosity. Notably, the IV estimates of the religiosity measure denoted by church buildings in 1890 show greater explanatory power as compared with the more contemporary measure, suggesting that developments of religious environments in recent history have a persistent impact on the financial environment in the U.S. study, exceeding those from current values and beliefs. More importantly, consistent with our view, all the IV estimates support a robust finding that religiosity is a potential constraint for financial inclusiveness across different states within the country, whereby a standard deviation increase in *REL* is associated with an overall decrease of 0.917 standard deviations in the prevalence of savings and checking accounts within the state.

To illustrate, consider the coefficient of *REL* corresponding to column 6 in Table 3.2. We take the state of Pennsylvania, which has a value of *REL* close to the sample mean of -0.003. An increase of 1 standard deviation in *REL* brings its value to 0.883, a value which is approximately observed in the state of Virginia. According to the estimation model, this is associated with a decrease in 0.917 standard deviations in the outcome variable, which translates to a decline of approximately 8.22-point in the percentage of the state population with both savings and checking accounts – a value roughly observed in the states of Louisiana or South Carolina.

Figure 3.2: Religiosity and financial inclusiveness across states and countries

Notes: Plots depicting the conditional relationship between state- and country-level religiosity and financial inclusiveness. The added-variable plots with partial regression lines corresponds to column 6 of Table 3.1 and column 8 of Table 3.3 respectively.

3.5.2 Religiosity and Financial Inclusiveness using cross-country data

In this next exercise, we move to a broader level of variation – utilizing variations in cross-country data to examine the explanatory influences of religiosity on three assessments of the outcome of financial inclusiveness from the demand-side – 1) the percentage of those with financial accounts, 2) the percentage of those who saved at a financial institution in the past year, and 3) the percentage of those who borrowed from a financial institution in the past year. The baseline OLS specifications which utilize the first representation of financial inclusiveness is reported in Table 3.3. We employ three measures for the explanatory religiosity variables, the country aggregated survey responses of how the population regards the importance of God, the importance of religion and how often they attend religious services, followed by an overall religiosity variable which incorporates the first principal components from the three measures.

In the various specifications, we first show the bivariate estimates of the religiosity variables on outcomes of financial inclusiveness before subjecting the analyses to religious composition controls, legal origin controls and the usual set of geographical controls. It has been widely established in existing literature that a country's religious composition plays a crucial role in its financial landscape through the impact on legal systems and creditor's rights (Stulz and Williamson, 2003). Furthermore, religiosity is likely to have varying effects on financial outcomes conditional on the country's religious denominations. Likewise, the legal origins of a country can significantly account for differences in investor protection and the subsequently its financial developments (La Porta et al., 1998). We include the standard geographical controls which may bestow influences on financial inclusiveness through other mechanisms such as trade or climate-related avenues.

Table 3.3: Cross-country religiosity and prevalence of financial accounts (OLS estimates)

Dep var = financial account	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
R1: importance of God	-0.690*** (-9.35)				-0.552*** (-5.33)			
R2: importance of religion		-0.676*** (-9.02)				-0.540*** (-4.74)		
R3: religious attendance			-0.571*** (-7.34)				-0.383*** (-4.37)	
REL (1 st PC of R1, R2, R3)				-0.667*** (-8.98)				-0.519*** (-5.12)
Catholic					0.258*** (2.99)	0.204** (2.31)	0.208** (2.30)	0.229** (2.64)
Protestant					0.264** (2.65)	0.274** (2.46)	0.287*** (2.66)	0.245** (2.33)
Muslim					0.076 (0.56)	0.127 (0.88)	-0.093 (-0.76)	0.065 (0.50)
Legal - UK					0.231** (2.15)	0.226* (1.88)	0.267** (2.50)	0.272** (2.43)
Legal - Germany					0.144 (1.66)	0.170* (1.94)	0.278*** (3.42)	0.179** (2.07)
Legal - Scandinavia					-0.026 (-0.32)	-0.002 (-0.02)	0.009 (0.11)	0.002 (0.02)
Distance to coast/river					0.083 (1.36)	0.045 (0.78)	0.072 (1.32)	0.037 (0.64)
Elevation					-0.202** (-2.10)	-0.210** (-2.21)	-0.224** (-2.42)	-0.219** (-2.40)
Landlocked					-0.199*** (-3.09)	-0.204*** (-3.18)	-0.183** (-2.64)	-0.185*** (-2.88)
Island					0.022 (0.29)	0.000 (0.00)	-0.018 (-0.24)	-0.009 (-0.13)
Precipitation					0.032 (0.41)	0.036 (0.38)	0.042 (0.41)	0.021 (0.23)
Terrain ruggedness					0.208** (2.37)	0.175* (1.93)	0.226*** (2.69)	0.199** (2.33)
<i>R-squared</i>	0.477	0.457	0.325	0.445	0.685	0.669	0.667	0.664
<i>Number of observations</i>	83	83	82	84	83	83	82	84

Notes: This table reports the cross-country OLS results of the prevalence of having financial accounts on measures of religiosity. The prevalence of having financial accounts is measured by the percentage of those with a banking account within the country. Columns 1 to 4 show the bivariate estimates, while those in columns 5 to 8 are conditional on religious composition controls, legal origin controls, and a range of geographical controls. The coefficient values correspond to standardized beta coefficients and figures in the parenthesis indicate t-statistics. *, ** and *** denote significance at the 10, 5 and 1 percent levels respectively.

The results are very similar across the different indicators of religiosity. All coefficients are highly significant at the 1 percent level and the only specification in which the magnitude is somewhat diminished is that of *R3: religious attendance*. Moreover, the R-squared values suggest that about 32 to 48 percent of the variation in financial inclusiveness can be explained solely by the religiosity variables. The effects of the four religiosity variables considerably exceed those from the various control variables in terms of their magnitudes, further suggesting

that religiosity constitutes an important effect in determining the percentage of those with financial accounts even after we account for the influences from the other established sources. The second plot in Figure 2.2 illustrates the partial relationship between religiosity and financial inclusiveness at the country-level analysis, corresponding to column 8 of Table 3.3. The estimates remain negative and statistically significant even with the exclusion of prominent outliers in the sample. The estimates across the other two representations of financial inclusiveness – prevalence of savings and borrowings, are reported in Appendix Table 3.A.3. Likewise, the results are consistent with those from the first, both reporting negative and highly significant coefficients for the religiosity variables.

Table 3.4 displays our cross-country IV estimates of religiosity on the percentage of those with financial accounts, using historical pathogen prevalence as the instrument for the religiosity variables. The first-stage F-test statistics on the excluded instrument are comfortably large, with the exception of one religiosity measure *RI: importance of God*, indicating that historical pathogen prevalence is generally a strong instrument for religiosity. The results are consistent with that of our previous exercises, signifying the large negative impact of religiosity on financial inclusiveness. Additionally, the point estimates of the coefficients on the religiosity variables are distinctly greater in magnitude as compared with the OLS specifications, with a standard deviation increase in the religiosity measures being associated with a 0.74 to 1.6 standard deviation declines in the financial inclusiveness outcome. To illustrate, we consider Chile, a country with a *REL* observation close to the sample mean. In the estimation model corresponding to column 6 in Table 4, a standard deviation decline (equivalent to 0.95 in absolute terms) in this religiosity measure brings about approximately 33-point increase in the percentage of those who possess a financial account within the country, bringing it close to a level that is observed in France.

Table 3.4: Cross country religiosity and prevalence of financial accounts (2SLS estimates)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>PANEL A: SECOND STAGE RESULTS</i>								
<i>Dependent variable: prevalence of financial accounts</i>								
R1: importance of god	-1.133*** (-7.351)				-1.598*** (-2.760)			
R2: importance of religion		-1.084*** (-8.502)				-1.282*** (-3.675)		
R3: religious attendance			-1.074*** (-6.932)				-0.739*** (-3.777)	
REL (1 st PC of R1, R2, R3)				-1.047*** (-8.044)				-1.126*** (-3.619)
Catholic					0.566** (2.242)	0.337** (2.330)	0.301*** (2.734)	0.387** (2.594)
Protestant					-0.029 (-0.139)	0.014 (0.088)	0.132 (1.123)	0.029 (0.205)
Muslim					0.627 (1.602)	0.526* (1.826)	-0.004 (-0.026)	0.362 (1.457)
Legal - UK					0.474** (2.306)	0.466** (2.569)	0.452*** (3.238)	0.490*** (2.940)
Legal - Germany					-0.221 (-1.004)	-0.061 (-0.468)	0.217*** (2.643)	0.001 (0.007)
Legal - Scandinavia					0.008 (0.052)	0.095 (0.801)	0.073 (0.853)	0.068 (0.632)
Distance to coast/river					0.022 (0.241)	-0.048 (-0.664)	0.017 (0.257)	-0.035 (-0.473)
Elevation					-0.037 (-0.216)	-0.111 (-0.848)	-0.177 (-1.626)	-0.126 (-0.999)
Landlocked					-0.057 (-0.414)	-0.113 (-1.181)	-0.102 (-1.218)	-0.083 (-0.844)
Island					0.070 (0.646)	-0.019 (-0.243)	-0.047 (-0.734)	-0.017 (-0.258)
Precipitation					0.070 (0.794)	0.060 (0.639)	0.054 (0.546)	0.045 (0.500)
Terrain ruggedness					0.132 (0.969)	0.125 (1.088)	0.225*** (2.676)	0.160 (1.560)
R-squared	0.281	0.292	0.072	0.301	0.305	0.483	0.600	0.523
Number of observations	83	83	82	84	83	83	82	84
<i>PANEL B: FIRST STAGE RESULTS</i>								
<i>Dependent variable: religiosity</i>								
Pathogen	0.587*** (6.011)	0.630*** (6.955)	0.635*** (6.480)	0.636*** (6.786)	0.238** (2.505)	0.317*** (3.716)	0.523*** (4.554)	0.356*** (3.817)
R-squared	0.345	0.397	0.403	0.405	0.682	0.717	0.608	0.684
Number of observations	83	83	82	84	83	83	82	84
1 st stage F-statistic	36.13	48.37	41.99	46.05	6.28	13.81	20.74	14.57

Notes: This table reports the cross-country IV results of the prevalence of having financial accounts on measures of religiosity. The prevalence of having financial accounts is measured by the percentage of those with a banking account within the country, and measures of religiosity are instrumented using historical country-level pathogen prevalence. Panel A reports the second stage estimates, and panel B reports the first stage estimates. Columns 1 to 4 show the bivariate estimates, while those in columns 5 to 8 are conditional on religious composition controls, legal origin controls, and a range of geographical controls. The coefficient values correspond to standardized beta coefficients and figures in the parenthesis indicate t-statistics. *, ** and *** denote significance at the 10, 5 and 1 percent levels respectively.

When we explore the results of the other two representations of the outcome variable – prevalence of savings and borrowing (reported in Appendix Table 3.A.3), the IV estimates remain highly consistent for the borrowing specifications but are less robust to savings. In the IV analyses of the effect of religiosity on the percentage of people who have saved in a financial institution over the past year, we find that the coefficients of the religiosity estimates are no longer significant. This may be attributed to a potentially strong effect from religious composition, particularly that of Protestantism.

3.5.3 Robustness checks

3.5.3.1 Tests for sensitivity to exclusion restriction assumption

To ease concerns over violations of the exclusion restriction, we subject the IV models to some over-identifying tests. As the IV specifications are just identified, we employ additional instrumental variables that measure the exposure to natural disasters to assess the validity of the main *pathogen* instrument. These variables are *weather hazards* and *earthquake exposure* in the U.S. cross-state and cross-country analyses respectively. In our approach, we assume that the *weather hazards* and *earthquake exposure* variables are truly exogenous in the models. And we test whether the instruments are correlated with the residuals in the IV estimation models, as well as whether the effects of *pathogen* on our financial inclusiveness outcome variables work through the channel of religiosity. In these tests, we apply the instruments only to the contemporary religiosity variables that measure values and practices and exclude the historical measure of church edifices in 1890, due to the contemporaneous measurement of the *weather hazards* variable.

Table 3.5 reports the results of these tests for the U.S. state-level and cross-country analyses. Panels A and B show the respective second and first stage estimation results using

both *pathogen* and natural hazards variables - *weather hazards* and *earthquake exposure* as instruments with the full set of controls. In both analyses, the coefficient estimates of all the contemporary religiosity variables in panel A remain negative and are significant at least at 1 percent level, supporting a strong inverse link between religiosity and financial inclusiveness. In panel B, the coefficient estimates of both the included instruments *pathogen* and the natural hazard measures are positive and remain highly significant throughout the different specifications. Furthermore, the Pearson correlation coefficient between the two instruments in each analysis takes on a value that is close to zero for both the U.S. state-level and cross-country observations. Together, these suggest that the effect of each instrument on religiosity is likely to be insensitive to the effect from the other, validating the credibility of the over-identifying tests.

Panel C describes the results from an alternative test of whether the *pathogen* variable satisfies the exclusion restriction. Here, *pathogen* is treated as an exogenous variable in the IV estimation model using the natural hazard measures as the instrument with the full set of controls. The results show that the *pathogen* coefficients are not significant when added as an exogenous variable, while each religiosity coefficient remains negatively significant. This establishes that it is unlikely for *pathogen* to directly impact the outcome variable, or to work through alternative channels in affecting the outcome, and hence substantiates its validity as an instrument for religiosity. Panel D reports the test statistics. The Sargan-Hansen statistics that correspond to the estimates from Panels A and B indicate that we cannot reject the null hypothesis that *pathogen* is uncorrelated with structural errors in the estimation models at the usual significance levels. As an additional check in our cross-country study, we repeat the tests using religiosity data from only the last 2 waves of the WVS, with similar results obtained.

Table 3.5: Tests for over-identifying restrictions

U.S. Cross-state		Cross-country				
	(1)		(1)	(2)	(3)	(4)
<i>Panel A: Second stage results with two instruments</i>						
<i>Dependent variable: both savings and checking accounts</i>		<i>Dependent variable: prevalence of financial accounts</i>				
R1: religious participation and values	-0.843*** (-7.169)	R1: importance of god	-1.007*** (-4.526)			
		R2: importance of religion		-1.051*** (-4.639)		
		R3: religious attendance			-0.699*** (-3.750)	
		REL (1 st PC of R1, R2, R3)				-0.944*** (-4.315)
Baseline controls		Baseline controls	Yes	Yes	Yes	Yes
<i>Panel B: First stage results</i>						
<i>– Dependent variables: religiosity measures</i>						
pathogen	0.760*** (6.452)	pathogen	0.235** (2.307)	0.298*** (3.283)	0.530*** (4.045)	0.349*** (3.365)
weather hazards	0.195** (2.214)	earthquake exposure	0.266*** (3.363)	0.246*** (3.287)	0.232** (2.248)	0.260*** (3.132)
<i>Panel C: 2SLS treating pathogen as exogenous</i>						
<i>Dependent variable: both savings and checking accounts</i>		<i>Dependent variable: prevalence of financial accounts</i>				
pathogen	0.260 (1.091)	pathogen	-0.196 (-1.559)	-0.162 (-1.226)	0.058 (0.278)	-0.131 (-0.930)
R1: religious participation and values	-1.159*** (-3.818)	R1: importance of god	-0.686*** (-3.072)			
		R2: importance of religion		-0.750*** (-3.341)		
		R3: religious attendance			-0.789** (-2.414)	
		REL (1 st PC of R1, R2, R3)				-0.714*** (-3.103)
<i>Panel D: Test statistics</i>						
F (Excluded instruments)	25.920		7.73	11.04	11.56	10.65
Over-identification test statistic	0.937		1.727	1.170	0.084	0.720
OID P-value	0.333		0.189	0.280	0.772	0.396
Second-stage R-squared	0.497		0.577	0.535	0.594	0.556
First-stage R-squared	0.503		0.707	0.729	0.623	0.696
Number of observations	49		72	72	71	73

Notes: This table reports the over-identification (OID) and exclusion restriction test results. Panel A reports the second stage estimates of the prevalence of financial accounts on religiosity measures. Religiosity measures are instrumented using historical country-level pathogen prevalence and an additional IV – modeled earthquake exposure. Panel B reports the corresponding first stage estimates. In panel C, pathogen prevalence is treated as an exogenous variable, and religiosity measures are instrumented solely using modeled earthquake exposure. Estimates for the control variables are not reported. Panel D reports the test statistics. The OID test statistics correspond to the estimates from Panels A and B, and has a $\chi^2(1)$ distribution under the null hypothesis that the over-identification restrictions are valid. The coefficient values correspond to standardized beta coefficients and figures in the parenthesis indicate t-statistics. *, **, and *** denote significance at the 10, 5 and 1 percent levels respectively.

Next, we look at how well the results hold as we relax the exclusion restriction assumption. We adopt the approach by Conley et al. (2012), in which we substitute the strict exclusion restriction condition in the IV model ($\gamma = 0$) with two allowable ranges for the coefficient of the IV on the structural equation (γ) as seen below:

$$fin_i = \beta_0 + \beta_1 religiosity_i + \gamma pathogen_i + RC_i' \beta_2 + LO_i' \beta_3 + GEO_i' \beta_4 + \varepsilon_i \quad (3.3)$$

$$religiosity_i = \pi_0 + \pi_1 pathogen_i + RC_i' \pi_2 + LO_i' \pi_3 + GEO_i' \pi_4 + v_i \quad (3.4)$$

We adopt both the union of confidence (UCI) and the local to zero (LTZ) methods as detailed in Conley et al. (2012). In the UCI method, we set a specific range of values for γ and assume that γ_0 takes on a value within $[0, 2\delta]$. We calculate the corresponding bounds that reflect the union of all confidence intervals on γ in the assumed range of γ_0 . Then using the LTZ method, we set a specific distribution for γ . Here, we assume that γ follows a normal distribution of $[\delta, \delta^2]$. Under both methods, δ denotes the extent of the violation of the exclusion restriction. We set $\delta \in \{1, 2, 3, 4, 5\}$ and plot the bounds at 95% confidence across the range of priors.

These are represented in Figure 3.3. The long-dashed lines correspond to the bounds estimated using the UCI method, while the short-dashed lines correspond to those using the LTZ method with a γ prior of $N(\delta, \delta^2)$. In both cases, the upper bounds take on negative values, which suggests that religiosity is likely to negatively affect financial inclusiveness, and this effect seems to remain even if there is a violation of the exclusion restriction condition, and that historical prevalence of pathogens are not perfectly exogenous as IVs.

Figure 3.3 – Conley’s “plausibly exogenous” test

Notes: Graphical representation of point estimates and 95% confidence intervals for the effect of religiosity on financial inclusiveness using Conley et al., (2012)’s “plausibly exogenous” test. These confidence intervals incorporate prior information of γ as seen in equation (2) using the UCI (assumption: $\gamma_0 \in [0, 2\delta]$) and LTZ (assumption: $\gamma \sim N(\delta, \delta^2)$) methods. δ denotes the allowable violation of the exclusion restriction.

Next, we subject our cross-country IV specifications to the inclusion of factors that are possibly correlated with unobserved determinants of financial inclusiveness and have the potential to affect the validity of the religiosity estimates.

In the first instance, differences in the educational level of the population may lead to a divergence in outputs which can subsequently affect the development of the financial environments. Moreover, the intensity of religious beliefs and the extent to which the people live in accordance with religious principles may very well be correlated with their educational levels, and as such, we cannot dismiss the possibility that the religiosity variables in our estimations may incorporate some of these educational effects. To mitigate this likelihood, we

utilize the average years of tertiary education in each country and include the variable as an additional control in the regression. As a second robustness check, we separately include the average GDP and GDP growth rates of the individual countries as additional control variables. The usage and access of financial services may be related to relative income levels of countries and hence differences in financial inclusiveness may be a reflection of such income-related factors rather than religiosity. Thirdly, we account for differences in generalized trust levels within the country, as this is a potential channel through which pathogen prevalence may affect financial inclusiveness. Furthermore, religiosity may be positively linked to overall trust levels which can affect the usage of financial services. In all these additional specifications, the religiosity variables are still estimated fairly precisely, maintaining both significance and magnitudes. These findings are shown in Table 3.6.

Table 3.6: Cross-country 2SLS – accounting for other effects

Dep var = financial account	(1)	(2)	(3)	(4)
REL (1 st PC of R1, R2, R3)	-1.117** (-2.098)	-0.831** (-2.178)	-1.114*** (-3.215)	-1.209*** (-2.615)
Years of tertiary education	0.021 (0.144)			
Log GDP		0.308* (1.893)		
GDP growth			-0.065 (-0.537)	
Generalized trust				-0.279 (-1.120)
religious composition controls	Yes	Yes	Yes	Yes
legal origin controls	Yes	Yes	Yes	Yes
geographical controls	Yes	Yes	Yes	Yes
R-squared	0.526	0.644	0.546	0.592
Number of observations	74	77	68	70

Notes: In this table, we account for the effects of tertiary education, GDP, GDP growth and generalized trust levels and report the corresponding cross-country IV estimates. Likewise, the variable of interest – religiosity – is instrumented using historical pathogen prevalence. The estimates are conditional on religious composition controls, legal origin controls, and a range of geographical controls.

The coefficient values correspond to standardized beta coefficients. The standard errors are clustered at the region level, and figures in the parenthesis indicate t-statistics. *, ** and *** denote significance at the 10, 5 and 1 percent levels respectively.

Table 3.7: Repeated cross-country estimates

	(1)	(2)	(3)	(4)
<i>Panel A: OLS results</i>				
<i>Dependent variable: prevalence of financial accounts</i>				
R1: importance of god	-0.453*** (-7.00)			
R2: importance of religion		-0.481*** (-6.80)		
R3: religious attendance			-0.321*** (-5.75)	
REL (1 st PC of R1, R2, R3)				-0.358*** (-6.21)
baseline controls	Yes	Yes	Yes	Yes
R-squared	0.675	0.667	0.666	0.670
Number of observations	211	208	211	219
<i>Panel B: IV – Second stage results</i>				
<i>Dependent variable: prevalence of financial accounts</i>				
R1: importance of god	-1.977*** (-2.702)			
R2: importance of religion		-1.492*** (-3.718)		
R3: religious attendance			-0.730*** (-4.805)	
REL (1 st PC of R1, R2, R3)				-0.818*** (-4.463)
baseline controls	Yes	Yes	Yes	Yes
R-squared	0.00	0.309	0.568	0.570
Number of observations	206	203	207	214
<i>Panel C: IV – First stage results</i>				
<i>Dependent variable: REL</i>				
pathogen	0.156*** (2.709)	0.205*** (4.041)	0.442*** (6.141)	0.371*** (5.655)
R-squared	0.643	0.670	0.540	0.573
Number of observations	207	204	208	215
F (Excluded instruments)	7.39	16.57	38.05	32.22

Notes: This table reports the repeated cross-country results of the prevalence of financial accounts on measures of religiosity. The prevalence of having financial accounts is measured by the percentage of those with a banking account within the country. Panel A reports the OLS estimates, panel B reports the IV second stage estimates using historical country-level pathogen prevalence as an instrument for measures of religiosity, and panel C reports the corresponding first stage estimates. The estimates are conditional on 3 religious composition controls, 4 legal origin controls, and 6 geographical controls. The coefficient values correspond to standardized beta coefficients and figures in the parenthesis indicate t-statistics. *, **, and *** denote significance at the 10, 5 and 1 percent levels respectively.

3.5.3.2 Repeated cross-country estimations

Finally, we extend our analysis using repeated cross-country data. Table 3.7 reports the repeated cross-country results for our OLS and IV estimations using prevalence of financial accounts as our dependent variable. For these exercises, we include the aggregated survey

responses of each country from each wave of the WVS, instead of taking the average religiosity measures across the different survey periods for each country. This has the added benefits of allowing us to capture some effects of the changes over time, as well as having a larger sample size. Regardless of the specification employed, the estimates are consistent with the earlier findings from the cross-country regressions, that religiosity has significant explanatory power in the spatial variation of financial inclusiveness.

3.6 Conclusion

In this paper, we investigate the effects of religiosity on the financial environment. We analyze how religiosity may influence financial inclusiveness over different states in the U.S. and across different countries globally. Our results suggest that higher levels of religiosity are negatively correlated with the usage of financial services across the society. These findings are robust to alternative specifications as well as the inclusion of reasonably thorough sets of controls. To identify causality, we use historical pathogen prevalence as the main instrument for religiosity in our estimation models. All the IV results consistently report a significantly negative impact of religiosity measures vis-à-vis the corresponding financial outcomes across both layers of analyses. To ensure the validity of pathogenic prevalence as an instrument for religiosity, we employ additional instruments, measures of exposure to natural hazards and conduct over-identification tests in our analyses.

Our findings contribute to ongoing discussions on the effects of religion on economic developments, providing preliminary evidence that religiosity matters for financial inclusiveness. With the upsurge of secularism in parts of the world and the simultaneous resurgence in religiosity in other parts over the past decades, the examination of how systematic differences in religion and other engendered experiences can affect global developments

remains crucial in our understanding of the current economic climate. An in-depth understanding of what drives financial inclusiveness is equally important in today's context, as a more inclusive financial sector is likely to constitute a more egalitarian economic system. This study further underscores the significance of cultural attributes in the analysis of economic developments and suggests that traditionally intangible factors may have a more significant role in shaping the economic and financial landscape than previously imagined.

3.7 Appendix

Table 3.A.1. Description of variables and data sources

Variable	Description	Source
<i>A. US Cross-State</i>		
Financial account	Percentage of those with any account(s) at a federally insured depository institution	FDIC National Survey (2013)
Savings & checking	Percentage of those with both savings and checking account(s) at a federally insured depository institution	FDIC National Survey (2013)
R1: Religious participation and values	Religious participation and values index derived from a series of measures reported in the US Religious Landscape Survey conducted by the PEW Forum on Religion and Public Life. Higher values denote greater religiosity.	Fincher and Thornhill (2012)
R2: Church edifices 1890	Standardized measure of the number of buildings owned and used for worship in the year 1890	ARDA- Statistics of Churches in the United States (1890)
REL	The first principal component of both religiosity measures – R1, R2	Fincher and Thornhill (2012), ARDA- Statistics of Churches in the United States (1890)
Landlocked	Dummy variable of 1 if a state is fully enclosed by land	
Distance to major rivers	Distance to major navigable river (km)	G-Econ Database
Elevation	Standardized measure of mean elevation of the state above sea level	G-Econ Database
Precipitation	Standardized measure of annual precipitation of the state from 1965 to 1990	Food and Agriculture Organization of the United Nations (FAO) – GAEZ
Terrain slope	Standardized measure of median terrain slope gradients of the state	FAO – GAEZ
Pathogen	Index of parasite stress	Fincher and Thornhill (2012)
Weather hazards	Average annualized hazardous weather damages from 1995 to 2004. Data is adjusted for population size and GDP figures in 2000.	NOAA-NWS (2016)
<i>B. Country level</i>		
Financial account	Percentage of those with an account at a financial institution (age 15+) – Most Recent Value	Global Findex Database (2014)
Borrow from financial institution	Percentage of those who borrowed from a financial institution in the past year age 15+) –Most Recent Value	Global Findex Database (2014)
Save at financial institution	Percentage of those who saved at a financial institution in the past year (age 15+) – Most Recent Value	Global Findex Database (2014)
R1: Importance of god	Aggregated and rescaled score (0 to 1) based on World Values Survey sample question: How important is God in your life? The average reading is taken across all 6 waves.	World Value Survey 1981-2014 Longitudinal
R2: Religious attendance	Aggregated and rescaled score (0 to 1) based on World Values Survey sample question: How often do you attend religious services? The average reading is taken across all 6 waves.	World Value Survey 1981-2014 Longitudinal

R3: Importance of religion	Aggregated and rescaled score (0 to 1) based on World Values Survey sample question: How important is religion in your life? The average reading is taken across all 6 waves.	World Value Survey 1981-2014 Longitudinal
REL	The first principal component of all 3 religiosity measures – R1, R2, R3	World Value Survey 1981-2014 Longitudinal
Catholic	Percentage of Catholics in each country, year 1970	McCleary and Barro (2006)
Protestant	Percentage of Protestants in each country, year 1970	McCleary and Barro (2006)
Muslim	Percentage of Muslims in each country, year 1970	McCleary and Barro (2006)
Other religions	Excluded group include other denominations of Christians, Jewish, Hindus, Buddhists and other religions, year 1970	McCleary and Barro (2006)
Distance to coast/river	Mean distance to coast or river	Gallup, Mellinger, and Sachs (2001)
Elevation	Mean elevation of the country above sea level	Gallup et al. (2001)
Landlocked	Dummy variable of 1 if a country is fully enclosed by land, and 0 otherwise	CIA World Fact Book
Island	Dummy variable of 1 if the country is an island, and 0 otherwise	CIA World Fact Book
Legal origins	Dummy variables indicating the legal origins of the country – UK, France (excluded group), Germany, Scandinavia and Socialist	La Porta, Lopez-de-Silanes, and Shleifer (2008)
Precipitation	Minimum monthly precipitation	G-Econ Database
Terrain ruggedness	Index of small-scale terrain irregularities	Nunn and Puga (2012)
Pathogen	Index of historical prevalence of 9 disease-causing pathogens: leishmanias, schistosomes, trypanosomes, leprosy, malaria, typhus, filariae, dengue, and tuberculosis	Murray and Schaller (2010)
Earthquake exposure	Estimated annual physical exposure to earthquakes of MMI categories higher than 5,7,8,9 over the period between 1973 to 2007	UNEP/GRID – Europe (2015)
Years of tertiary education	Average years of tertiary schooling for those age 15 onwards in 1980	Barro and Lee (2013)
GDP	Average GDP per capita from 1981 to 1990, using current US dollar prices	World Bank National Accounts, OECD National Accounts
GDP growth	Average GDP growth per capita from 1981 to 1990, using current US dollar prices	World Bank National Accounts, OECD National Accounts
Generalized trust	Fraction of those who believe that most people can be trusted	World Value Survey 1981-2014 Longitudinal

Table 3.A.2. Descriptive statistics (U.S. Cross-state)

Variable	Obs	Mean	Std.Dev.	Min	Max
Financial account	49	92.892	3.096	85.5	98.1
Savings & checking	49	67.935	9.055	45.6	85.1
R1: Religious participation and values	49	-.568	7.553	-13.701	17.104
R2: Church edifices 1890	49	2.146	.92	.663	4.571
Religiosity	49	.012	.888	-1.354	2.128
Landlocked	49	.551	.503	0	1
Distance to major rivers	49	503000	451000	62249.89	2600000
Elevation	49	237.571	190.553	17	727
Precipitation	49	115.096	135.552	6.827	644.714
Terrain slope	49	.132	.079	.028	.295
Pathogen	49	-.004	.919	-1.464	2.635
Weather hazards	49	7302.857	14622.23	54.541	93660.88

Table 3.A.3. Descriptive statistics (Country-level)

Variable	Obs	Mean	Std.Dev.	Min	Max
Financial account	84	59.17	29.425	6.448	100
Borrow from financial institution	83	13.512	7.55	.419	40.513
Save at financial institution	84	24.887	19.929	.861	78.41
R1: Importance of god	83	.744	.213	.237	.986
R2: Religious attendance	83	.699	.224	.204	.985
R3: Importance of religion	82	.524	.194	.106	.889
REL	84	.033	.965	-2.255	1.355
Catholic	84	.285	.35	0	.969
Protestant	84	.109	.207	0	.974
Muslim	84	.228	.349	0	1
Legal origins – UK	84	.25	.436	0	1
Legal origins - German	84	.202	.404	0	1
Legal origins - Scandinavian	84	.036	.187	0	1
Distance to coast/river	84	.298	.403	.008	2.386
Elevation	84	.607	.46	.009	1.871
Landlocked	84	.19	.395	0	1
Island	84	.071	.259	0	1
Precipitation	84	31.364	30.367	0	148.28
Terrain ruggedness	84	1.338	1.013	.037	4.761
Pathogen	84	.023	.65	-1.31	1.16
Earthquake exposure	73	25907.71	44231.75	0	214000
Years of tertiary education	74	.221	.197	0	.93
GDP	77	4487.026	5830.508	191.9	23841.43
GDP growth	68	.838	2.813	-8.663	8.464
Generalized trust	70	.244	.155	.035	.693

Table 3.A.4: Cross-state estimates of religiosity and the prevalence of banking accounts

	(1)	(2)	(3)	(4)	(5)	(6)
<i>Panel A: OLS results</i>						
<i>Dependent variable: prevalence of banking accounts</i>						
R1: importance of god	-0.658*** (-5.578)			-0.691*** (-6.024)		
R2: importance of religion		-0.359** (-2.471)			-0.411** (-2.643)	
REL (1 st PC of R1, R2)			-0.578*** (-5.083)			-0.620*** (-5.535)
Baseline controls	No	No	No	Yes	Yes	Yes
R-squared	0.433	0.129	0.334	0.519	0.194	0.408
Number of observations	49	49	49	49	49	49
<i>Panel B: IV – Second stage results</i>						
<i>Dependent variable: prevalence of banking accounts</i>						
R1: importance of god	-1.190*** (-5.281)			-1.049*** (-7.406)		
R2: importance of religion		-1.272*** (-3.895)			-1.838*** (-3.165)	
REL (1 st PC of R1, R2)			-1.086*** (-5.578)			-1.176*** (-5.535)
Baseline controls	No	No	No	Yes	Yes	Yes
R-squared	0.150	0.0	0.076	0.385	0.0	0.130
Number of observations	49	49	49	49	49	49
<i>Panel C: IV – First stage results</i>						
<i>Dependent variable: REL</i>						
pathogen	0.540*** (4.256)	0.505*** (4.456)	0.592*** (5.416)	0.762*** (6.583)	0.435*** (3.128)	0.680*** (5.412)
R-squared	0.292	0.255	0.350	0.470	0.360	0.438
Number of observations	49	49	49	49	49	49
1 st stage F-statistic	18.115	19.854	29.329	43.342	9.786	29.286

Notes: This table reports the U.S. state-level results using the percentage of those who have a banking account as the dependent variable. Panel A reports the OLS estimates, panel B reports the IV second stage estimates using historical state-level pathogen prevalence as an instrument for measures of religiosity, and panel C reports the corresponding first stage estimates. Columns 1 to 3 present the bivariate estimates while the estimates in columns 4 to 6 are conditional on a range of geographical controls.

The coefficient values correspond to standardized beta coefficients and figures in the parenthesis indicate t-statistics. *, ** and *** denote significance at the 10, 5 and 1 percent levels respectively.

Table 3.A.5: Cross-country estimates using other measures of financial inclusiveness

	(1)	(2)	(3)	(4)
<i>Panel A: OLS – Dependent variable: prevalence of savings</i>				
R1: importance of god	-0.527*** (-5.445)			
R2: importance of religion		-0.409*** (-3.409)		
R3: religious attendance			-0.194* (-1.860)	
REL (1 st PC of R1, R2, R3)				-0.394*** (-3.515)
Baseline controls	Yes	Yes	Yes	Yes
R-squared	0.747	0.720	0.695	0.699
Number of observations	83	83	82	84
<i>Panel B: 2SLS second-stage estimates – Dependent variable: prevalence of savings</i>				
R1: importance of god	-0.350 (-1.067)			
R2: importance of religion		-0.347 (-1.327)		
R3: religious attendance			-0.174 (-1.046)	
REL (1 st PC of R1, R2, R3)				-0.289 (-1.224)
Baseline controls	Yes	Yes	Yes	Yes
R-squared	0.736	0.719	0.694	0.695
Number of observations	83	83	82	84
1 st stage F-statistic	6.28	13.81	20.74	14.57
<i>Panel C: OLS – Dependent variable: prevalence of borrowing</i>				
R1: importance of god	-0.317** (-2.573)			
R2: importance of religion		-0.329** (-2.373)		
R3: religious attendance			-0.296*** (-3.054)	
REL (1 st PC of R1, R2, R3)				-0.355*** (-2.873)
Baseline controls	Yes	Yes	Yes	Yes
R-squared	0.349	0.391	0.412	0.141
Number of observations	82	82	81	82
<i>Panel D: 2SLS second-stage estimates – Dependent variable: prevalence of borrowing</i>				
R1: importance of god	-1.325* (-1.906)			
R2: importance of religion		-1.166** (-2.333)		
R3: religious attendance			-0.672** (-2.510)	
REL (1 st PC of R1, R2, R3)				-0.908** (-2.326)
Baseline controls	Yes	Yes	Yes	Yes
R-squared	0.00	0.155	0.335	0.237
Number of observations	82	82	81	83
1 st stage F-statistic	5.92	13.40	20.40	14.08

Notes: This table reports the cross-country results using other measures of financial inclusiveness as the dependent variable. Panels A and B report the respective OLS and 2SLS estimates of the percentage of those who have saved at a financial institution in the past year on measures of religiosity. Panels C and D report the respective OLS and 2SLS estimates using the percentage of those who have borrowed from a financial institution in the past year as the dependent variable. All estimates are conditional on religious composition controls, legal origin controls, and a range of geographical controls. The coefficient values correspond to standardized beta coefficients and figures in the parenthesis indicate t-statistics. *, **, and *** denote significance at the 10, 5 and 1 percent levels respectively.

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