

Religious heterogeneity and sovereign debt risk: An empirical analysis of “Belt and Road” countries

*Wang Lu¹, Li Yanxi², He Chao³ and Wang Danyang⁴

¹Doctoral candidate, Faculty of Management and Economics, Dalian University of Technology

²Professor, PhD. Candidate Supervisor, Faculty of Management and Economics, Dalian University of Technology

³Doctoral candidate, Faculty of Management and Economics, Dalian University of Technology

⁴Lecturer, College of Comprehensive Foundation Studies, Liaoning University

*Corresponding Author Email address: luwang1206@hotmail.com¹, Tel. +86 159 9836 5839



Corresponding Author

Wang Lu

Doctoral candidate, Faculty of
Management and Economics,
Dalian University of Technology

*Corresponding Author's Email:
luwang1206@hotmail.com¹, Tel.
+86 159 9836 5839

Abstract

Given the importance of the conflict dimension of religious heterogeneity, this paper explores empirically the effect of religious heterogeneity on sovereign debt risk from three dimensions: religious diversity, religious polarization and religious concentration. The research results show that both religious diversity and polarization lead to higher level of sovereign debt risk as they increase probability of internal conflict, government consumption, and cost of debt. On the contrary, religious concentration reduces sovereign debt risk through mitigating internal conflicts and reducing transaction costs. Further studies indicate that international cooperation plays a moderating role between religious heterogeneity and sovereign debt risk. This paper contributes to the existing literatures with innovative refinement and supplementation, and proposes that religious heterogeneity should be taken into consideration in the assessment of sovereign debt risk.

Key words: religious heterogeneity, sovereign debt risk, “Belt and Road” Initiative, international cooperation

Introduction

In recent years, economic consequences of religious heterogeneity have drawn increasing concern worldwide. With respect to the role it might play, religion is often associated with exchange and interpretation of information, willingness to communicate, mutual trust, and attribution of motivation. Religious people usually have a broad set of beliefs, values and norms which are shared across adherents and passed down from

generation to generation (Dow *et al.*, 2016; Voicu, 2016), and might have significant impacts on people's preference, communication, and decision-making process. However, there are huge differences in the doctrines and values across different religions.

With those disparities, religious heterogeneity could cause conflicts on many occasions, which will lead to social and political instability or even civil wars resulting in worse-off economic outcome and high fiscal expenditure (Triandis, 2000; Montalvo & Reynal-Querol, 2005b;

Peace, 2020). Besides, potential conflicts caused by religious heterogeneity increase cost of debt and induce rent-seeking activities which will raise government expense. All these issues could damage both short-term and long-term solvency of a nation (Alesina *et al.*, 2001). Therefore, this paper aims to explore the relationship between religious heterogeneity and sovereign debt risk.

Sovereign debt, though well understood in theory, has been ignored by empirical research. Existing risk assessments of sovereign debt have been focusing exclusively on macroeconomic fundamentals. Alesina & Tabellini (1990) are the first to incorporate political uncertainty into debt risk models, after which the academics began to consider the effects of non-economic factors on sovereign debt risk. Candelon & Palm (2010) point out that one of the important factors giving rise to the sovereign debt crisis in Europe is their high social welfare. However, high welfare, as is usually related to developed countries such as US and European countries, might not be a major problem in emerging markets and developing countries. Thus other factors should be explored in order to expand the existing literature about sovereign debt risk.

Existing studies on economic consequences of religious heterogeneity are mainly based on coarse religious divisions, such as Christianity and Islam. In order to present a more comprehensive analysis, we measure religious heterogeneity from a wider range of aspects, including religious diversity, religious polarization and religious concentration, with finer religious divisions, such as Islam Sunni and Islam Shia. The in-depth analysis based on finer division is important in analyzing potential conflicts caused by religious heterogeneity within a country. For example, the confrontation between Islam Sunnis and Islam Shias has resulted in conflicts leading to social and political instability or even civil wars, presenting the necessity to take a finer division into account. Therefore, this paper aims to discuss religious heterogeneity from three more specific aspects and in finer division.

Our study is based on countries participating in the "Belt and Road" Initiative (BRI), which was proposed by Chinese President Xi Jinping in 2013 and aims to deepen strategic mutual trust and to promote win-win cooperation and common development among the countries along the Silk Road Economic Belt and the 21st Century Maritime Silk Road. Most of these countries are emerging markets and developing countries which are in great need of capital to develop their economies, and many of their debts have been piling up for years. Accordingly, their sovereign debt should be paid high attention to so as to prevent risks. Besides, most BRI countries are multi-religious ones featuring a strong religious atmosphere and a long religious history. For them, religion is not only a matter of faith, but also at the core of their culture, economy, society and politics. The BRI region even incorporates the birthplaces of Islam, Buddhism and Christianity, making the effects of religions in BRI countries difficult to be neglected. Therefore, this paper aims to explore the relationship between religious heterogeneity and sovereign debt risk on the basis of BRI countries. Further studies indicate a moderating role

played by international cooperation between religious heterogeneity and sovereign debt risk. This paper contributes to the existing literature on BRI, which has drawn extensive attention worldwide, with innovative refinement and supplementation, and proposes that religious heterogeneity should be taken into consideration when assessing sovereign debt risk.

The rest of this article is organized as follows. In the next section, we review the literature and provide the theoretical background to clarify the relationship between religious heterogeneity and sovereign debt risk. The third section presents the research design, where data, variables and model specification are illustrated. The fourth section provides the empirical analysis. The last section concludes the paper.

Literature Review

Religion and sovereign debt risk

In recent years, the economic consequences of religion begin to attract a growing scholarly interest. As the influence of religion is long-lasting and stable, it constitutes an important part of culture passed down from generation to generation. People's economic attitude, financial development, decision-making and risk preference will all be significantly influenced by their religions.

Since Max Weber (1930), there has been a debate on the influence of religion on individual's economic attitudes. Guiso *et al.* (2003) discussed the relationship between religious beliefs and economic attitudes based on World Values Surveys. The study discusses six respects including economic attitudes toward cooperation, government, working women, legal rules, thriftiness and market economy, and their result reveals that religious beliefs are related to positive economic attitudes, though religious people are more racist. These effects differ across various religious denominations. Overall, they find that Christianity is more positively related to attitudes conducive to economic development.

Qayyum *et al.* (2019) explore the relationship between religion and economic development by using cross sectional data of 110 countries, and the result shows that religion has a positive and statistically significant direct impact on economic development and shadow economy. Additionally, their study investigates the indirect channels by which religion could affect economic development including ethics, poverty alleviation, political participation and social capital.

Williamson & Stulz (2003) find that religions have significant influence on creditors but little on shareholders, indicating that legal origin is essential in explaining shareholder rights. However, the dominant religion explains more about the variation in creditor rights. Catholic countries have a weaker protection on creditors compared with other countries, resulting in the fact that long-term debt tends to be less important in these countries. Moreover, international cooperation and openness can mitigate the impact of religion on creditor rights.

The existing literature also discusses the influence of

religion on the behaviour and decision-making of individuals and enterprises. Porter & Steen (2006) find that 79% investors classify themselves as religious, and 62% of who would be influenced by their religious beliefs in the investing process based on US data.

As an informal institution, religion affects debt risk both directly and indirectly. The direct impact is reflected in the wide range of economic and social issues that religions deal with, including the system of economic decision making, financial system, the allocation of resources, the types of economic freedom, the proper role of government provides social justice and income and wealth distribution. For example, Riba (interest), Gharar (hazard/chance) and Qimar (gambling) are forbidden in Islam. The prohibition of Riba is justified by Shari'ah scholars as a prevention of accumulation of wealth in a few hands whether they are institutions or individuals. Conventional debt markets are restricted in the area where Muslim constitutes a significant portion of the society as they are not compliant with Shariah principles (Hassan, 2012). Schoon & Nuri (2012) find that Judaism also influences the design of corresponding financial instruments.

The indirect impact of religion on debt risk refers to its influence on individual's economic attitude and behaviour. Religion enables individuals to implement the obligations to their God by preventing injustice in acquisition of resources and assets. For example, Islam advocates hard work, thriftiness and honesty but forbids speculations, and it is believed that people only get what they deserve.

Bénabou & Tirole (2006) find that religious effects of individual's beliefs can extend to their perceptions of justice on redistribution of wealth, such as taxation and social welfare. Kumar *et al.* (2011) explore whether geographic variation in religion-induced gambling norms influences aggregate market outcomes. It is discovered that gambling propensity is stronger in regions with higher concentrations of Catholics relative to Protestants. Their findings show that religion affects investors' financial preferences and behaviours. Benjamin *et al.* (2016) analyse how their economic choices are affected by religions, and find that Protestants tend to increase contributions to public goods due to priming effects, while Catholics will reduce contributions to public goods, expect others to contribute less to public goods, and are less risk averse.

Religious Heterogeneity and sovereign debt risk

Compared with the existing literatures on the economic consequences of religions, studies on those of religious heterogeneity are much less. Montalvo & Reynal-Querol (2003) construct an index of polarization and an index of fractionalization, and measure religious heterogeneity by adopting the classification of the World Christian Encyclopaedia. They find that religious heterogeneity has a negative impact on economic development as it reduces investments and increases government consumption and potential conflict. Additionally, they argue that an index of polarization, compared with that of fractionalization, is more appropriate to measure internal

conflict. Mankiw *et al.* (1992) put forward that religious polarization has a significant negative effect on economic development, while the effect of religious fractionalization on economic development is insignificant. Alesina & Zhuravskaya (2011) find that religious diversity has a negative impact on government quality. Alesina *et al.* (2016) discuss the reasons why religious diversity hinders economic development and find that religious diversity leads to disagreements over public policy making as well as hostility and conflict between different groups. On the contrary, there are also existing literatures indicating that diversity promotes economic development. Brunow *et al.* (2015) propose that heterogeneity leads to different production skills and cognitive abilities, which promote innovation and productivity. Ying *et al.* (2017) adopt the indexes of religious fragmentation and polarization as measurements for religious diversity. They explore the relationship between religious diversity and economic development in China, and find that while economic development in the eastern part of China is facilitated by religious fragmentation, that of central and western part of China is positively influenced by religious polarization.

Theory and Hypothesis

Most BRI countries have a strong religious atmosphere and a long religious history. In these countries religion is not only a matter of faith, but also stays at the core of their culture, economy, society and politics. Therefore, the effect of religious heterogeneity should be recognized when assessing their sovereign debt risk. This paper aims to find out whether religious heterogeneity leads to potential conflict or high tolerance in these regions.

Countries joined the BRI project often witness religious disputes. Take Pakistan and India for example, before the partition of India and Pakistan, Muslims are unsatisfied with the fact that the Hindu took the majority in the Congress Party. Nationalists from both religions fought continuously for scarce resources and political patronage from colonial rulers, making violence and conflict inevitable. Religious heterogeneity conforms to the theory of social conflict, that is, scarcity and unfair distribution of social resources are the root causes of social conflicts (Cosser, 1957). Until now, sectarian dispute in Pakistan is still evident, as Sunni extremists continue to attack Shias because of disparities in faith.

Besides, religious tensions in Lebanon are severe. Islam and Christianity in Lebanon have resorted to force in their struggle for power and resources. The conflicts are also serious in Palestine among Judaism, Islam and Christianity and in Iraq between Islam Sunni and Islam Shia. These, accordingly, illustrate that religious heterogeneity is more about conflict than tolerance and peace. Cosser (1957) puts forward that the causes of social conflicts are pluralistic, ranging from faith to social status and resource allocation. Based on the social conflict theory, the more the group disputes over non-realistic issues, the stronger the emotions and involvement aroused in the conflict will be, and therefore the more intense the conflict will be. The conflicts of religion belonging to non-practical issues are more violent. Montalvo & Reynal-Querol (2005a) show in their

research that religious polarization explains the incidence of internal conflicts and civil wars. Therefore, religious heterogeneity could lead to internal conflicts and political instability which would increase the amount of government expenditure and sovereign debt.

Besides, from the perspective of economic development, most countries in the BRI project are emerging markets and developing countries whose governance mechanism brought by formal institution lags far behind that of developed countries such as Britain and the United States. With weaker governance, religious heterogeneity might have a higher probability to trigger rent-seeking behaviours for the benefit of one's own religions (denominations) at the expense of others. Rent-seeking behaviours may redirect resources, violate regulations, and cause bribery (Iqbal & Daly, 2014), increases social costs which cannot be converted into productivity, and damage economic development and financial stability (Montalvo & Reynal-Querol, 2005b). Additionally, the higher political and economic uncertainty aroused by religious heterogeneity will affect the cost of debt and exchange rate negatively. Based on these statements, this paper proposes the following hypothesis:

H1: Religious heterogeneity has a positive effect on sovereign debt risk.

Cultural differences make believers of different religions show disapproval and distrust in interaction. Coleman (1997) proposes that social interaction is an important mechanism that leads to trust, and that interacting frequency has a positive impact on trust building. Macrae (2000) and Fukuyama (2001) come to the same conclusion on culture-trust nexus.

Countries engaged in international cooperation interact with outsiders more frequently. In this way, mutual trust and tolerance are enhanced through communication and understanding. Besides, high frequency of foreign political, economic and cultural interaction can mediate domestic differences and conflicts, as different religions will be urged to seek common ground and set aside differences in their actions and thoughts and to participate in international cooperation for the development of the country. Based on the intergroup contact theory, intergroup contact can improve intergroup relationship only under the mechanism of interdependence. When the groups share common goals, strive for intergroup cooperation or receive the support from the government, intergroup conflicts will be mitigated (Berkowitz & Sherif, 1967). For example, the Pakistani government once forced the leader of Jamayat-E-Islami to promise China that "All religious parties in Pakistan will set Sino-Pakistan friendship above everything else". Therefore, international cooperation can mitigate the negative effects caused by religious conflicts. On basis of these statements, this paper proposes its second hypothesis:

H2: Religious heterogeneity has a negative effect on sovereign debt risk moderated by international cooperation.

Research Design

Data and Variable

The total number of BRI countries varies according to different information sources. It has also been increasing during the past years. Therefore, we choose a conservative definition of 65 countries¹ with reference to the Industrialization of the Belt and Road Countries Report published by the China Academy of Social Science. As China is regarded as atheistic by the World Christian Encyclopaedia (Barret, 1982), it is excluded from the sample of BRI countries. Therefore, our initial sample consists of data of 65 BRI countries from 2008 to 2017. Country-year observations with incomplete information are excluded to obtain a total of 490 country-year observations.

Sovereign debt risk will be regarded high if the government has a high propensity of failing to service its debt in the absence of adjustment (IMF, 2002). Two aspects are encompassed here: solvency and liquidity. Debt solvency refers to the account surplus that can repay the debt of the principal and interest. From the sustainable point of view, it means that the discounted value of current and future expenditures shall not be greater than the discounted value of current and future incomes minus earlier liabilities. In terms of liquidity, there will be a lack of liquidity if a country's liquid assets and available financing are insufficient to roll over maturing debt. In the case of illiquidity, the interest rate of debt will rise, which may lead to the difficulty of refinancing the country, and the marginal interest rate can be infinite, ultimately affecting the solvency of the country. In fact, solvency and liquidity cannot be clearly distinguished. Debt sustainability requires both solvency and liquidity. Therefore, this paper selects three indicators (fordebt, debtserv, Intlq) to measure sovereign debt risk from both solvency and liquidity perspectives, in consistent with Kraay (2006).

In order to measure religious diversity, the paper calculates two indexes: Score and Frac. Score refers to the total number of major religions in a country. A major religion is defined, in consistent with Dow *et al.* (2016), as any religion to which more than 20% of the population claims an affiliation. Within a religion that is deemed "major", only the divisions which represent more than 25% of that religion's adherents are deemed applicable to our analysis. For example, Sunni Muslims should represent more than 25% of a country's Muslims to be regarded as a "major" group. Each major religion and denomination has been counted and summed up to get the Score.

The other index of religious diversity is Frac, also

¹ Afghanistan, Albania, Armenia, Azerbaijan, Bahrain, Bangladesh, Belarus, Bhutan, Bosnia and Herzegovina, Brunei, Bulgaria, Cambodia, Croatia, Czech Republic, East Timor, Egypt, Estonia, Georgia, Hungary, India, Indonesia, Iran, Iraq, Israel, Jordan, Kazakhstan, Kuwait, Kyrgyzstan, Laos, Latvia, Lebanon, Lithuania, Malaysia, Maldives, Moldova, Mongolia, Myanmar, Nepal, Oman, Pakistan, Palestine, Philippines, Poland, Qatar, Romania, Russia, Saudi Arabia, Serbia, Serbia & Montenegro, Singapore, Slovakia, Slovenia, Sri Lanka, Syria, Tajikistan, Thailand, Turkey, Turkmenistan, Ukraine, United Arab Emirates, Uzbekistan, Vietnam, Yemen, Yugoslav Macedonia.

called ethnolinguistic fractionalization. It is constructed by Taylor & Hudson (1972) and is the most widely used index of fractionalization. A fractionalization index, *Frac*, is defined as

$$\text{Frac}_i = 1 - \sum_{i=1}^N \pi_i^2$$

Where π_i is the percentage of individuals belonging to religious group *i*. The index can be interpreted as measuring the probability that two randomly selected individuals in a country belonging to different religious groups. The index *Frac* ranges between 0 and 1 and it increases as the number of groups increases. The larger the value is, the more religiously diversified a country is.

Religious polarization refers to the proximity of the number of adherents of major religions (denominations). With equal number of religions, the closer the proportion of adherents of each religion is, the higher the degree of religious polarization is. This index, proposed by Montalvo & Reynal-Querol (2005b), emphasizes the conflict dimension of religious heterogeneity and is calculated as follows:

$$\text{Pol}_i = 1 - \sum_{i=1}^N \left(\frac{0.5 - \pi_i}{0.5} \right)^2 \pi_i$$

Where π_i is the percentage of individuals belonging to religious group *i*. The index *Pol* ranges from 0 to 1 and it reaches a maximum when there are two religious groups of equal size. Ying *et al.* (2017) use this index to examine the relationship between religious heterogeneity and regional economic development.

This study uses the proportion of the largest religion to measure religious harmony following La Porta *et al.* (1999). The largest religious belief would be regarded as the mainstream value, and the value of others takes free-riding. The more concentrated the largest religion is, the more harmonious all religions are.

This paper also adopts the number of Bilateral Investment Treaties (BIT) signed by a country as an indicator of international cooperation. BIT is signed between two governments to promote bilateral investment between signatories. The existing literatures show that BIT significantly facilitates foreign capital inflow (Busse & Nunnenkamp, 2010; Desbordes & Vicard, 2009; Neumayer & Spess, 2005). This indicator reflects the level of openness and cooperation at the national level. According to United Nations Conference on Trade and Development (UNCTD), the total number of BITs around the world has reached 2,902 by 2019, and among which, that of BRI countries accounted for approximately 46%². In addition, this study uses the expectation towards BRI from the public as another indicator to reflect the openness and cooperation at the public level.

In order to explore the relationship between religious

diversity and sovereign debt risk, this paper controls the factors of economy, formal institution and informal institution consistent with Elgin & Uras (2013). All variables are specified in Table 1.

² Data source: UNCTAD database from: <https://investmentpolicy.unctad.org/international-investment-agreements>

Table 1: Definition and calculation of variables

Sovereign debt risk	Fordebt	Gross foreign debt in a given year is divided by the Gross Domestic Product. It is rescaled and converted to a risk point with the highest risk of 50 and lowest risk of 0.	World Bank
	Debtse rv	The foreign debt service, for a given year, is divided by the sum of the total exports of goods and services for that year. It is rescaled and converted to a risk point with the highest risk of 50 and lowest risk of 0.	
	Intliq	The total official reserves for a given year, including official holdings of gold, but excluding the use of IMF credits and the foreign liabilities of the monetary authorities, is divided by the average monthly merchandise import cost. It is rescaled and converted to a risk point with the highest risk of 50 and lowest risk of 0.	
Religion	Score	Agent of religious diversity and calculated as the total number of major religions and denominations.	World Christian Encyclopedia (Barret, 1982), The World Fact book
	Frac	Agent of religious diversity and calculated as follows: $\text{Frac}_i = 1 - \sum_{i=1}^N \pi_i^2$	
	Pol	Agent of religious polarization and calculated as follows: $\text{Pol}_i = 1 - \sum_{i=1}^N \left(\frac{0.5 - \pi_i}{0.5} \right)^2 \pi_i$	
	Per	Agent of religious harmony and calculated as the largest percentage of the religion.	
International cooperation	BIT	The total number of Bilateral Investment Treaties (BIT) signed by a country.	UNCTAD
	Exp	The expectation towards " Belt and Road" cooperation from the public.	CSMAR database
Economic factors	GDPp	Economic development: the natural logarithm of Gross Domestic Product per capita	World Bank and IMF
	Growth	Economic growth: the growth rate of Gross Domestic Product	
	Infl	Inflation rate: inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services.	
	Unem	Long-term unemployment rate	
Formal institution	Law	Law refers to the strength and impartiality of the legal system is considered, while Order is an assessment of popular observance of the law. A high value refers to an effective judicial system and sanction.	ICRG
	Stab	Government stability: the government's ability to carry out its declared program(s), and its ability to stay in office.	
Informal institution	Bureau	Bureaucracy quality: the institutional strength and quality of the bureaucracy. High value refers to countries where the bureaucracy has the strength and expertise to govern without drastic changes in policy or interruptions in government services.	
	Democ	Democratic accountability: a measure of how responsive government is to its people.	

Model Specification

In order to test the hypothesis, this paper includes all available control variables to be consistent with the above literature and constructs a multilinear regression model by applying the ordinary least square method. The regression equations are constructed as follow:

$$\text{Sustain} = \beta_0 + \beta_1 \text{Religion} + \beta_2 \text{GDPp} + \beta_3 \text{Growth} + \beta_4 \text{Inf} + \beta_5 \text{Unem} + \beta_6 \text{Law} + \beta_7 \text{Stab} + \beta_8 \text{Bureau} + \beta_9 \text{Democ} + \varepsilon \dots\dots\dots (1)$$

$$\text{Sustain} = \beta_0 + \beta_1 \text{Religion} + \beta_2 \text{Coop} + \beta_3 \text{Div} \times \text{Coop} + \beta_4 \text{GDPp} + \beta_5 \text{Growth} + \beta_6 \text{Inf} + \beta_7 \text{Unem} + \beta_8 \text{Law} + \beta_9 \text{Stab} + \beta_{10} \text{Bureau} + \beta_{11} \text{Democ} + \varepsilon \dots\dots\dots (2)$$

The relationship between religion heterogeneity and sovereign debt risk is explored by controlling other economic and institutional factors in model 1. In order to explore the moderating effect, an interaction term of religious heterogeneity and international cooperation is added to the regression in model 2.

Empirical Results

Table 2 presents the summary statistics. The mean values of the variables are close to the median, indicating that the sample tends to be normally distributed. The differences in sovereign debt risk among countries are obvious. The average of Score is 1.354 and that of Frac is 0.308, indicating religious diversification. The standard deviation of Frac is 0.127, indicating that the level of religious diversity varies greatly among countries. Table 3 shows the results of Pearson's correlation coefficient matrix between variables, where no multicollinearity problem has been found.

Table 2: Summary statistics

	N	Min	Max	Mean	Median	Stdev
Fordebt	490	0	49.167	23.731	21.875	6.437
Debtsev	490	0	50	5.501	2.500	9.597
Intliq	490	0	49.167	22.721	20	8.274
Score	490	1	3	1.354	1	0.559
Frac	490	0.003	0.953	0.308	0.288	0.127
Pol	490	0.008	0.999	0.507	0.534	0.138
Per	490	0.049	0.990	0.728	0.819	0.249
BIT	490	1	119	52.456	49	23.101
Exp	490	0.720	3.910	2.223	2.310	0.95
GDPp	490	-37.147	19.592	3.009	3.393	3.262
Growth	490	2.258	7.949	4.734	4.761	0.599
Infl	490	-26.866	75.201	5.420	3.539	5.577
Unem	490	0.136	24	6.996	4.949	3.274
Law	490	1.500	5	3.661	4	0.652
Stab	490	4.042	11.5	7.328	7.5	1.277
Bureau	490	0.167	6	3.629	4	0.915
Democ	490	1	4	2.026	2	0.475

Table 3: Correlation coefficient matrix

	Fordebt	Debtserv	IntLiq	Score	Frac	Pol	Per	BIT	Exp	GDPp	Growt	Infl	Unem	Law	Stab	Bureau	Democ
Fordebt	1																
Debtserv	0.548	1															
IntLiq	0.375	0.311	1														
Score	0.169	0.109	0.188	1													
Frac	0.243	0.122	0.076	0.030	1												
Pol	0.306	0.061	0.077	0.067	0.683	1											
Per	-0.303	-0.186	-0.145	-0.030	-0.718	-0.655	1										
BIT	0.106	0.077	0.024	-0.194	0.175	0.135	-0.150	1									
Exp	-0.299	-0.284	-0.278	-0.059	0.215	0.112	-0.045	0.237	1								
GDPp	-0.091	-0.214	-0.232	0.182	0.228	0.175	-0.116	-0.131	0.300	1							
Growt	-0.092	-0.069	-0.024	-0.022	-0.042	0.015	0.068	-0.088	0.221	0.179	1						
Infl	-0.051	-0.014	0.157	-0.060	0.039	-0.072	0.037	0.085	0.141	-0.005	0.059	1					
Unem	0.283	0.321	0.055	-0.158	0.063	-0.057	-0.088	0.234	-0.359	-0.057	-0.193	-0.033	1				
Law	0.094	0.084	0.026	-0.028	0.084	0.303	-0.292	0.190	-0.080	-0.174	-0.050	-0.131	-0.018	1			
Stab	-0.242	-0.106	0.012	-0.116	0.086	0.122	-0.079	-0.231	0.004	-0.049	0.195	-0.067	-0.144	0.249	1		
Bureau	0.027	0.065	-0.059	-0.122	0.168	0.405	-0.257	0.039	0.143	0.027	0.025	-0.281	0.046	0.430	0.080	1	
Democ	0.468	0.317	0.014	-0.001	0.099	0.181	-0.128	0.273	-0.063	0.021	-0.061	-0.132	0.368	-0.061	-0.481	0.311	1

Table 4 reports the main regression results of model 1. When Fordebt is used as the dependent variable, the adjusted R-square is 0.210 for Score and 0.354 for Frac, indicating all regressions have good explanatory power and the F-statistics in all cases reject the null hypothesis of joint insignificance. The coefficient of Score is 0.189 and is positively significant at 1% level, showing that sovereign debt risk rises as the number of major religions increases in a country. The coefficient of Frac is 0.226 and positively significant at 1% level as well.

The coefficient of Pol is 0.332 and is significant at 1% level, revealing that the religious polarization has a positive effect on sovereign debt risk. The adjusted

R-square is 0.389, demonstrating good explanatory power and the F-statistic of 32.718 rejects the null hypothesis of joint insignificance as well. According to rent-seeking theory, social costs are higher and social tensions emerge more easily when population is distributed in two groups of equal size (Montalvo & Reynal-Querol, 2005b). More government expenditures are spent on dealing with the internal conflicts, raising the sovereign debt risk. Our findings are consistent with that of Montalvo & Reynal-Querol (2003), who find that religious polarization has a negative impact on investment and increases government expense.

The results in Table 4 show a negative relationship

between religious harmony and sovereign debt risk. Specifically, the coefficient of Per is -0.261 and is negatively significant at 1% level. The adjusted R-square is 0.333 and the F-statistic of 27.016 rejects the null hypothesis of joint insignificance as well. When a major religion dominates, the mainstream value is obvious, and that will lay a common value basis for individuals' decision-making. Social tension and potential conflicts would also be mitigated. Public expenses would be

reduced or diverted into more productive area for more economic value to be created. Apart from that, common value reduces communication obstacle and transaction costs, which would be beneficial to the overall economy. Therefore, religious harmony reduces sovereign debt risk. When using Debtserv and Intlq as the dependent variables, the regression results reflect same conclusions, which are consistent with the existing literatures (Alesina *et al.*, 2003).

Table 4: Religious heterogeneity and sovereign debt risk

	Fordebt				Debtsev				IntLiq			
Score	0.189*** (4.668)				0.194*** (4.489)				0.166*** (3.558)			
Frac	0.226*** (5.544)				0.106** (2.312)				0.104** (2.094)			
Pol	0.332*** (7.601)				0.042 (0.822)				0.135** (2.472)			
Per	-0.261*** (-6.345)				-0.144** (-3.186)				-0.195** (-4.053)			
GDPp	-0.026 (-0.643)	-0.010 (-0.249)	-0.031 (-0.769)	-0.038 (-0.956)	-0.127** (-2.921)	-0.099** (-2.132)	-0.080* (-1.712)	-0.116** (-2.647)	-0.147** (-3.126)	-0.148** (-2.934)	-0.153** (-3.040)	-0.215** (-4.599)
Growt h	-0.010 (-0.238)	0.022 (0.543)	0.020 (0.507)	0.008 (0.206)	0.025 (0.571)	0.021 (0.460)	0.011 (0.250)	0.031 (0.694)	0.001 (0.020)	0.038 (0.770)	0.036 (0.728)	0.029 (0.607)
Infl	0.005 (0.131)	-0.069* (-1.726)	-0.063 (-1.629)	-0.024 (-0.587)	0.074* (1.681)	0.037 (0.816)	0.043 (0.956)	0.050 (1.142)	0.172*** (3.642)	0.145*** (2.986)	0.148*** (3.065)	0.175*** (3.724)
Unem	0.152*** (3.522)	0.129*** (3.103)	0.177*** (4.333)	0.102** (2.451)	0.308*** (6.669)	0.269*** (5.748)	0.276*** (5.828)	0.262*** (5.714)	-0.015 (-0.297)	0.042 (0.832)	0.062 (1.213)	0.010 (0.215)
Law	0.223*** (4.885)	0.249*** (5.493)	0.197*** (4.397)	0.166*** (3.582)	0.104** (2.129)	0.114** (2.240)	0.110** (2.118)	0.079 (1.552)	0.048 (0.904)	0.058 (1.045)	0.037 (0.660)	-0.019 (-0.354)
Stab	0.009 (0.175)	-0.049 (-1.000)	-0.078 (-1.616)	-0.036 (-0.755)	0.055 (1.052)	0.005 (0.089)	0.018 (0.328)	0.022 (0.426)	0.039 (0.693)	0.014 (0.227)	0.005 (0.077)	0.032 (0.562)
Burea u	-0.210** (-4.313)	-0.296** (-6.270)	-0.353** (-7.506)	-0.267*** (-5.627)	-0.034 (-0.659)	-0.073 (-1.380)	-0.071 (-1.299)	-0.082 (-1.568)	-0.072 (-1.279)	0.109* (1.723)	-0.097 (-1.647)	-0.059 (-1.056)
Democ	0.474*** (9.024)	0.482*** (9.292)	0.426*** (8.270)	0.460*** (8.906)	0.246*** (4.386)	0.240*** (4.122)	0.248*** (4.137)	0.248*** (4.369)	0.098 (1.610)	-0.075 (-1.307)	0.088 (1.373)	0.053 (0.882)
R ²	0.225	0.367	0.401	0.346	0.225	0.200	0.192	0.209	0.098	0.063	0.066	0.105
Adj-R ²	0.210	0.354	0.389	0.333	0.210	0.184	0.175	0.193	0.080	0.044	0.047	0.087
F	14.813** (*)	28.283** (*)	32.718** (*)	27.016	14.813** (*)	12.207** (*)	11.566** (*)	13.440** (*)	5.517***	3.267***	3.469***	5.968***

*** Significant at the 1% level, ** significant at the 5%, * significant at the 10%.

Table 5 reports the regression results of model 2 with Panel A providing the regression results of BIT as a moderating variable between religious diversity and sovereign debt risk. The coefficient of Frac is 0.151 and that of Frac×BIT is -0.169, which are both significant at 1% level. The adjusted R-square is 0.210 and the F-statistic of 12.076 rejects the null hypothesis of joint insignificance as well. This means that BIT plays a significant moderating role in the relationship between religious diversity and sovereign debt risk. Specifically, with higher

international cooperation, the positive impact of religious diversity on sovereign debt risk has been mitigated. On top of that, the coefficient of Pol×BIT is statistically significant as well, revealing the moderating effect of BIT in the relationship between religious diversity and sovereign debt risk. The moderating effect of international cooperation is reported in Panel B, where another indicator (Exp) is adopted. The results of using these two indicators remain consistent.

Table 5: Religious heterogeneity, international cooperation and sovereign debt risk
Panel A

	Fordebt		Debtsev		IntLiq	
Frac	0.233*** (5.613)		0.151*** (3.300)		0.138*** (2.821)	
Frac×BIT	-0.036 (-0.791)		-0.169*** (-3.355)		-0.298*** (-5.542)	
Pol		0.275*** (6.423)		0.052 (1.084)		0.085 (1.622)
Pol×BIT		0.068 (1.454)		-0.150*** (-2.866)		-0.185*** (-3.243)
BIT	-0.177*** (-3.964)	-0.121*** (-2.567)	-0.153*** (-3.105)	-0.159*** (-2.989)	-0.153*** (-2.900)	-0.150*** (-2.606)
GDPp	-0.011 (-0.257)	-0.034 (-0.820)	-0.082* (-1.783)	-0.055 (-1.174)	-0.093* (-1.873)	-0.097* (-1.906)
Growth	0.011 (0.268)	-0.002 (-0.057)	0.033 (0.734)	0.015 (0.344)	0.032 (0.678)	0.014 (0.292)
Inf	-0.050 (-1.267)	-0.042 (-1.059)	0.038 (0.873)	0.040 (0.909)	0.143*** (3.047)	0.143*** (2.978)
Unem	0.133*** (3.113)	0.184*** (4.350)	0.252*** (5.336)	0.267*** (5.607)	-0.019 (-0.368)	0.019 (0.370)
Law	0.275*** (5.916)	0.224*** (4.818)	0.131** (2.555)	0.138*** (2.618)	0.037 (0.668)	0.047 (0.819)
Stab	-0.030 (-0.614)	-0.025 (-0.509)	-0.016 (-0.299)	-0.002 (-0.038)	0.048 (0.819)	0.053 (0.888)
Bureau	-0.297*** (-5.988)	-0.297*** (-6.052)	-0.143*** (-2.602)	-0.124** (-2.247)	-0.156*** (-2.654)	-0.112* (-1.859)
Democ	0.531*** (9.955)	0.463*** (8.578)	0.299*** (5.086)	0.306*** (5.025)	0.199*** (3.155)	0.172*** (2.597)
R ²	0.366	0.383	0.229	0.213	0.116	0.075
Adj-R ²	0.351	0.368	0.210	0.194	0.094	0.052
F	23.484***	25.227***	12.076***	11.009***	5.311***	3.283***

Panel B

	Fordebt		Debtserv		IntLiq	
Frac	0.289*** (6.873)		0.165*** (3.487)		0.203*** (4.142)	
Frac×Exp	-0.131* (-1.775)		-0.165*** (-3.343)		-0.252*** (-4.934)	
Exp	-0.136* (-1.849)		-0.047 (-0.908)		-0.275*** (-5.177)	
Pol		0.318*** (7.234)		0.035 (0.717)		0.064 (1.275)
Pol×Exp		0.073 (0.871)		-0.081* (-1.719)		-0.126** (-2.559)
Exp		-0.241*** (-2.781)		-0.062 (-1.237)		-0.309*** (-5.910)
GDPp	0.039 (0.954)	0.010** (0.250)	-0.074 (-1.595)	-0.043 (-0.881)	-0.057 (-1.195)	-0.023 (-0.457)
Growth	0.045 (1.127)	0.039 (0.987)	0.021 (0.468)	0.018 (0.395)	0.038 (0.825)	0.040 (0.845)
Inf	-0.042 (-1.072)	-0.041 (-1.073)	0.038 (0.866)	0.038 (0.852)	0.175*** (3.844)	0.173*** (3.678)
Unem	0.042 (0.966)	0.114*** (2.663)	0.229*** (4.675)	0.235*** (4.600)	-0.102** (-2.016)	-0.099* (-1.864)
Law	0.234*** (5.249)	0.177*** (3.994)	0.127** (2.514)	0.095* (1.831)	0.036 (0.701)	-0.019 (-0.344)
Stab	-0.073 (-1.521)	-0.089* (-1.889)	0.007 (0.121)	0.021 (0.377)	0.044 (0.777)	0.054 (0.947)
Bureau	-0.262*** (-5.375)	-0.295*** (-6.021)	-0.101* (-1.836)	-0.072 (-1.286)	-0.040 (-0.698)	0.001 (0.014)
Democ	0.448*** (8.808)	0.423*** (8.315)	0.204*** (3.516)	0.263*** (4.386)	0.043 (0.720)	0.120* (1.922)
R ²	0.411	0.424	0.225	0.200	0.172	0.129
Adj-R ²	0.396	0.41	0.206	0.181	0.152	0.107
F	27.751***	29.298***	11.797***	10.171***	8.449***	6.006***

*** Significant at the 1% level, ** significant at the 5%, * significant at the 10%.

Robustness tests have also been conducted. Firstly, financial risk rating provided by ICRG, which gives a comprehensive assessment of a country's financial risk, is employed as an explanatory variable. The empirical results show that religious heterogeneity has a positive impact on financial risk and the moderating effect of international cooperation is significant as well. Besides, considering the heteroscedasticity issue, the model is regressed to obtain the standard error of heteroscedasticity robustness.

Conclusion

The existing research on sovereign debt risk mainly focuses on legal and political stability and other formal institutions (Alesina & Tabellini, 1990; Candelon & Palm, 2010). Studies on the impact of informal institutions such

as religion and culture on debt risk are limited. Therefore, this paper takes informal institutional factors into account and explores the relationship between religious heterogeneity and sovereign debt risk by drawing on data from 65 BRI countries during the period from 2008 to 2017.

Given the importance of conflict of religious heterogeneity, this paper analyses the impact of religion on sovereign debt risk from three dimensions: religious diversity, religious polarization and religious concentration, contributing to the existing literature with innovative refinement and supplementation. Results show that both religious diversity and polarization have negative impact on sovereign debt risk through increase of cost of debt, government consumption, and probability of internal conflict. On the contrary, religious concentration improves sovereign debt risk. Further

studies uncover the moderating effect of international cooperation between religious heterogeneity and sovereign debt risk. This paper concludes and proposes that the religious heterogeneity should be taken into consideration in the assessment of sovereign debt risk, and demonstrates that international cooperation can mitigate the adverse effect of religious heterogeneity on sovereign debt risk. Our main contributions are that we analyse the informal institutional environment in depth, supplement the existing research of sovereign debt risk with informal institutional factors, and emphasize the importance of religion when assessing debt risk.

Acknowledgement

The authors wish to express their sincere gratitude to the National Social Science Foundation of China for funding this research under the Grant/Award Number: 18ZDA095.

References

- Alesina, A., Devleeschauwer, A., Easterly, W., Kurlat, S., Wacziarg, R. (2003). Fractionalization. *Journal of Economic Growth*, 8(2), 155-194.
- Alesina, A., Harnoss, J., Rapoport, H. (2016). Birthplace Diversity and Economic Prosperity. *Journal of Economic Growth*, 21(2), 101-138.
- Alesina, A., Tabellini, G. A. (1990). Positive Theory of Fiscal Deficits and Government Debt. *Review of Economic Studies*, 57(6), 403-414.
- Alesina, A., Zhuravskaya, E. (2011). Segregation and the Quality of Government in a Cross Section of Countries. *American Economic Review*, 101(5), 1872-1911.
- Barret, D. (1982) *The World Christian Encyclopedia*. Oxford University Press.
- Bénabou, R., Tirole, J. (2006). Belief in a Just World and Redistributive Politics. *Quarterly Journal of Economics*, 121(2), 699-746.
- Benjamin, D. J., Choi, J. J., Fisher G. (2016) Religious Identity and Economic Behavior. *Review of Economics and Statistics*, 98(4), 617-637.
- Berkowitz, L., Sherif, M. (1967) In Common Predicament: Social Psychology of Intergroup Conflict and Cooperation. 32(2), 333-334.
- Busse, M., Nunnenkamp, J. K. (2010) FDI Promotion through Bilateral Investment Treaties: More than a Bit? *Review of World Economics*, 146(1), 147-177.
- Candelon, B., Palm, F. C. (2010). Erratum to: Banking and Debt Crises in Europe: The Dangerous Liaisons? *De Economist*, 158(3):337-340.
- Coleman, M. (1997). Trust: The Basis of Capitalism. *Studies: An Irish Quarterly Review*, 86(342), 156-164.
- Coser, L. (1957) Social Conflict and the Theory of Social Change. *British Journal of Sociology*, 8(3), 197-207.
- Desbordes, R., Vicard, V. (2009) Foreign Direct Investment and Bilateral Investment Treaties: An International Political Perspective. *Journal of Comparative Economics*, 37(3), 300-386.
- Dow, D., Cuypers, I. R. P., Ertug, G. (2016) The Effects of within-Country Linguistic and Religious Diversity on Foreign Acquisitions. *Journal of International Business Studies*, 47(3), 319-346.
- Elgin, C., Uras, B. R. (2013) Public Debt, Sovereign Default Risk and Shadow Economy. *Journal of Financial Stability*, 9(4), 628-640.
- Fukuyama, F. (2001) Social Capital, Civil Society and Development. *Third World Quarterly*, 22(1), 7-20.
- Guiso, L., Sapienza, P., Zingales, L. (2003). People's Opium? Religion and Economic Attitudes, *Journal of Monetary Economics*, 50(1), 225-282.
- Hassan, K. A. (2012). Comparison between Sukuk and Conventional Bonds: Value at Risk Approach. *Social Science Electronic Publishing*.
- IMF. (2002) Assessing Risk, IMF Staff Paper, No.02/28/2002.
- Iqbal, N., Daly, V. (2014). Rent seeking opportunities and economic growth in transitional economies. *Economic Modelling*, 37, 16-22.
- Kraay, A. (2006) When Is External Debt Sustainable? *World Bank Economic Review*, 20(3), 341-365.
- Kumar, A., Page, J. K., Spalt, O. G. (2011) Religious Beliefs, Gambling Attitudes, and Financial Market Outcomes. *Journal of Financial Economics*, 102(3), 671-708.
- La Porta, R., Lopez-De-Silanes, F., Shleifer, A., Vishny, R. (1999). The Quality of Government. *Journal of Law Economics and Organization*, 15(1), 222-279.
- Macrae, C. (2000) .Trust: The Social Virtues and the Creation of Prosperity. *Journal of Brand Management*, 7(4), 309-319
- Mankiw, N., Romer, D., Weil, D. A. (1992). Contribution to the Empirics of Economic Growth. *Quarterly Journal of Economics*, 107(2), 407-437.
- Montalvo, J. G., Reynal-Querol, M. (2005a). Ethnic Polarization, Potential Conflict, and Civil Wars. *American Economic Review*, 95(3), 796-816.
- Montalvo, J. G. Reynal-Querol, M. (2005b). Ethnic Diversity and Economic Development. *Journal of Development Economics*, 76(2), 293-323.
- Montalvo, J. G., Reynal-Querol, M. (2003). Religious Polarization and Economic Development. *Economics Letters*, 80(2), 201-210.
- Neumayer, E., Spess, L. (2005) Do bilateral investment treaties increase foreign direct investment to developing countries? *International Finance*, 33(10), 1567-1585.
- Qayyum, U., Anjum, S., Sabir, S. (2019). Religion and economic development: new insights. *Empirica*, <https://doi.org/10.1007/s10663-019-09456-3>
- Peace, T. (2020) The problem of religious diversity: European challenges, Asian approaches [J]. *Contemporary Political Theory*, 19: 51-54.
- Porter, B. E., Steen, T. P. (2006). Investing in Stocks: Three Models of Faith Integration. *Managerial Finance*, 32(10), 812-821.
- Schoon, N., Nuri, J. (2012). Comparative Financial Systems in Judaism, Christianity and Islam: The Case of Interest. Working Paper, University of Surrey, United Kingdom
- Taylor, C., Hudson, M. C. (1972). *The World Handbook of Political and Social Indicators*. New Haven, Yale University Press.
- Triandis, H. C. (2000) Culture and Conflict. *International Journal of Psychology*, 35(2), 145-152.
- Voicu, M. (2016). Diversity and family: an inquiry into the effects of ethnic, linguistic, and religious fractionalization on family values. *Ethnic & Racial Studies*, 240(14):1-19.
- Weber, M. (1930). *The Protestant Ethic and the Spirit of Capitalism*. London, Allen and Unwin.
- Williamson, R., Stulz, R. M. (2003) Culture, Openness, and Finance. *Journal of Financial Economics*, 70(3), 313-349.
- Ying, Z., Liu, S., Bao, S., Zhou, Z. B. (2017). Religious Diversity and Regional Development in China. *China Economic Review*, 46, 1-9.