

The impact of religious diversity on economic development

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Abstract:

This paper assesses the impact of religious diversity on economic development using an ordinary least squares regression model. I find that religious diversity is a strong and positive predictor of GDP growth between 1990 to 2020, and that the results are robust to region-fixed effects and to several covariates. Furthermore, religious diversity is neither a significant predictor of conflict levels nor public goods provisions. My paper supports previous research that religious diversity is a neutral to positive predictor of countries' economic growth and institutions.

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1. Introduction:

Religious unity and divisions have shaped countries' decision making, institutions and development for centuries. Protestant and Catholic divisions spurred a series of wars in Europe for over three hundred years after the Protestant Reformation in 1517 (Nolan 2006).

Hindu-Muslim tensions resulted in the 1947 partition of the Indian subcontinent, and one of the largest human migrations in history, 15 million people (Bharadwaj et al, 2006).

It may be easier to avoid such divisions and conflict in countries with religiously homogeneous populations. If so, we might expect to see evidence of better outcomes in such countries, and worse outcomes in countries with substantial religious heterogeneity. Much research has been done on the role of ethnic diversity on economic growth, but the economic literature has focused less on religious diversity. Religious diversity could potentially hinder growth by harming a country's national unity, increasing fractionalization and divisions, and potentially even spurring civil war.

Religious diversity could also increase political gridlock and reduce access to public goods: countries with more diversity could provide less access to public goods due to developing a more individualistic and less collectivist culture, or due to discrimination in public goods provisions for minority populations. There's a large body of literature that has found that ethnic diversity is associated with lower public good provision (Habyarimana et al 2007). It is possible that religious diversity could have a similar impact on public good provision as well.

On the other hand, diversity more broadly (including religious diversity) could have positive societal impacts. Greater religious diversity could result in diverse thoughts and ideas,

perhaps spurring entrepreneurship and innovation. Some literature has indicated that more cultural diversity generates new ideas, and more diverse goods & services (Bove and Elia 2016).

In this paper, I investigate the link between religious diversity and economic growth. Using an ordinary least squares regression model, I analyze the impact of a country's religious diversity on several different factors, including: GDP per capita levels in 2020, GDP per capita growth from 1990 to 2020, conflict levels, and access to public goods.

I find a strong, positive, and statistically significant relationship between religious diversity and GDP growth between 1990 and 2020. However, I do not find strong evidence that there is any impact of religious diversity on a country's conflict levels nor its public goods provisions.

1. Literature Review:

My paper is inspired by earlier research on the role of ethnic diversity on economic development. *Africa's Growth Tragedy: Policies and Ethnic Divisions* is a 1997 paper by Easterly and Levine that argued that ethnolinguistic diversity explains a large part of growth differences between countries. The paper noted a distinctly negative association between ethno-linguistic fractionalization and economic growth and argued that the low economic growth in many Sub-Saharan African countries between 1960 and 1980 can be partially explained by the large number of ethnic groups residing there. In particular, the paper argued that a large share of the growth differences between Sub-Saharan African and East Asian countries could be attributed to differences in ethnic diversity. East Asia, which has much lower levels of ethnic diversity, grew much faster in the late 1900s compared to Sub-Saharan Africa, the most ethnically diverse region in the world.

A few other papers modeled after Easterly and Levine (1997) find similar results. Alesina et al. (2002) confirmed the negative impact of ethnic and linguistic diversity on economic development. Furthermore, Gören (2012) also finds a negative impact of ethnic diversity on economic growth.

This paper is modeled after the Easterly and Levine (1997) paper, except with a focus on religious diversity's impact on economic development worldwide. The main stream of logic in the Easterly and Levine paper was that higher ethnic diversity results in more political gridlock and therefore, a lower level of investment in public goods. The political economy literature has offered several models and empirical evidence that indicates that polarized societies have more difficulty reaching agreements on public goods such as health and education, often harming the economic wellbeing of communities. For example, Alesina et al. (1999) showed an inverse relationship between ethnic diversity in American cities and the share of spending on productive public goods, such as education or road maintenance. Other literature showed that greater voter heterogeneity "constrains the potential benefits of elections for public goods provision" (Miquel et al 2012).

The logic supporting the hypothesized link between ethnic diversity and economic development applies directly to religious diversity as well. Religion, like ethnicity, is a source of divisions in society, and these divisions could potentially hinder public goods provision. However, religious diversity follows distinctly different trends from ethnic diversity. For example, although East Asia has low levels of ethnic diversity, it has high levels of religious diversity. My paper will address this gap in the literature by looking at the impact of religious diversity on economic growth and institutions worldwide.

Indeed, some related literature suggests that religious diversity impacts economic development differently from ethnic diversity. A 2013 paper *Religious Diversity and Economic Development in Sub-Saharan Africa: So Far So Good* measured the relationship between GDP and religious polarization and fractionalization in Sub Saharan Africa (Kodila-Tedika 2013). It found that religious diversity had no statistically significant impact on GDP growth in Sub-Saharan Africa. My paper will investigate a similar question but will instead look at trends worldwide across different regions, rather than focusing solely on Sub-Saharan Africa.

Other literature looks at the presence and intensity of religion in predicting growth. One 2004 paper that looks at this is *Religion and Economic Growth*. Using an instrumental variable approach, the paper found that growth responds positively to high levels of religious beliefs (particularly a belief in heaven or hell), possibly due to increasing people's productivity (Barrow and McCleary 2004). However, the paper notes that growth responds negatively to church attendance, hypothesizing that it is because churches extract more resources from a country. The paper indicates that the intensity of religious beliefs and practices can impact growth. The paper does not analyze the impact of religious diversity or fractionalization, as it focuses on the intensity of Christian religious institutions rather than the presence of different religions.

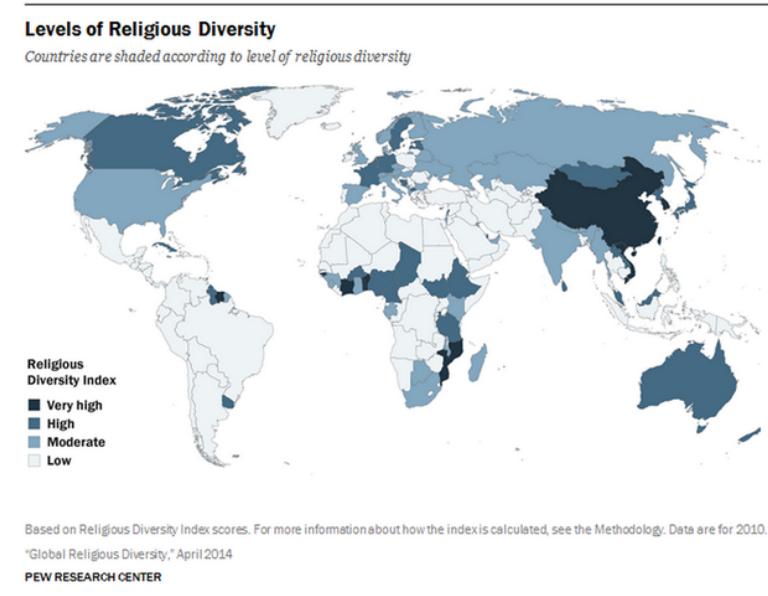
Data:

The religious diversity data comes from the Pew Research Center's 2014 Religious Diversity data set. The dataset contains the religious distribution of every country in the world. For each country, the data set contains the percentage of the country's population that identifies as one of the eight following groups: Christians, Muslims, Hindus, Buddhists, Jews, folk religions, other religions and unaffiliated. These proportions are then used to calculate the religious diversity index (RDI) for each country using a modified Herfindahl-Hirschman Index to

calculate an index of religious diversity ranging from 0 to 10. A country with an RDI of 0 (least diverse) is composed entirely of one religious group. A country with an RDI of 10 (the most diverse) contains exactly 1/8th of each of the religious categories. Each country's religious data was gathered from a variety of sources: census, population counts, and surveys from around 2000-2010.

Religious Diversity Description:

Figure 1: Map of RDI



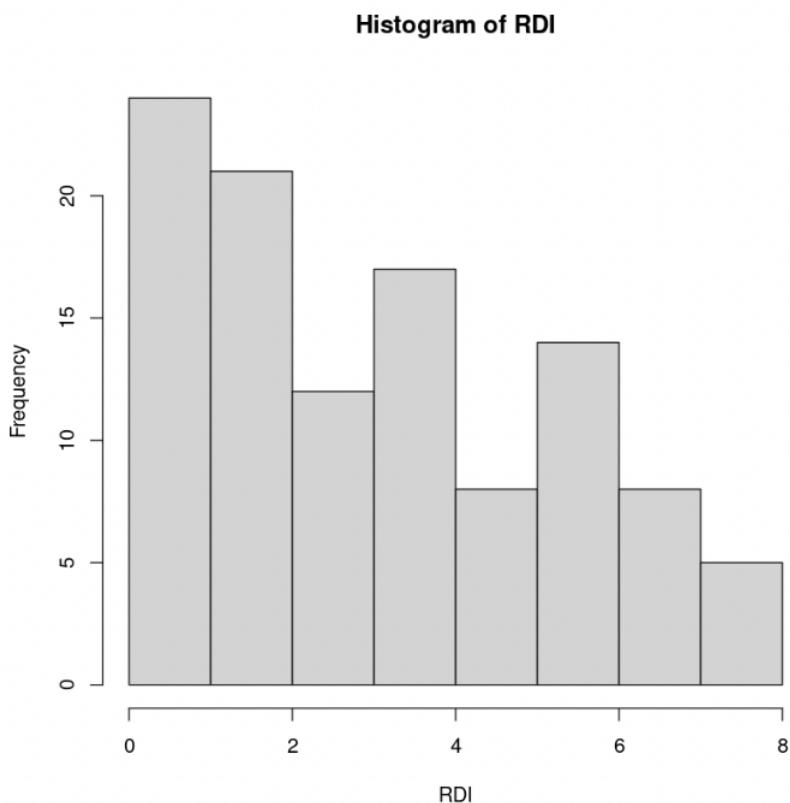
Using this index, the most religiously diverse countries are in East Asia and Sub Saharan Africa, as seen in Figure 1 above, a map from the Pew Research Center.

Twelve countries were ranked by the Pew Research Center as having “very high RDI” (an RDI of seven or higher): Six of these top 12 most religious diverse countries as measured by RDI are in Asia: Singapore, Taiwan, Vietnam, South Korea, China, and Hong Kong. Five others are in Sub-Saharan Africa: Guinea-Bissau, Togo, the Ivory Coast, Benin, and Mozambique. The

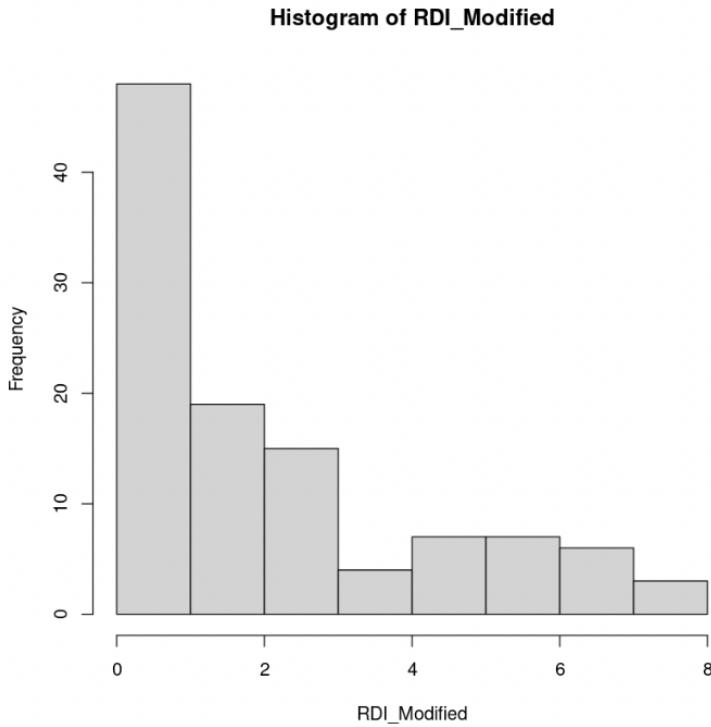
only country in the top 12 not in Asia or Sub Saharan Africa is Suriname, a small country in South America with ~600,000 people.

The data is skewed right, with a mean of 2.9 out of 10, as shown in the histogram below.

Figure 2:



Much of the religious diversity seems to stem from unaffiliated populations. If you took the unaffiliated category out of the index and recalculated, the data became even more skewed right, as shown in Figure 3 below.

Figure 3:**Summary Statistics:****Table 1: RDI Mean, standard deviation and weighted mean**

Region	RDI Mean	RDI Standard Deviation	RDI Weighted Mean
Asia-Pacific	3.02373	2.64877	4.75047
Europe	3.222	1.70836	4.12478
Latin America and the Caribbean	2.38261	1.67628	2.02284
Middle East and North Africa	2.115	2.11468	1.16761
North America	3.22	2.02904	4.21794
Sub-Saharan Africa	3.264	2.32877	4.1639

Table 1 shows the average mean, standard deviation, and weighted mean (by population) of the RDI for each world region. Sub-Saharan Africa has the highest mean RDI, followed by

Europe, North America, and then the Asia Pacific. The Middle East & North Africa and Latin America & the Caribbean have significantly lower religious diversity.

However, Asia-Pacific has by far the highest standard deviation in RDI across countries in the region, followed by Sub-Saharan Africa. Six of the twelve countries with the highest RDI are in the Asia-Pacific region, but six out of the twelve countries with the *lowest* RDIs also are in Asia-Pacific.

The RDI mean and standard deviation values weigh all countries in each region equally, regardless of population. Taking the weighted average by region tells a different story. When you take a weighted average by population (column three in Table 1 above), Asia-Pacific has the highest religious diversity. This is likely influenced by China's high religious diversity and large population. More broadly, there is a positive correlation between religious diversity and population: a 0.14 correlation (which is statistically significant at the 5% level).

In addition, I also looked at religious diversity by region when excluding the unaffiliated category. Unaffiliated categories can be individuals who identify as atheist or agnostic but also individuals who refuse to fill out the form or answer the question, and therefore, are not necessarily indicative of greater religious diversity. For each country, I excluded the unaffiliated population, recalculated the percentage of each religion from the affiliated population, and redid the index using seven categories instead of eight.

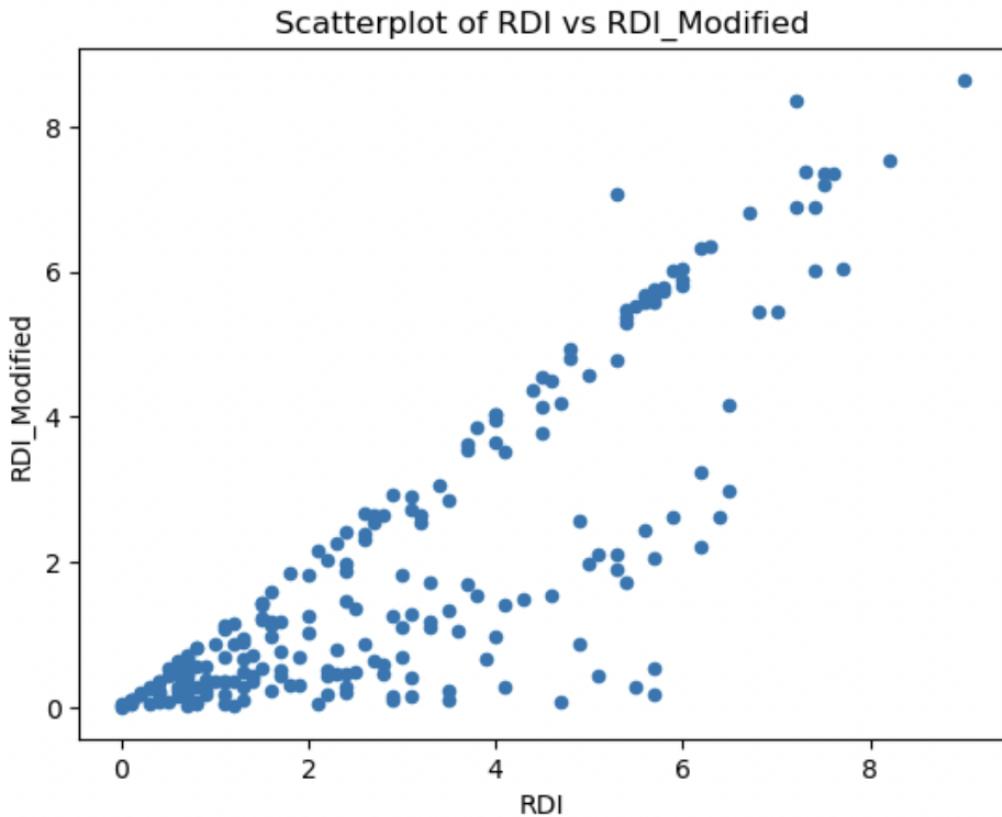
Here are the summary statistics for the “RDI modified” category, which is the recalculated RDI index without the unaffiliated population.

Table 2:

Region	RDI Modified Mean	RDI Modified SD	RDI Modified Weighted Mean
Asia-Pacific	2.60169	2.52392	4.62466
Europe	1.2376	1.35408	1.59143
Latin America and the Caribbean	1.13761	1.57247	0.551873
Middle East and North Africa	2.0515	2.12873	1.07624
North America	1.152	0.781518	1.48793
Sub-Saharan Africa	2.7414	2.41873	3.78171

The average RDI value excluding unaffiliated (“RDI modified”) is lower in all regions. However, Europe and North America’s decreased the most. Europe’s RDI modified mean is now just the 4th highest region, and almost half the value of Asia-Pacific and Sub-Saharan Africa. This suggests that much of Europe’s high RDI value stems from its relatively high unaffiliated population, such as atheists and agnostics. Sub-Saharan Africa and Asia had by far the highest RDI modified values, using this methodology, and also had the highest standard deviations. Consistent with the previous table, Asia’s weighted RDI modified average is significantly higher than its mean, again likely due to China’s large population and high RDI modified value.

The correlation between RDI and RDI modified is naturally positive and fairly strong, at 0.834. Figure 4 below shows a scatter plot of RDI and RDI modified. This shows that there are two groups of countries. One group, along the 45-degree line, has an RDI modified that is nearly the same as the original RDI, reflecting small unaffiliated populations. Another group has a sizable RDI but an RDI modified near zero. This arises when a country has a single dominant religion but a large unaffiliated group. When the unaffiliated category is included, the country appears to have a lot of diversity, but without it the country is homogenous. The latter is arguably more relevant to the political competition hypothesis that this paper seeks to evaluate.

Figure 4:**GDP Data:**

I collected GDP data from the World Bank World Development Indicators. The GDP figures used in this paper is GDP per capita, PPP in constant international 2017 dollars. I took the average GDP per capita growth rate from 1990 to 2020 for my analysis. I chose to end my GDP per capita measure in 2020 to capture economic growth before COVID-19, when economic growth depended greatly on public health and lockdown measures. Religious diversity could perhaps impact a country's decisions on public health measures during the pandemic, but this is out of scope of this paper.

Other data sources:

For covariates in my regression (metrics of natural resources and education), I used data from the World Bank's World Development Indicators database.

The conflict data used in this paper came from the Uppsala Conflict Data Program (UCDP), which measures civil conflict and war trends over time for every country. UCDP has collected organized violence and conflict trends since the 1970s, and is one of the most frequently cited sources of publicly available conflict data.

Data Assumptions:

A key assumption in my thesis is that each country's religious demographics stayed roughly the same from 1990 to 2010. That way, the RDI of a country in 2010 (when the religious diversity data was collected) is roughly representative of the RDI of a country in 1990, and we could determine the impact of RDI in 1990 on growth in the next 30 years. This assumption would break if there was either a major exodus or influx of a certain religious group in a country between 1990 to 2010.

An exodus of a specific religious minority group out of a country is often caused by a major incident of religious violence, religious-based genocide, or mass migration of a religious or ethnic group. One major example is the Holocaust, which resulted in the death or exodus of more than half the Jews in Europe. I determine that there are not many incidents of this in the past 30 years that could significantly impact RDI. A potential exception could be the Rohingya refugee crisis in Burma. Myanmar is a majority Buddhist country, and the Rohingya are a Muslim minority group, the majority of whom have fled the country due to persecution and genocide. Estimates suggest that nearly one million Rohingya have fled, which is roughly 1.8%

of Myanmar's population (United Nations Human Commission for Refugees). This percentage is small enough that it is unlikely to drastically change Myanmar's RDI.

Mass immigration of a different religious group into a country would also increase religious diversity. For the most part, for the past 30 years, refugees have tended to flee to countries with similar religious denominations to their own. For example, most Muslim Rohingya fled to Muslim-majority Bangladesh. Venezuelan refugees, who are mostly Catholic, fled to Peru, Columbia and Argentina. Ukrainian refugees fled to neighboring, Christian-majority eastern European countries (United Nations Human Commission for Refugees). The major exception could be the influx of Syrian refugees in Europe, which is a case where a majority Muslim population moved to a majority Christian region. However, this migration does not seem to be large enough to dramatically affect Europe's religious diversity. The country that took in the most Syrian refugees is Germany. Germany has approximately 800,000 Syrian refugees, which is still less than 1% of Germany's population (United Nations). Furthermore, the Pew Research Center's religious diversity data (from ~2010) was taken right before the Syrian refugee crisis began.

Overall, I conclude that it is a reasonable assumption that religious diversity in 2010 is a good proxy for religious diversity in 1990. Therefore, we can regress a country's economic growth from 1990 to 2020 on its religious diversity index to assess the impact of religious diversity in 1990 on growth from 1990 to 2020.

Although my analysis will attempt to isolate a causal pathway between religious diversity and development and control for confounding factors, there nonetheless are issues with omitted variable bias. For example, countries with greater religious diversity may have a more pluralistic and tolerant societal culture or institutions. More tolerant societies might have more religious

diversity and have conditions that result in positive economic growth. Another potential omitted variable is that the country has been historically at some crossroads for trade. Trading routes might have exposed the country to different cultures, thus increasing religious diversity. Having access to trade might also positively impact growth potential.

I believe that reverse causality is less of an issue. There's no reason to believe that more economic development might result in more religious diversity in a country. Perhaps more developed countries have a larger atheist population- however, I also ran my regression on RDI_modified, which excludes the atheist percentage, and the results were robust.

2. Results

2020 GDP per capita Levels:

I first analyzed whether there is a relationship between religious diversity (RDI) and GDP per capita levels in 2020. This answers a distinctly different question than growth: are religiously diverse countries on average, wealthier or poorer in 2020? The results are shown below in Table 3 below:

Table 3:

Regression of RDI on 2020 GDP levels		
Dependent variable:		
	2020 GDP	
	(1)	(2)
RDI	2,764.330*** (800.493)	2,518.021*** (606.019)
Region: Europe		26,884.470*** (3,976.993)
Region: Latin America and the Caribbean		1,212.179 (3,773.427)
Region: Middle East and North Africa		9,787.975* (5,245.194)
Region: North America		49,017.460*** (10,806.780)
Region: Sub-Saharan Africa		-11,374.410*** (3,673.003)
Constant	11,337.430*** (3,019.108)	8,171.978** (3,342.639)
Observations	135	135
Note:	*p<0.1; **p<0.05; ***p<0.01	

I found a positive relationship between religious diversity and 2020 GDP per capita levels, both with and without region fixed effects (Asia-Pacific is the excluded category), which was statistically significant at the 1% level.

Given the number of factors that impact growth, the conclusion is not necessarily causal. However, it is nonetheless significant that there is a strong positive correlation between religious diversity and income—contrary to ethnic and ethnolinguistic diversity, where previous studies have found a negative correlation.

RDI and Economic Growth:

The main focus of my paper is the impact of religious diversity on average economic growth. Table 4 shows the results of that regression.

Table 4:

Table 4: Regression of RDI on economic growth

Dependent variable:			
Average GDP per capita growth between 1990 to 2020			
	(1)	(2)	(3)
1990 GDP per capita			-0.00004*** (0.00001)
RDI	0.142** (0.062)	0.130** (0.062)	0.208*** (0.061)
Region: Europe		-0.971** (0.410)	-0.082 (0.438)
Region: Latin America and the Caribbean		-0.850** (0.389)	-0.717* (0.366)
Region: Middle East and North Africa		-1.387** (0.540)	-0.629 (0.538)
Region: North America		-1.674 (1.113)	0.239 (1.138)
Region: Sub-Saharan Africa		-0.985** (0.378)	-1.219*** (0.359)
Constant	1.208*** (0.233)	2.013*** (0.344)	2.140*** (0.325)
Observations	135	135	135

Note: *p<0.1; **p<0.05; ***p<0.01

I regressed the average GDP growth rate from 1990 to 2020 on RDI, controlling for region fixed effects. In the table above, the first column shows the simple linear relationship between RDI and average economic growth- which is positive and statistically significant at the 5% level. In column two, I added region fixed effects and found that the coefficient remains roughly constant with column 1, and statistically significant.

I then added 1990 GDP per capita to the regression to account for the fact that countries that start off with low GDP could have more potential for growth. Aligning with that intuition, there is a negative correlation between lagged GDP and growth, suggesting that countries that

started off with higher GDPs grew slower between 1990 and 2020, when controlling for region and RDI. The positive correlation between religious diversity and economic growth actually grew stronger when controlling for lagged GDP- the coefficient increased to 0.208 and became statistically significant at the 1% level.

The R-squared value for my simple linear regression for column 1 was 0.040. Adding in the region increased the R-squared value to 0.1223. Finally, my R-squared in column 3 after adding in 1990 GDP per capita is 0.2317. This means that religious diversity, region and 1990 GDP per capita can explain roughly 23.17% of growth differences between countries from 1990 to 2020.

Regression with Covariates:

I then then added two additional covariates (agriculture and education levels in 1990), and ran the regressions again:

Table 5: Regression of RDI on Economic Growth (with covariates)

Regression of RDI on Average GDP Growth		
Dependent variable:		
	Average GDP Growth from 1990 to 2020 (1)	Average GDP Growth from 1990 to 2020 (2)
RDI	0.213*** (0.058)	0.221*** (0.058)
Region: Europe	0.013 (0.409)	-0.089 (0.414)
Region: Latin America and the Caribbean	-0.843** (0.358)	-0.720* (0.370)
Region: Middle East and North Africa	-0.425 (0.577)	-0.316 (0.583)
Region: North America	0.345 (1.276)	0.243 (1.276)
Region: Sub-Saharan Africa	-1.580*** (0.334)	-1.687*** (0.377)
AgData		0.009 (0.006)
School		-0.004 (0.007)
1990 GDP per Capita	-0.0001*** (0.00001)	-0.00005*** (0.00001)
Constant	2.249*** (0.312)	2.153*** (0.715)
Observations	108	108

Note: *p<0.1; **p<0.05; ***p<0.01

The variable *AgData* is the percentage of land in a country that can be used for agriculture. This value typically does not change over time, and would likely be independent of religious diversity. However, the percentage of fertile land could be a key driver of GDP growth. Column 1 is the regression when this covariate is added. In this regression, the coefficient on religious diversity remains positive and statistically significant at the 1% level.

In Column 2, I added the average years of schooling in a country in 1990 into the regression, to control for average education levels at the beginning of the time period. Again, the coefficient on RDI remains roughly the same and very statistically significant at the 1% level.

This indicates that even with added covariates, our conclusion remains the same- RDI is a positive predictor of average GDP growth from 1990 to 2020.

Region Specific Regressions:

I also ran the previous regression in each specific world region. Here, I found that the impact of religious diversity seemed to vary significantly by region.

I found very positive correlations between RDI and growth in Sub-Saharan Africa and Asia-Pacific. In both cases, controlling for initial GDP per capita and the two covariates increased the magnitude of the coefficients.

Table 6: Regression of RDI on Average GDP Growth- Asia-Pacific

Dependent variable:			
	2020 GDP		
	(1)	(2)	(3)
RDI	0.352** (0.133)	0.566*** (0.105)	0.546*** (0.115)
X1990.GDP		-0.0001*** (0.00003)	-0.0001*** (0.00003)
AgData			0.010 (0.011)
School			0.006 (0.015)
Constant	1.323** (0.565)	1.668*** (0.408)	0.716 (1.443)
Observations	24	24	24

Note: *p<0.1; **p<0.05; ***p<0.01

Table 7: Regression of RDI on Average GDP Growth- Sub-Saharan Africa

Dependent variable:			
	Average GDP per capita from 1990 to 2020		
	(1)	(2)	(3)
RDI	0.202** (0.094)	0.203** (0.095)	0.214** (0.096)
X1990.GDP		-0.00005 (0.0001)	0.00000 (0.0001)
AgData			0.017 (0.013)
School			-0.011 (0.011)
Constant	0.558 (0.395)	0.691 (0.466)	0.534 (0.849)
Observations	31	31	31

Note: *p<0.1; **p<0.05; ***p<0.01

In the Middle East and North Africa region, religious diversity is not a strong predictor of growth in the simple linear regression, but became a very strong predictor after adding the covariates. There are only seven countries in this region in my data, however.

Table 8:

Middle East and North Africa

Dependent variable:			
	Average GDP per capita from 1990 to 2020		
	(1)	(2)	(3)
RDI	-0.354 (0.201)	0.016 (0.235)	0.255*** (0.022)
X1990.GDP		-0.00003 (0.00001)	-0.00003*** (0.00000)
AgData			0.034*** (0.001)
School			-0.005* (0.002)
Constant	1.444* (0.576)	1.569** (0.449)	0.684* (0.182)
Observations	7	7	7

Note: *p<0.1; **p<0.05; ***p<0.01

Latin America and Europe's regressions showed no statistically significant impact of RDI on growth, as seen below. This may simply be because there are few countries in these regions, and the confidence intervals, therefore, are wider. Given the lack of precision in these regions, I cannot quite reject that the Latin America RDI effect matches the point estimate for Sub-Saharan Africa, though I can reject this in the case of Europe.

Table 9:

Latin America and the Caribbean

Dependent variable:			
	Average GDP per capita from 1990 to 2020		
	(1)	(2)	(3)
RDI	-0.001 (0.113)	0.015 (0.116)	-0.005 (0.118)
X1990.GDP		-0.00004 (0.0001)	0.00001 (0.0001)
AgData			-0.001 (0.013)
School			-0.028 (0.018)
Constant	1.419*** (0.333)	1.771*** (0.612)	4.428** (1.868)
Observations	23	23	23

Note: *p<0.1; **p<0.05; ***p<0.01

Table 10:

Europe			
Dependent variable:			
	Average GDP per capita from 1990 to 2020		
	(1)	(2)	(3)
RDI	-0.292*	-0.171	-0.162
	(0.149)	(0.152)	(0.152)
X1990.GDP		-0.00004*	-0.00004**
		(0.00002)	(0.00002)
AgData			-0.007
			(0.011)
School			-0.044
			(0.032)
Constant	2.554***	3.225***	8.079**
	(0.571)	(0.632)	(3.317)
Observations	22	22	22

Note: *p<0.1; **p<0.05; ***p<0.01

Due to the very small sample size, I did not run the regression in North America.

Heterogeneity Test:

I next tested if there are heterogeneous effects of religious diversity on economic development based on a country's initial economic standing in 1990.

According to the World Bank, the thresholds for GNI per capita for country classification by income in 1990 were the following:

Table 11:

Country Classification	1990 GNI per capita
Low Income Countries	<\$580
Low-Middle Income Countries	\$580-\$2465
Upper-Middle Income Countries	\$2465-\$7260
High Income Countries	>\$7260

I used these classifications to create dummy variables, based on a country's 1990 GNI per capita (Atlas method), using data from the World Bank's World Development Indicators. I made a dummy variable for low income countries, upper middle income, and high income countries.

I then used the following regression equation to test for heterogeneity:

Average GDP per capita growth = RDI + Low Income dummy + Upper middle income dummy + high income dummy + RDI x Low Income + RDI x Upper middle income + RDI x High Income.

I left the lower-middle income dummy variable and RDI interaction out of the equation, so that group of countries serves as the baseline in my regression.

If one or more interaction variables are statistically significant, that suggests that there are heterogeneous effects of RDI of economic growth by income per capita in 1990. The table on the next page shows the results of my regression. None of the interaction terms are statistically significant, suggesting that there is not any heterogeneous effects of religious diversity on economic development based on a country' initial economic standing.

Table 12: Heterogeneity Test- Regression of RDI on Average GDP Growth

Table 1: Heterogeneity Test: Regression of RDI on Average GDP Growth

	<i>Dependent variable:</i>		
	GDP per growth per capita from 1990 to 2020		
	(1)	(2)	(3)
RDI	0.624 (0.746)	0.634 (0.712)	0.656 (0.702)
Low income	0.643 (1.813)	0.736 (1.721)	0.618 (1.701)
High-middle income	-0.439 (0.553)	-0.280 (0.556)	-0.114 (0.555)
High income	0.278 (1.926)	0.256 (1.846)	0.351 (1.829)
Region: Europe		-1.005** (0.411)	-1.053** (0.405)
Region: Latin America and the Caribbean		-1.020** (0.403)	-0.819** (0.409)
Region: Middle East and North Africa		-1.639*** (0.611)	-1.319** (0.622)
Region: North America		-1.089 (1.369)	-1.048 (1.348)
Region: Sub-Saharan Africa		-1.362*** (0.374)	-1.598*** (0.417)
AgData			0.014** (0.007)
Schooling			-0.006 (0.007)
RDI x low _i ncome	-0.588 (0.741)	-0.618 (0.705)	-0.603 (0.696)
RDI x highmiddle income	0.210 (0.137)	0.196 (0.132)	0.174 (0.131)
RDI x high income	-0.593 (0.786)	-0.589 (0.755)	-0.571 (0.745)
Constant	0.760 (1.848)	1.617 (1.780)	1.534 (1.955)
Observations	108	108	108

Note:

*p<0.1; **p<0.05; ***p<0.01

I also ran a joint significance test for the three interaction variables, and the p-value (0.23) is not statistically significant- further indicating that there is not sufficient evidence of heterogeneity.

Robustness Checks:**RDI Modified:**

One concern could be that the percentage of the “unaffiliated” population could be a misleading or a poor metric to measure religious diversity. For example, those identifying as unaffiliated might be in countries with religious persecution or anti-religion sentiment, and choose not to identify with a specific religion. Unaffiliated also buckets many different groups— from those who specifically identify as atheist or agnostic, to those who simply left the form blank or refused to answer the question.

I created an “RDI_modified” index that recalculated religious diversity without the unaffiliated population. I found that results were roughly consistent using the RDI_modified index versus the regular RDI index. The following is the result:

Table 13: Regression of RDI_Modified on Average GDP Growth

RDI Modified on Average GDP Growth			
Dependent variable:			
	Avg GDP per capita growth between 1990 to 2020 (1)	(2)	(3)
RDI_Modified	0.196*** (0.063)	0.264*** (0.060)	0.289*** (0.060)
RegionEurope		0.336 (0.414)	0.237 (0.411)
RegionLatin America and the Caribbean		-0.632* (0.358)	-0.442 (0.368)
RegionMiddle East and North Africa		-0.584 (0.550)	-0.406 (0.552)
RegionNorth America		0.725 (1.250)	0.629 (1.235)
RegionSub-Saharan Africa		-1.621*** (0.326)	-1.733*** (0.363)
AgData			0.013** (0.006)
School			-0.003 (0.006)
X1990.GDP		-0.00005*** (0.00001)	-0.00005*** (0.00001)
Constant	1.190*** (0.187)	2.222*** (0.294)	1.882*** (0.696)
Observations	108	108	108

Note: *p<0.1; **p<0.05; ***p<0.01

As shown in the table above, RDI modified is a positive and very statistically significant predictor of GDP per capita growth between 1990 and 2020. In fact, the magnitude of the coefficient on RDI_modified is higher than that of RDI, and more statistically significant (at the 1% in all three regressions rather than the 5%). The modified religious diversity index, without unaffiliated proportion, is a stronger predictor of economic growth than the religious diversity index.

Dominant Religion:

In addition, I also added the dominant religion to the regression as a control. The results are shown in the table below. The comparison is to countries with Buddhism as the dominant religion.

Table 14: Regression of RDI on Average GDP Growth, with dominant religion as a covariate

Regression of RDI on Average GDP Growth, with dominant religion	
Dependent variable:	
Average GDP growth from 1990 to 2020	
1990 GDP per capita	-0.00004*** (0.00001)
RDI	0.115* (0.066)
Region: Europe	0.501 (0.471)
Region: Latin America and the Caribbean	-0.173 (0.415)
Region: Middle East and North Africa	-0.264 (0.600)
Region: North America	0.823 (1.125)
Region: Sub-Saharan Africa	-0.627 (0.393)
Dominant religion: Christianity	-1.550** (0.732)
Dominant religion: Folk Religion	1.363 (1.536)
Dominant religion: Hinduism	-0.135 (1.026)
Dominant religion: Islam	-1.442* (0.764)
Dominant religion: Unaffiliated	1.158 (1.167)
Constant	3.333*** (0.708)
Observations	135
Note:	*p<0.1; **p<0.05; ***p<0.01

As shown in the table above, RDI remains positive and somewhat statistically significant at the 10% level- the magnitude and statistical significance of the RDI coefficient went down significantly. This could be due to omitted variable bias- perhaps dominant religion is correlated with both RDI and GDP growth.

Public Good Provisions:

Previous studies have found that ethnic diversity impacts economic growth through public goods provision. I will now test whether religious diversity could also impact economic growth through public goods provision. Perhaps religious diverse countries face more political gridlock or fractionalization, and therefore, have less access to public goods.

I tested whether there's a relationship between religious diversity and various public goods, and found little evidence that religious diversity hinders public goods provision or access.

Health:

To measure access to public health provisions, I regressed a country's 2019 government health expenditure per capita (in PPP) on RDI. I accounted for region-fixed effects in my analysis and added the country's 2020 GDP per capita (PPP) as a control variable.

Table 15: Regression of RDI on Government Health Expenditure per Capita

Regression of RDI on government expenditure on health per capita			
Dependent variable:			
	2019 Government Expenditure on healthcare per capita, international PPP		
	(1)	(2)	(3)
RDI	182.037*** (57.720)	149.993*** (37.966)	30.590 (28.546)
Region: Europe		2,504.671*** (251.237)	1,215.630*** (208.905)
Region: Latin America and the Caribbean		80.905 (239.001)	83.840 (167.206)
Region: Middle East and North Africa		231.520 (327.628)	-221.640 (232.621)
Region: North America		4,752.692*** (938.936)	2,848.620*** (677.722)
Region: Sub-Saharan Africa		-545.996** (229.411)	-25.099 (166.855)
2020 GDP per capita			0.046*** (0.004)
Constant	477.133** (218.782)	184.936 (209.011)	-175.136 (149.587)
Observations	131	131	131

Note: *p<0.1; **p<0.05; ***p<0.01

In the first two regressions, RDI is positive and very statistically significant at the 1% level. However, column 3's regression adds current GDP per capita as a covariate, and the RDI coefficient drastically reduces and the statistical significance goes away. This suggests that GDP per capita was a major omitted variable in our first two regressions. As discussed earlier in this paper, RDI is strongly positively correlated with GDP per capita, and it appears that GDP per capita is a very strong predictor of government healthcare expenditure per capita. This is evident in column three, where RDI is not statistically significant but GDP per capita is a very positive and statistically significant predictor at the 1% level.

The results indicate that religious diversity is not a significant predictor of health expenditures per capita, when controlling for region fixed effects and GDP per capita.

Education:

I next looked at the impact of religious diversity on education expenditures. Specifically, I looked at the percentage of government expenditure on education.

Table 16: Regression of RDI on Government Expenditures on Education

Regression of RDI on education expenditures			
	Dependent variable:		
	Government Expenditure on education, total (% of GDP)		
	(1)	(2)	(3)
RDI	-0.051 (0.077)	-0.059 (0.078)	-0.058 (0.081)
Region: Europe		0.095 (0.481)	0.109 (0.534)
Region: Latin America and the Caribbean		-0.450 (0.490)	-0.448 (0.493)
Region: Middle East and North Africa		-0.221 (0.726)	-0.215 (0.736)
Region: North America		0.856 (1.070)	0.889 (1.204)
Region: Sub-Saharan Africa		-0.629 (0.488)	-0.634 (0.497)
2020 GDP per capita			-0.00000 (0.00001)
Constant	4.704*** (0.288)	4.938*** (0.421)	4.940*** (0.423)
Observations	153	153	153
Note:	*p<0.1; **p<0.05; ***p<0.01		

I did not find a statistically significant relationship between RDI and government expenditure on education (as a share of total GDP). The results were consistent across all three regressions- RDI was not a statistically significant predictor of government education expenditure. Similar to health, Europe and North America spend a higher percentage of their government expenditure on education compared to Sub-Saharan Africa, even when adjusting for current GDP per capita in 2020. In this case, GDP per capita in 2020 is not a statistically significant predictor of our dependent variable, likely because it already accounted for total government spending.

Environment:

Governments often play a key role in protecting the environment, through regulations and policies to promote environmental sustainability. I regressed RDI on a metric of environmental

sustainability. The dependent variable here is the CPIA policy and institutions for environmental sustainability- which ranges from 1 to 6.

Table 17: Regression of RDI on Environmental Sustainability

Regression of RDI on environment expenditures			
Dependent variable:			
	CPIA policy and sustainability rating (1= low, 6= high)		
	(1)	(2)	(3)
RDI	0.016 (0.028)	0.018 (0.031)	0.021 (0.031)
Region: Europe		0.319 (0.347)	0.295 (0.344)
Region: Latin America and the Caribbean		0.165 (0.201)	0.009 (0.228)
Region: Middle East and North Africa		-0.789 (0.479)	-0.768 (0.475)
Region: Sub-Saharan Africa		-0.015 (0.153)	0.063 (0.161)
2020 GDP per capita			0.0001 (0.00004)
Constant	3.271*** (0.095)	3.253*** (0.118)	3.111*** (0.154)
Observations	59	59	59

Note: *p<0.1; **p<0.05; ***p<0.01

Like education, I did not find a statistically significant relationship between RDI and environmental subsidies. All three of the coefficients are positive but statistically insignificant.

Beyond public good provisions, I also tested whether religiously diverse countries have more/less equitable institutions.

Gender Equality:

Do countries with more religious diversity have more or less equitable institutions? I looked at whether there's any relationship between RDI and gender equality.

Table 18: Regression of RDI on Gender Equality

Regression of RDI on gender equality

Dependent variable:			
	CPIA gender equality rating (1=low to 6=high)		
	(1)	(2)	(3)
RDI	-0.008 (0.038)	0.003 (0.042)	0.007 (0.042)
Region: Europe		0.722 (0.472)	0.696 (0.472)
Region: Latin America and the Caribbean		0.094 (0.273)	-0.073 (0.312)
Region: Middle East and North Africa		-0.780 (0.652)	-0.757 (0.651)
Region: Sub-Saharan Africa		-0.084 (0.208)	-0.001 (0.221)
2020 GDP per capita			0.0001 (0.00005)
Constant	3.285*** (0.130)	3.274*** (0.160)	3.122*** (0.211)
Observations	59	59	59

Note: *p<0.1; **p<0.05; ***p<0.01

I did not find any statistically significant relationships between RDI and gender equality.

The results did not change when I regressed gender equality on RDI modified.

Legal Rights:

Furthermore, there did not seem to be a significant relationship between RDI and legal rights. I ran our regression model with a metric of legal rights as the dependent variable, as shown in Table 19. The dependent variable, strength of legal rights, is from the World Bank World Development Indicators. It ranges from 1 (weak legal rights) to 12 (strong legal rights).

Table 19: Regression of RDI on Legal Rights (from 1 to 12) in 2019

Regression of RDI on Legal Rights (from 1 to 12) in 2019			
Dependent variable:			
	2020 GDP		
	(1)	(2)	(3)
RDI	0.003 (0.135)	-0.068 (0.136)	-0.111 (0.144)
Region: Europe		-1.683* (0.884)	-2.274** (1.089)
Region: Latin America and the Caribbean		-1.689* (0.889)	-1.709* (0.889)
Region: Middle East and North Africa		-3.236** (1.297)	-3.545*** (1.339)
Region: North America		3.907 (3.028)	2.930 (3.207)
Region: Sub-Saharan Africa		-1.424* (0.815)	-1.161 (0.864)
2020 GDP per capita			0.00002 (0.00002)
Constant	5.850*** (0.519)	7.370*** (0.784)	7.164*** (0.815)
Observations	107	107	107

Note:

*p<0.1; **p<0.05; ***p<0.01

Conflict Analysis:

Beyond public goods, the other potential pathway in which religious diversity could impact economic growth is through civil conflict. Perhaps more religiously diverse countries face more civil conflict, which might hinder growth.

To determine if religious diversity could impact conflict levels, I took the total number of civil conflicts in each country from 1990 to 2020. I then regressed RDI on the civil conflict count.

Table 20: Regression of RDI on Conflict

Regression of RDI on Civil Conflict

	Dependent variable: Total Civil Conflict Count from 1990 to 2020		
	(1)	(2)	(3)
RDI	-0.265 (0.698)	-0.252 (0.696)	0.066 (0.909)
Region: Europe		-11.260*** (4.236)	-6.766 (6.464)
Region: Latin America and the Caribbean		-8.276* (4.415)	-10.177* (5.390)
Region: Middle East and North Africa		0.822 (5.797)	4.540 (7.947)
Region: North America		-7.925 (10.097)	8.202 (16.888)
Region: Sub-Saharan Africa		-0.938 (4.270)	-4.043 (5.298)
1990 GDP per capita			-0.0003** (0.0002)
Constant	8.836*** (2.553)	13.363*** (3.577)	18.196*** (4.740)
Observations	177	177	136

Note: *p<0.1; **p<0.05; ***p<0.01

The simple linear regression, column 1, indicates no statistically significant relationship between RDI and Civil Conflict. The results were about the same when including region-fixed effects (column 2) as well as initial 1990 GDP per capita (column 3). This is evidence against the hypothesis that religious diversity results in increased fractionalization and division in a country, and therefore increases levels of civil conflict.

It seems more likely that religious diversity could impact *internal* conflict (civil war) rather than conflict with other countries. Nonetheless, I repeated my analysis with the total war count. While the variable “civil count” refers to conflicts between two or more groups within a country, “war count” is a conflict with another country or region, where at least one player is a government actor. In the regression table below, I regressed RDI on the total war count from 1990 to 2020 from each country. My results were similar to civil count- none of my three regressions were statistically significant.

Table 21: Regression of RDI on War Count

Regression of RDI on Conflict			
Dependent variable:			
Total War Count from 1990 to 2020			
	(1)	(2)	(3)
RDI	-0.181 (0.778)	-0.149 (0.774)	0.194 (1.011)
Region: Europe		-13.365*** (4.715)	-8.485 (7.188)
Region: Latin America and the Caribbean		-10.258** (4.914)	-12.653** (5.994)
Region: Middle East and North Africa		0.126 (6.452)	4.185 (8.837)
Region: North America		-9.204 (11.237)	9.325 (18.780)
Region: Sub-Saharan Africa		-2.781 (4.753)	-6.818 (5.892)
1990 GDP per capita			-0.0004*** (0.0002)
Constant	9.406*** (2.844)	15.260*** (3.981)	21.023*** (5.271)
Observations	177	177	136

Note: *p<0.1; **p<0.05; ***p<0.01

I found that the results remained consistent even when using RDI_Modified as the explanatory variable: RDI_modified was not a statistically significant predictor of civil conflict or war levels.

V. Conclusion and Limitations

My thesis supports the conclusion that religious diversity is a positive predictor of a country's economic outcomes and institutions. Religious diversity is a strong positive predictor of both GDP per capita levels in 2020 and GDP per capita growth from 1990 to 2020. This relationship was consistent across countries of different income levels. Modified religious

diversity (which excluded unaffiliated populations from the index) was an even stronger positive predictor of growth.

My analysis was less successful at identifying channels by which this occurs. There is no evidence that religious diversity has any impact on public goods provisions, conflict levels, gender equality or legal institutions. This suggests that higher religious diversity does not cause higher conflict levels or political/institutional gridlock. In general, I find no evidence that higher religious diversity predicts worse economic outcomes for a country, unlike ethnic and ethnolinguistic diversity.

One limitation with my paper is that the religious diversity data does not account for religious denominations. Over time, there are many examples of conflict and political fractionalization that have stemmed from intra-religious tensions: for example, Catholics and Protestants, Sunni & Shiite Muslims, etc. It is possible that while higher inter-religious diversity did not seem correlated with lower growth, intra-religious diversity could be.

Furthermore, countries with high percentages of “folk religions” or “other religions” may have higher religious diversity than is reflected in the RDI metric. This is because the index treated “folk religions” as one singular religious group, rather than dozens or even hundreds of unique minority folk religions with individual practices and beliefs in the folk religion category.

Some World Bank data had missing entries, mainly for countries where data collection was impossible due to political conditions or war. In those cases, I took those countries out of the regression. This could lead to omitted variable bias, as countries where data collection might be impossible might be countries where GDP is particularly low; conflict levels have been high; or public goods provisions are poor.

A standard problem with dealing with observational development data is the number of confounding factors that could impact GDP per capita growth, that would be difficult to account entirely for. I attempted to understand the causal pathway in which religious diversity positively predicts growth. However, my two hypotheses, that religious diversity could impact public goods provisions or conflict levels, were not born out by the empirical evidence- religious diversity was not a predictor of neither conflict nor public goods provisions. Future research could investigate the causal link between religious diversity and economic growth further.

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7. Appendix:

RDI modified and conflict figures:

Regression of RDI Modified on Civil Conflict			
	Dependent variable:		
	Total Civil Count from 1990 to 2020		
	(1)	(2)	(3)
RDI_Modified	0.865 (0.717)	0.070 (0.759)	0.313 (0.942)
RegionEurope		-11.262** (4.337)	-6.205 (6.682)
RegionLatin America and the Caribbean		-8.106* (4.494)	-9.733* (5.530)
RegionMiddle East and North Africa		0.879 (5.797)	4.756 (7.814)
RegionNorth America		-8.071 (10.112)	8.899 (17.007)
RegionSub-Saharan Africa		-1.106 (4.277)	-4.130 (5.295)
X1990.GDP			-0.0003** (0.0002)
Constant	6.347*** (2.034)	12.477*** (3.475)	17.608*** (4.606)
Observations	177	177	136

Note:

*p<0.1; **p<0.05; ***p<0.01

Regression for low-income, lower-middle, upper-middle and higher income

Regression of RDI on Average GDP Growth for low income countries

	Dependent variable:		
	2020 GDP		
	(1)	(2)	(3)
RDI	0.128*	0.185***	0.198***
	(0.070)	(0.066)	(0.067)
RegionEurope	-0.396	-0.504	
	(0.466)	(0.473)	
RegionLatin America and the Caribbean	-1.138***	-0.973**	
	(0.407)	(0.424)	
RegionMiddle East and North Africa	-0.759	-0.638	
	(0.653)	(0.666)	
RegionNorth America	0.004	-0.081	
	(1.326)	(1.326)	
RegionSub-Saharan Africa	-1.756***	-1.853***	
	(0.374)	(0.424)	
AgData		0.009	
		(0.007)	
School		-0.004	
		(0.007)	
X1990.GDP	-0.00005***	-0.00005***	
	(0.00001)	(0.00001)	
Constant	1.224***	2.540***	2.450***
	(0.282)	(0.366)	(0.847)
Observations	92	92	92

Note: *p<0.1; **p<0.05; ***p<0.01

Regression of RDI on Average GDP Growth for lower middle income countries

	Dependent variable:		
	2020 GDP		
	(1)	(2)	(3)
RDI	0.035	0.127	0.132
	(0.086)	(0.092)	(0.096)
RegionEurope	-0.167	-0.203	
	(0.521)	(0.553)	
RegionLatin America and the Caribbean	-0.910	-0.836	
	(0.563)	(0.625)	
RegionMiddle East and North Africa	-0.510	-0.432	
	(0.742)	(0.803)	
RegionNorth America	0.183	0.179	
	(1.330)	(1.362)	
RegionSub-Saharan Africa	-1.378**	-1.343*	
	(0.577)	(0.674)	
AgData		0.003	
		(0.011)	
School		0.001	
		(0.014)	
X1990.GDP	-0.00004***	-0.00004***	
	(0.00001)	(0.00001)	
Constant	1.403***	2.215***	1.933
	(0.343)	(0.454)	(1.684)
Observations	50	50	50

Note: *p<0.1; **p<0.05; ***p<0.01

Regression of RDI on Average GDP Growth for upper middle income countries

	Dependent variable:		
	2020 GDP		
	(1)	(2)	(3)
RDI	0.244** (0.109)	0.232** (0.093)	0.239** (0.091)
RegionEurope		0.187 (0.899)	0.310 (0.884)
RegionLatin America and the Caribbean		-1.441** (0.586)	-1.297** (0.585)
RegionMiddle East and North Africa		-0.818 (1.447)	-0.546 (1.443)
RegionSub-Saharan Africa		-2.539*** (0.528)	-2.730*** (0.566)
AgData			0.019* (0.010)
School			-0.006 (0.009)
X1990.GDP		-0.0001*** (0.00003)	-0.0001*** (0.00003)
Constant	1.008** (0.437)	3.341*** (0.603)	2.964*** (1.000)
Observations	45	45	45

Note: *p<0.1; **p<0.05; ***p<0.01

Regression of RDI on Average GDP Growth for upper income countries

	Dependent variable:		
	2020 GDP		
	(1)	(2)	(3)
RDI	0.031 (0.187)	0.722 (0.493)	0.704 (0.541)
RegionEurope		3.715* (1.531)	4.073* (1.701)
RegionLatin America and the Caribbean		0.710 (0.763)	0.873 (0.841)
RegionMiddle East and North Africa		0.422 (1.642)	0.235 (1.875)
RegionSub-Saharan Africa		-0.419 (0.678)	0.074 (1.093)
AgData			-0.025 (0.028)
School			0.002 (0.018)
X1990.GDP		-0.0001 (0.0001)	-0.0001 (0.0001)
Constant	1.038** (0.410)	0.755 (0.627)	1.331 (1.428)
Observations	13	13	13

Note: *p<0.1; **p<0.05; ***p<0.01

Regression of RDI on government expenditure on health per capita

	Dependent variable:		
	2019 Government Expenditure on healthcare per capita, international PPP		
	(1)	(2)	(3)
RDI Modified	-64.102 (60.800)	57.818 (42.849)	-42.977 (29.443)
Region: Europe		461.100 (993.134)	-6.237 (658.040)
Region: Latin America and the Caribbean		3,080.199*** (993.514)	1,060.227 (676.338)
Region: Middle East and North Africa		499.384 (989.470)	-10.457 (655.818)
Region: North America		547.580 (1,018.275)	-318.015 (677.096)
Region: Sub-Saharan Africa		5,404.322*** (1,376.559)	2,672.645*** (935.862)
2020 GDP per capita		-83.631 (992.547)	13.431 (656.661)
X2020.GDP			0.049*** (0.004)
Constant	1,167.298*** (181.331)	66.176 (973.303)	0.964 (643.905)
Observations	132	132	132

Note:

*p<0.1; **p<0.05; ***p<0.01