

The relative importance of religious denominations for life satisfaction

Lena Malešević-Perović¹, Maja Mihaljević-Kosor, Petar Filipić

Faculty of Economics, University of Split, Croatia

This paper estimates the importance of religious denomination (we differ between Christians, Muslims, Chinese Universists, Buddhists, Hindus, Non-religious and others) for life satisfaction across countries, after controlling for a set of quality of life variables. We use a sample of 144 countries, covering approximately 96 percent of world population. Our results indicate that religion does have a significant influence on life satisfaction. It was shown that pertaining to one of the following denominations: Christian, Muslim or Hindu significantly influences satisfaction and that these categories are more satisfied with their lives than the reference category. Separating our sample even further, the results show that Catholics are the most satisfied group among Christians, and Sunnis among Muslims. We take the analysis one step further and examine the relative importance of the religions with most adherents on life satisfaction. Our results indicate that Christians are the most satisfied, followed by the Muslim and Hindu.

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1. Introduction

The examination of subjective well-being (happiness and/or life satisfaction) has a long tradition in philosophy and psychology but only (relatively) recently other disciplines have started to take part. The conventional role of economists in debates regarding public policy has been to discuss measures that governments should take in order to achieve the four main economic goals: price stability, economic growth, full employment and external balance. However, since raising levels of happiness and/or life satisfaction has come to be viewed as an important goal of policymakers, policymakers might benefit more from understanding the factors that significantly impact the levels of happiness. This paper is an attempt to contribute to a growing literature within the social sciences and economics that is increasingly

¹ Correspondence to Lena Malešević-Perović, E-mail: lena@efst.hr

concerned with investigation of the factors that contribute to happiness or life satisfaction. A specific contribution of religion to these trends has been relatively under-examined to date.

The examination of the relationship between life satisfaction and religion is motivated by recent research which points to significant influences of religion on economic growth and development, and seemingly has the potential to influence satisfaction with life and/or happiness (Barro and McCleary, 2001; Guiso et al., 2003; Mookerjee and Beron, 2005; Greeley and Hout, 2006). However, most of the papers in this area have dealt with the United States only (e.g. Lim and Putman, 2010) and/or focused on Christians (e.g. Francis et al. 2003; Lelkes, 2006; Lewis and Cruise, 2006). Furthermore, most of the above mentioned studies deal with individuals in a certain region or country and their subjective well-being. Religious denominations are rarely examined and the focus is on variables such as participation in religious activities, public and private devotion, personal religious beliefs on life after death and happiness. Religious denominations are found to have a small but significant role in determining life satisfaction in a study by Ellison et al. (1989); however this is again a national study for the United States. One thing in common to all the studies in this area is that they suggest that religiosity does exert a positive relationship on life satisfaction.

As noted by Frey and Stutzer (2002), religion raises happiness because of several reasons. Firstly, church attendance is an important source of social support; religion can instill life with meaning and purpose; religious people are better at dealing with negative circumstances in life and church members live healthier lives and live longer which also contributes to happiness. However, as Frey and Stutzer note, the question still remains as to whether the positive relationship between religion and happiness applies to all religions equally or whether there exist some differences among the faiths.

This paper attempts to estimate the importance of religious denomination on life satisfaction across countries, after controlling for a set of quality of life variables. We use a sample of 144 countries, covering approximately 96 percent of world population.

In the paper we attempt to answer the following research questions: does the data support claims that religiosity increases life satisfaction? If so, where does this relationship come from? Unlike any previous study known to us, this paper analyses the above questions from a denominational perspective; that is, it compares results between Christians, Muslims, Chinese Universists, Buddhists, Hindus, Non-religious and others. A special feature of this paper is that it also seeks an answer to the question: which religion is the most important for life satisfaction? Through two different empirical approaches (which have not, to the best of our knowledge, ever been applied to a similar data) we carefully investigate the relative importance of various religious denominations in their influence on life satisfaction. The conclusions are only tentative but first in this area.

The paper is organised as follows. Section 2 presents the model to be used in empirical estimation. Section 3 gives the results of various estimations as well as the analysis of the relative importance of religious denominations for life satisfaction, while Section 4 concludes.

2. Empirical Strategy and Model

In our empirical research we employ cross-sectional analysis. Broadly following Mookerjee and Beron (2005) we employ the following model:

$$LS_i = \beta_1 + \beta_2 QL_i + \beta_3 RD_i + \varepsilon_i \quad (1)$$

where LS stands for life satisfaction in country i , QL represents a set of quality of life variables in country i , while RD stands for religious denomination in country i . ε_i is the white noise error term.

The data for the dependent variable, life satisfaction, is taken from Human Development Report and is collected by surveying general public samples. Scores are based on responses to the question: "All things considered, how satisfied or dissatisfied are you with your life as a whole?", and the scores range from least satisfied (0) to most satisfied (10). The results collected from various survey waves across countries are then averaged for each country, resulting in one observation per country for 144 countries for the period 2006-2009.

Several variables are used as a proxy for the quality of life across countries and these include the Human development index (HDI), the Gini coefficient of income inequality, the Corruption perceptions index and Civil liberties index.

Several attempts were made during the past decades to develop an index that would measure the quality of life. The examples consist of the Unitary Index (Drewnovsky and Scott, 1966), the Physical Quality of Life Index (Morris, 1979), the Measure of Economic Welfare (Nordhaus and Tobin, 1972), the International Human Suffering Index (Population Crisis Committee, 1992) and the Human Development Index (HDI) developed in the 1990s. The common characteristic of all these indices is that they combine a number of economic and social variables in the areas of nutrition, shelter, health, education, leisure, security, and social and physical environment, into one index of development. For these reasons we include the HDI in our model as an overall measure of the quality of life. The HDI combines three dimensions: a long and healthy life, access to knowledge and a decent standard of living. For this reason in some specifications we will replace HDI with public expenditure on health as a percentage of GDP (to take account of the first dimension), mean years of schooling (to take account of the second dimension) and GDP per capita (to take account of the third dimension). This will also enable us to further explore the linkage between the three components of HDI and life satisfaction. The inclusion of GDP per capita will account for differences in levels of development across countries in the sample. We expect a positive sign on all of the mentioned variables: HDI, GDP per capita, mean years of schooling and expenditure on health.

The Gini coefficient of income inequality is included in order to measure the variation in relative wealth across nations. This index is constructed in such a way that a higher index indicates a more unequal income distribution in a country. A more detailed analysis of the sign expectations and the meaning of this index is provided in section 3.

Civil liberties index is an index on a 7- point scale used by Freedom House, measuring political rights and civil liberties every year, while the Corruption Perceptions Index (CPI) is an aggregate indicator that combines different sources of information about corruption, making it possible to compare countries. It measures the degree to which public sector corruption is perceived to exist in 178 countries around the world. It scores countries on a scale from 10 (very clean) to 0 (highly corrupt). We expect a positive sign on both of these two indices, which would imply that more freedom and less corruption results in more life satisfaction.

Religious denomination data is taken from the World Christian Database (WCD). This database contains information about the percentage of population in each country that pertains to a certain religious denomination. We are aware that using this database might leave us open to the criticism that our data source might be biased, being a Christian organisation. However, this is the only comprehensive source of religious data by country which leaves us little choice. It should also be stressed that the WCD generally computes the data obtained from other sources (Hsu et al., 2006). In our empirical analysis we will differ between Christians, Muslims, Non-religious, Hindus, Chinese Universists and Buddhists on the one side and all other denominations on the other side. The reason why we separate all possible denominations into these categories is that adherents of Christian (33.1%), Muslim (20.4%), Non-religious (14.3), Hindu (13.5%), Chinese Universist (6.3%) and Buddhist (5.9%) faith represent approximately 94% of the world population, while all other religions together (Ethno-religionists, Sikhs, Jews, Spiritists, Bahai's, Confucianists, Jains, Shintoists, Taoists and Zoroastrians) account for only 6%. In some specifications we will further divide Christians into: Catholics, Protestants, Orthodox and other Christians, and Muslims into Shias and Sunnis, to gain more insight into differences between/within religions.

Data description and sources as well as descriptive statistics are given in the Appendix in Tables A.1 and B.1. Some of the limitations of this research also need to be highlighted. First, the dataset on religious denominations is from 2005 while the majority of other explanatory variables are more recent and may not fully represent the situation in a selected country. Secondly, since 2005 there has been a large increase in the number of atheists in China and Russia and higher birth rates in Muslim countries thus potentially underestimating the share of these two groups in the dataset. We tried to adjust these numbers (Filipic, 2011), however due to a different methodology we decided to use the 2005 dataset. Finally, there is a problem with the life satisfaction score. It is calculated for a country as the average of individual satisfaction, but it does not contain information on the religion of those individuals. Therefore, in this research we assume that all religious denominations in a country share that country's life satisfaction score. For example, if there is a quarter of Christians, Muslims, Jews and atheists in a country they all have the same life satisfaction score.

3. Results

Table 1 presents the empirical results for four different equations. The sample consists of 126 countries for equations 1 and 3, and 123 countries for equations 2 and 4. In equations 1 and 2 we use a more general classification of religions into Christians, Muslims, Buddhists, Hindu, Chinese Universists and Non-religious. In equations 3 and 4 a more detailed classification of Christians and Muslims is presented. In equation 1, quality of life variables, including HDI, and religion are regressed on overall life satisfaction.

Table 1 OLS Results for Different Specification

Variable	Equation 1	Equation 2	Equation 3	Equation 4
	-1.068 (-1.29)	0.229 (0.24)	-0.562 (-0.72)	0.526 (0.58)
Quality of life variables				
HDI	5.668 (7.86)***		6.286 (8.51)***	
GDP per capita		0.00004 (3.44)***		0.00003 (2.69)***
Mean years of schooling		0.148 (3.45)***		0.180 (4.12)***
Expenditure on health (% of GDP)		0.184 (2.62)**		0.164 (2.41)**
Civil liberties index	0.126 (1.59)	0.02 (0.03)	0.165 (2.16)**	0.072 (0.77)
Corruption index	0.151 (2.52)**	-0.103 (-0.95)	0.073 (1.08)	-0.033 (-0.30)
GINI	0.028 (2.85)***	0.042 (3.55)***	0.017 (1.83)*	0.036 (2.93)***
RELIGION VARIABLES				
Christians	0.012 (2.09)**	0.019 (2.89)***		
Catholics			0.013 (2.80)***	0.020 (3.57)***
Protestants			0.010 (1.32)	0.006 (0.66)
Orthodox			-0.003 (-0.63)	0.004 (0.68)
Other Christians			0.005 (0.78)	0.007 (0.89)
Muslim	0.012 (1.99)**	0.023 (3.36)***		
Sunis			0.010 (2.07)**	0.16 (2.78)***
Shias			-0.001 (-0.15)	0.0149 (2.02)**
Chinese Universists	-0.009 (-0.70)	0.044 (2.04)**	-0.009 (-0.76)	0.031 (1.53)
Buddhists	0.013 (1.54)	0.027 (2.88)***	0.008 (1.10)	0.019 (2.31)**
Hindus	0.023 (2.50)**	0.033 (3.06)***	0.020 (2.50)**	0.028 (2.88)***
Non-religious	0.007 (0.70)	0.021 (1.72)*	0.006 (0.73)	0.015 (1.38)
Other	Omitted	Omitted	Omitted	Omitted
R ²	0.68	0.60	0.73	0.65
F	F (10. 115) =25.06***	F (12. 110) =14.27***	F (14. 111) =22.07***	F (16. 106) =12.32***
N	126	123	126	123

We start with the results for equation 1. All the variables capturing quality of life are statistically significant, except the civil liberties. HDI, GINI and corruption index are significant at a 5 percent level or higher and have a positive sign. The results suggest that a higher HDI is associated with higher life satisfaction, as hypothesized. The corruption index also has the expected positive sign. A higher index indicates lower corruption therefore higher index has a positive effect on life satisfaction, as found in Table 1. Our research results

furthermore suggest that higher income inequality has a favourable effect on life satisfaction and this positive effect is found in all equations. This finding is ambiguous. Normally, we would expect a negative relationship as more inequality implies a more heterogeneous/less satisfied society. However, we hypothesise that the result in Table 1 reflects the widely accepted idea in happiness research which posits that it is relative rather than absolute income which is important for happiness/life satisfaction. Namely, individuals are found not to value absolute income, but rather compare it to the income of relevant others (their reference group) – a notion behind the famous idiom “Keeping up with the Joneses”. Other papers have also found this coefficient to have a positive sign (see for example Alesina and La Ferrara, 2001, Ohtake and Tomioka, 2004, Mookerjee and Beron, 2005), and Mookerjee and Beron (2005) argue that greater income inequality may be related to a more mobile and freer society which ‘produces’ a happier population.

The two indices: civil liberties and corruption index are insignificant in most of our specifications. We believe this is because there is not a lot of variation in these indices and also because there is a certain amount of overlap between them as well as between them and GDP per capita or HDI.

In terms of religion, being a Christian, Muslim or Hindu has a statistically significant and positive effect on life satisfaction in comparison to other religions (omitted category). To gain more insight, various denominations within this main classification of religions are explored in equations 3 and 4.

Given the fact that the HDI is a composite index capturing health, education and living standards our goal was to examine those aspects in more detail. Therefore, in equations 2 and 4 HDI is replaced by three new variables that also capture the quality of life: GDP per capita, mean years of schooling and health expenditures as a percentage of GDP. This allows us to examine in more detail the effect of economic variables on life satisfaction. All of these new variables are statistically significant and have the expected positive sign meaning that, holding all other things constant, more years of schooling are associated with a more satisfied population, even after controlling for income (i.e. GDP per capita). It should be noted that we also used two other variables as proxies for education, namely population with at least secondary education and tertiary enrolment ratio. Those results are not reported here, but they are, however, robust. The decision to use mean years of schooling was led by practical reasons as it was available for a greater number of countries. At a five percent significance, an increase in health expenditures leads to an increase in life satisfaction. The same is the case with an increase in GDP per capita albeit at a one percent significance level.

Being a member of any of the major religions in equation 2 (Christian, Muslim, Hindu, Buddhist, Chinese Universist) has a positive and statistically significant effect on life satisfaction in comparison to the omitted category. This is also the case for the Non-religious variable which is significant at a 10 percent level and has a positive sign.

The results on the quality of life variables in equations 3 and 4 are consistent with the results in equations 1 and 2 in terms of statistical significance and signs (except for the aforementioned corruption index and civil liberties). Therefore, they will not be discussed in more detail here. In terms of religious denominations the results in equation 3 suggest that being a Catholic, Sunni Muslim or a Hindu has a statistically significant and positive effect on overall satisfaction in comparison to the omitted category. In equation 4, where HDI is replaced by three new variables the results on religious denominations show more statistically

significant relationships. Along with Catholics, Sunni Muslims or Hindus, now the Shia Muslims and Buddhists are statistically significant at a 5 percent level with a positive sign.

Given the results in Table 1, we next set out to explore which religion results in most life satisfaction, i.e. which religion is relatively more important for life satisfaction. We realise that it is a “dangerous” question to be asked, and that there are many flaws with investigating it empirically. However, it seems an interesting question to be posed, and since our database allows us to investigate it, we next embark upon assessing the relative importance of religious denomination for life satisfaction. It should be emphasised that the conclusions should be drawn only tentatively. The question remains, however, as to how to measure this relative importance. Kruskal and Majors (1989) note that the concept of relative importance has been very ambiguous in the scientific and statistical literature and that overall there has been little analysis of the topic given its importance. Statistical significance was often used for this purpose, which is inappropriate since importance is a population property and statistical significance is a property of both sample and population. A common way of “measuring” relative importance of the variables in the model is to calculate standardised coefficients.

Table 2, therefore, reports standardised coefficients. Namely, it is apparent from Table 1 that the variables in our dataset are in different units of measurement which can sometimes make their interpretation confusing. This can be avoided if the regressors and the regressand are expressed as standardised variables. An appealing property of a standardised variable is that it has the mean of zero and its standard deviation is one. The interpretation of coefficients is in standard deviation units where for a one standard deviation increase in the (standardised) independent variable the (standardised) dependent variable changes by beta standard deviations. Given that coefficients are all measured in standard deviations instead of the original units of the variables they can be compared to one another in absolute terms and the relative strength of each of the predictors can be assessed.

The results in Table 2 indicate the following. In equation 1, the variable with the strongest effect on life satisfaction is HDI (0.768) followed by Christian (0.339) and Muslim (0.294). A standard deviation increase in HDI (or 0.19) is associated with a 0.768 standard deviation (or 1.1 points) increase in life satisfaction. In equation 2, HDI is separated into three other components (education, health and GDP), hence the variable with the strongest effect on the dependent variable is Muslim (0.561). It is followed in descending order by Christian (0.527), GDP per capita (0.499), mean years of schooling (0.332), GINI (0.287), Buddhist (0.286), expenditures on health (0.268), Hindu (0.223), and Non-religious (0.154). Using the standardised coefficient, a standard deviation increase in the percentage of Muslims in a country leads, on average, to a 0.56 standard deviation (or 0.8 points) increase in overall life satisfaction. In a similar vein, a standard deviation increase in GDP per capita (an increase of just over 18 000\$) is associated with 0.499 standard deviation (0.7 points) increase in life satisfaction. In equations 3 and 4 we gain more insight into the effect of various denominations within the main groups. For equations 3 and 4 the rankings are similar; Catholics have the strongest effect on life satisfaction, followed by Sunni Muslims, Buddhists (only in equation 4) and Hindus.

Table 2 Standardised coefficients for specifications

Variable	Equation 1	Equation 2	Equation 3	Equation 4
Quality of life variables				
HDI	0.768 (7.86)***		0.852 (8.51)***	
GDP per capita		0.499 (3.44)***		0.396 (2.69)***
Mean years of schooling		0.332 (3.45)***		0.402 (4.12)***
Expenditure on health (% of GDP)		0.268 (2.62)**		0.239 (2.41)**
Civil liberties index	0.149 (1.59)	0.003 (0.03)	0.194 (2.16)**	0.086 (0.77)
Corruption index	0.236 (2.52)**	-0.159 (-0.95)	0.115 (1.08)	-0.052 (0.30)
GINI	0.187 (2.85)***	0.287 (3.55)***	0.120 (1.83)*	0.242 (2.93)***
RELIGION VARIABLES				
Christians	0.339 (2.09)**	0.527 (2.89)***		
Catholics			0.315 (2.80)***	0.464 (3.57)***
Protestants			0.143 (1.32)	0.086 (0.66)
Orthodox			-0.053 (-0.63)	0.067 (0.68)
Other Christians			0.060 (0.78)	0.082 (0.89)
Muslim	0.294 (1.99)**	0.561 (3.36)***		
Sunis			0.214 (2.07)**	0.344 (2.78)***
Shias			-0.001 (-0.15)	0.165 (2.02)**
Chinese Universists	-0.046 (-0.70)	0.152 (2.04)**	-0.010 (-0.76)	0.110 (1.53)
Buddhists	0.139 (1.54)	0.286 (2.88)***	0.082 (1.10)	0.199 (2.31)**
Hindus	0.163 (2.50)**	0.223 (3.06)***	0.142 (2.50)**	0.191 (2.88)***
Non-religious	0.053 (0.70)	0.154 (1.72)*	0.050 (0.73)	0.116 (1.38)
Other	Omitted	Omitted	Omitted	Omitted

Note: t-statistics in parenthesis, *, ** and *** denote statistical significance at 10, 5 and 1 percent, respectively

Overall, we may conclude that religion plays an important role in people's lives as it contributes to their life satisfaction. The results in general suggest that the ranking of the (statistically significant) results for religions according to their relative importance for life satisfaction from equation 1 is as follows: Christian, Muslim, and Hindu. This is presented graphically in Figure 1.

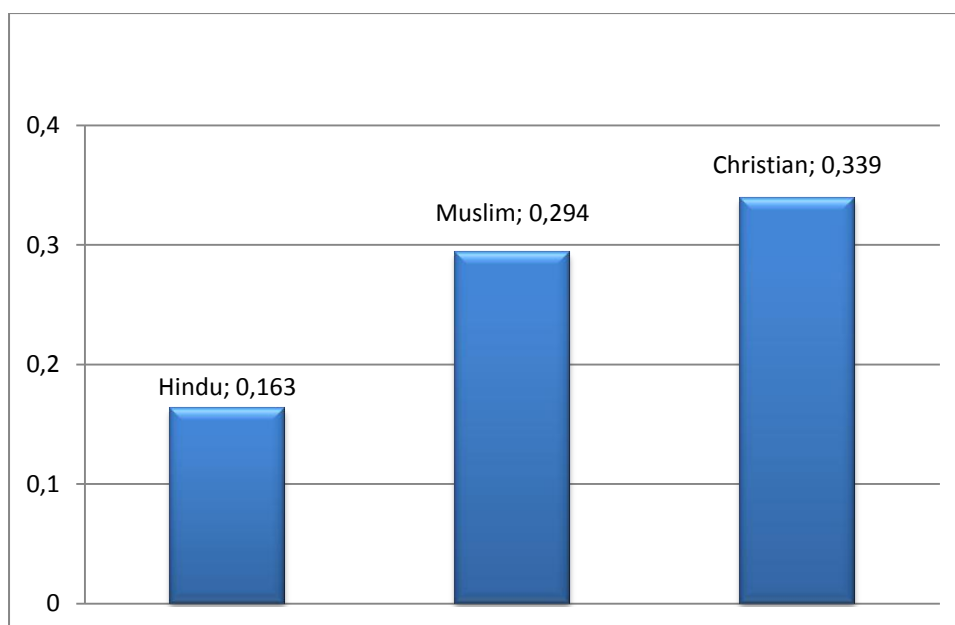


Figure 1 Change in life satisfaction for one standard deviation shift

Soofi et al. (2000) and Retzer (2001), however, criticise standardised regression coefficients as a measure of relative importance of explanatory variables. In both papers it is argued that there is a certain amount of overlap between the variation in the dependent variable explained by, say two, independent variables. This is not taken into account when using standardised coefficients. Therefore, the authors propose using the so-called "averaging over orderings" approach developed by Kruskal (1987). They call this approach an Analysis of Importance (ANIMP). In the ANIMP framework, the relative importance measures are computed by averaging the partial contribution of each variable over all orderings of the explanatory variables. This framework reflects two desirable properties for the relative importance measures: additive separability (relative importance of individual variables sum to their joint importance) and order-independence (relative importance measures are independent of the position of the variables in the equation). This method examines the additional contribution a variable makes as it is added to a set of one or more existing variables. In order to estimate this additional contribution, one needs to remove the variability explained by the existing variables first. All possible orderings are tested and the results are, then, averaged. The main advantage of this technique is that it allows for the overlapping information to be divided among the variables. The ANIMP measures take every partial information index into account, and therefore provide a comprehensive picture of the relative importance (Soofi et al., 2000). We adopt this procedure in order to further investigate the relative importance of four prevalent religion groups (Christian, Muslim, Hindu and Non-religious) in our model.

In presenting the core idea behind the ANIMP method we follow Kruskal (1987). The four-variable case is presented in Table 3. It should be noted at this point that the technique of calculating partial correlation coefficients is commonly used in small models with 3 to 5 explanatory variables. In the case of, say 5 variables, we would have ($5! =$) 120 possible orderings of the explanatory variables which makes the whole procedure tedious and inconvenient. Therefore, in order to test the relative importance of the variables of interest in our model for life satisfaction (X_1), we concentrate solely on four variables (Christian (X_2), Muslim (X_3), Hindu (X_4) and Non-religious (X_5)) and disregard, in this procedure, the rest of the independent variables. However, it should be emphasised that, given that this method

entails adding variables one by one until the fully specified model is obtained, variables that are being added to less than fully-specified models are likely to suffer from omitted variables bias. Moreover, we do not actually add them until the fully specified model is obtained for the reasons stated above, i.e. too many options (orderings). Eventually information is aggregated from a large number of misspecified models. In Table 3 rows present possible orderings (four variables, hence $4! = 24$ possible orderings), while columns correspond to the proportions of remaining variability linearly accounted for by each variable.

Table 3 The ANIMP method: four-variable case

Variable	X_2	X_3	X_4	X_5
$O_1 = 2, 3, 4, 5$	ρ_{12}^2	$\rho_{13.2}^2$	$\rho_{14.23}^2$	$\rho_{15.234}^2$
$O_2 = 2, 3, 5, 4$	ρ_{12}^2	$\rho_{13.2}^2$	$\rho_{14.235}^2$	$\rho_{15.23}^2$
$O_3 = 2, 4, 3, 5$	ρ_{12}^2	$\rho_{13.24}^2$	$\rho_{14.2}^2$	$\rho_{15.243}^2$
$O_4 = 2, 4, 5, 3$	ρ_{12}^2	$\rho_{13.245}^2$	$\rho_{14.2}^2$	$\rho_{15.24}^2$
$O_5 = 2, 5, 3, 4$	ρ_{12}^2	$\rho_{13.25}^2$	$\rho_{14.253}^2$	$\rho_{15.2}^2$
$O_6 = 2, 5, 4, 3$	ρ_{12}^2	$\rho_{13.254}^2$	$\rho_{14.25}^2$	$\rho_{15.2}^2$
$O_7 = 3, 4, 5, 2$	$\rho_{12.345}^2$	ρ_{13}^2	$\rho_{14.3}^2$	$\rho_{15.34}^2$
$O_8 = 3, 4, 2, 5$	$\rho_{12.34}^2$	ρ_{13}^2	$\rho_{14.3}^2$	$\rho_{15.342}^2$
$O_9 = 3, 5, 2, 4$	$\rho_{12.35}^2$	ρ_{13}^2	$\rho_{14.352}^2$	$\rho_{15.3}^2$
$O_{10} = 3, 5, 4, 2$	$\rho_{12.354}^2$	ρ_{13}^2	$\rho_{14.35}^2$	$\rho_{15.3}^2$
$O_{11} = 3, 2, 4, 5$	$\rho_{12.3}^2$	ρ_{13}^2	$\rho_{14.32}^2$	$\rho_{15.324}^2$
$O_{12} = 3, 2, 5, 4$	$\rho_{12.3}^2$	ρ_{13}^2	$\rho_{14.325}^2$	$\rho_{15.32}^2$
$O_{13} = 4, 5, 2, 3$	$\rho_{12.45}^2$	$\rho_{13.452}^2$	ρ_{14}^2	$\rho_{15.4}^2$
$O_{14} = 4, 5, 3, 2$	$\rho_{12.453}^2$	$\rho_{13.45}^2$	ρ_{14}^2	$\rho_{15.4}^2$
$O_{15} = 4, 3, 2, 5$	$\rho_{12.43}^2$	$\rho_{13.4}^2$	ρ_{14}^2	$\rho_{15.432}^2$
$O_{16} = 4, 3, 5, 2$	$\rho_{12.435}^2$	$\rho_{13.4}^2$	ρ_{14}^2	$\rho_{15.43}^2$
$O_{17} = 4, 2, 5, 3$	$\rho_{12.4}^2$	$\rho_{13.425}^2$	ρ_{14}^2	$\rho_{15.42}^2$
$O_{18} = 4, 2, 3, 5$	$\rho_{12.4}^2$	$\rho_{13.42}^2$	ρ_{14}^2	$\rho_{15.423}^2$
$O_{19} = 5, 4, 3, 2$	$\rho_{12.543}^2$	$\rho_{13.54}^2$	$\rho_{14.5}^2$	ρ_{15}^2
$O_{20} = 5, 4, 2, 3$	$\rho_{12.54}^2$	$\rho_{13.542}^2$	$\rho_{14.5}^2$	ρ_{15}^2
$O_{21} = 5, 3, 2, 4$	$\rho_{12.53}^2$	$\rho_{13.5}^2$	$\rho_{14.532}^2$	ρ_{15}^2
$O_{22} = 5, 3, 4, 2$	$\rho_{12.534}^2$	$\rho_{13.5}^2$	$\rho_{14.53}^2$	ρ_{15}^2
$O_{23} = 5, 2, 4, 3$	$\rho_{12.5}^2$	$\rho_{13.524}^2$	$\rho_{14.523}^2$	ρ_{15}^2
$O_{24} = 5, 2, 3, 4$	$\rho_{12.5}^2$	$\rho_{13.52}^2$	$\rho_{14.523}^2$	ρ_{15}^2

We will explain the application of this method through the four variables of interest in our model. If we concentrate on the first row and its meaning we observe that, given that the order is 2, 3, 4, 5 we first look at the percent of variance in the dependent variable (X_1 – life satisfaction) explained by variable X_2 (Christian). This is given by ρ_{12}^2 , the squared correlation coefficient between Christian and life-satisfaction. In this way we have extracted that part of the variance in the dependent variable accounted for by Christian. Next, we look at the fraction of the remaining variance accounted for by Muslim (X_3), controlling for Christian. This fraction is given by $\rho_{13.2}^2$. Via $\rho_{14.23}^2$ we account for the remaining variance accounted for by Hindus (X_4), given Christian and Muslim and finally $\rho_{15.234}^2$ explains the remaining fraction of variance accounted for by the Non-religious (X_5), controlling for Christian, Muslim and Hindus. $\rho_{13.2}^2$, $\rho_{14.23}^2$ and $\rho_{15.234}^2$ are first-, second-, and third-order squared partial correlation coefficients, respectively. To put differently, we first remove the variability explained by Christian (ρ_{12}^2), and then we look at additional contribution that Muslim makes ($\rho_{13.2}^2$) as it is added to

Christian and so on. In the second row we repeat this procedure, only this time the order of the variables is different. This procedure is then repeated for all possible orderings. The next step is to take the average of each column and compare those averages to get the relative importance.

Table 4 shows the squared correlation coefficients and squared partial correlation coefficients of the four variables in our model for all 24 possible orderings. The penultimate row gives the average index for each variable, while the last row gives ratios of these averages.

Table 4 The rankings of selected religious denominations

Variable	Christian	Muslim	Hindu	Non-religious
O ₁ = Christian, Muslim, Hindu, Non-religious	0.0977	0.0000348	0.00355	0.08679
O ₂ = Christian, Muslim, Non-religious, Hindu	0.0977	0.0000348	0.01825	0.07311
O ₃ = Christian, Hindu, Muslim, Non-religious	0.0977	0.000146	0.00343	0.08679
O ₄ = Christian, Hindu, Non-religious, Muslim	0.0977	0.01790	0.00343	0.07027
O ₅ = Christian, Non-religious, Muslim, Hindu	0.0977	0.00822	0.01825	0.0655
O ₆ = Christian, Non-religious, Hindu, Muslim	0.0977	0.01790	0.00855	0.0655
O ₇ = Muslim, Hindu, Non-religious, Christian	0.0917	0.0579	0.00029	0.04024
O ₈ = Muslim, Hindu, Christian, Non-religious	0.0454	0.0579	0.00029	0.08679
O ₉ = Muslim, Non-religious, Christian, Hindu	0.0749	0.0579	0.01825	0.0404
O ₁₀ = Muslim, Non-religious, Hindu, Christian	0.0917	0.0579	0.000088	0.0404
O ₁₁ = Muslim, Christian, Hindu, Non-religious	0.0423	0.0579	0.00355	0.08679
O ₁₂ = Muslim, Christian, Non-religious, Hindu	0.0423	0.0579	0.01825	0.07311
O ₁₃ = Hindu, Non-religious, Christian, Muslim	0.1100	0.01790	0.00004	0.0606
O ₁₄ = Hindu, Non-religious, Muslim, Christian	0.0917	0.03767	0.00004	0.0606
O ₁₅ = Hindu, Muslim, Christian, Non-religious	0.0455	0.0581	0.00004	0.08679
O ₁₆ = Hindu, Muslim, Non-religious, Christian	0.0917	0.0581	0.00004	0.04024
O ₁₇ = Hindu, Christian, Non-religious, Muslim	0.1008	0.01790	0.00004	0.07027
O ₁₈ = Hindu, Christian, Muslim, Non-religious	0.1008	0.000146	0.00004	0.08679
O ₁₉ = Non-religious, Hindu, Muslim, Christian	0.0917	0.03767	0.00054	0.0602
O ₂₀ = Non-religious, Hindu, Christian, Muslim	0.1100	0.01790	0.00054	0.0602
O ₂₁ = Non-religious, Muslim, Christian, Hindu	0.0749	0.0381	0.01825	0.0602
O ₂₂ = Non-religious, Muslim, Hindu, Christian	0.0917	0.0381	0.000088	0.0602
O ₂₃ = Non-religious, Christian, Hindu, Muslim	0.1028	0.01790	0.00855	0.0602
O ₂₄ = Non-religious, Christian, Muslim, Hindu	0.1028	0.00822	0.01825	0.0602
Average over all orderings	0.087	0.031	0.006	0.066
Ratio to Non-religious	1.32	0.47	0.09	1

The results in Table 4 indicate that the ranking of the investigated religions is as follows: Christian, Non-religious (Atheist and Agnostic), Muslim, and Hindu. This is graphically presented in Figure 2.

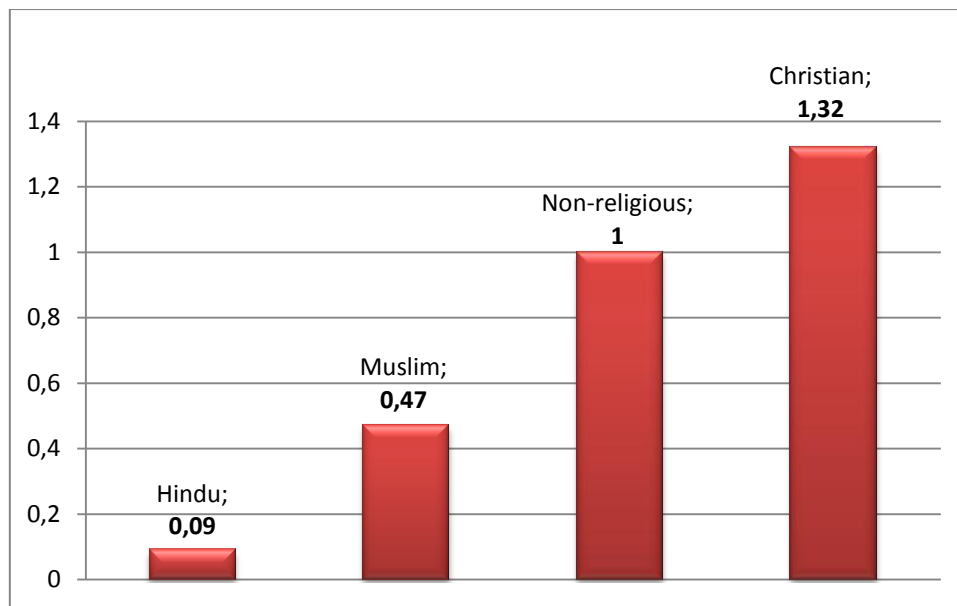


Figure 2: Relative importance of selected religious denominations

The results from standardised coefficients and the ANIMP method are broadly in line with each other. Namely, both approaches suggest that the most important religious denomination for life satisfaction is Christian, followed by Muslim and Hindu. The only difference is that the last set of result suggests that the Non-religious group are more satisfied than Muslim and Hindu and less satisfied than Christian.

4. Concluding Remarks

Using a sample of 144 countries and the data on life satisfaction, quality of life and religious denomination we analyse the relative importance of religion and religious denomination on life satisfaction. Among the quality of life variables we show that human development index and Gini coefficient both exert a positive influence on satisfaction. We hypothesise that the positive impact of Gini coefficient can be explained through the importance of relative rather than absolute income for happiness. When we separate out the three components of HDI, the results indicate that all three dimensions: health, wealth and education are important for life satisfaction. As for religion, our results indicate that it does have a significant influence on life satisfaction. It was shown that pertaining to one of the following denominations: Christian, Muslim or Hindu significantly influences satisfaction and that these categories are more satisfied with their lives than the reference category. Separating our sample even further, the results show that Catholics are the most satisfied group among Christians, and Sunnis among Muslims. We take the analysis one step further and examine the relative importance of the religions with most adherents on life satisfaction. Our results indicate that Christians are the most satisfied, followed by the Muslim and Hindu. Our results should be interpreted cautiously since we have no previous research to compare them with, but we firmly believe that they set the grounds for further research in this area.

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References

- Alberta A., La Ferrara, E. 2001. *Preferences for Redistribution in the Land of Opportunities*. NBER Working Paper 8278.
- Barro, R., McCleary, R. 2001. Religion, Economy, and Society in an International Panel, prepared for Religion-Factor Research. *Personal and Social Transformation Symposium* University of Pennsylvania, Philadelphia.
<http://www.wcfia.harvard.edu/sites/default/files/BarroMcCleary2001.pdf> [12/01/2012].
- Drewnowski, J., Scott W. 1966. *The Level of Living Index*, United Nations Research Institute for Social Development UNRISD Report 4, Geneva.
- Ellison, C., Gay, D., Glass, T. 1898. Does Religious Commitment Contribute to Individual Life Satisfaction? *Social Forces* 681, 100-123.
- Filipic, P. 2011. Procjena svjetskog stanovništva prema religijskoj pripadnosti, University of Split Publication, Croatian mimeo.
- Francis, L., Ziebertz, H.-G., Lewis, A. 2003. The Relationship between Religion and Happiness among German Students. *Pastoral Psychology* 514, 273-281.
- Freedom house data available at www.freedomhouse.org [15/03/2011].
- Frey, B., Stutzer, A. 2002. *Happiness and Economics. How the Economy and Institutions Affect Human Well-being*. Princeton and Oxford. Princeton University Press
- Greeley, A., Hout, M. 2006. *Happiness and Lifestyle among Conservative Christians, The Truth about Conservative Christians*. Chicago, IL. University of Chicago Press, 150-161.
- Guiso, L., Sapienza, P., Zingales, L. 2003. People's opium? Religion and economic attitudes. *Journal of Monetary Economics* 501, 225–282.
- Hsu, B., Reynolds, A., Hackett, C., Gibbon J. 2008. Estimating the Religious Composition of All Nations. An Empirical Assessment of the World Christian Database. *Journal of the Scientific Study of Religion* 47:4, 678-693.
- United Nations .2010. *UN Human development report 2010*. Development Programme. UN Publication. New York.
- Kruskal, W. 1987. Relative Importance by Averaging Over Orderings. *The American Statistician* 41:1, 6-10.
- Kruskal, W., Majors, R. 1989. Concepts of Relative Importance in Recent Scientific Literature. *The American Statistician* 43:1, 2-6.
- Lelkes, O. 2006. Tasting Freedom. Happiness, Religion and Economic Transition. *Journal of Economic Behavior and Organization* 592, 173-194.
- Lewis, C., Cruise, S. 2006. Religion and Happiness. Consensus, Contradictions, Comments and Concerns. *Mental Health, Religion and Culture* 93, 213-225.

Lim, C., Putman, R. 2010. Religion, Social Networks and Life Satisfaction. *American Sociological Review* 75(6), 914-933.

Mookerjee, R., Beron, K. 2005. Gender, religion and happiness. *The Journal of Socio-Economics* 34, 674-685.

Morris, D. 1979. *Measuring the Conditions of the World's Poor. The Physical Quality of Life Index*. Pergamon Policy Studies, No 42. Pergamon Press, New York.

Nordhaus, W., Tobin J. 1972. *Is Growth Obsolete?* Fiftieth Anniversary Colloquium, NBER; Columbia University Press, New York.

Ohtake F., Tomioka, J. 2004. "Happiness and Income Inequality in Japan", mimeo, available at <http://www.esri.go.jp/jp/prj-rc/macro/macro15/07-4-R.pdf> [11/03/2011].

Population Crisis Committee. 1992. *The International Human Suffering Index*. Colorcraft of Virginia, USA.

Retzer, J. 2001. Measuring Importance. A New Way of Assigning Relative Attribute Importance, available at <http://www.maritzresearch.com/2001Sum/HTMLVers.html> [11/03/2006]

Soofi, E., Retzer, J., Yasai-Ardekani, M. 2000. A Framework for Measuring the Importance of Variables with Applications to Management Research and Decision Models. *Decision Sciences* 31(3), 595-625.

World Christian database, available at www.worldmapper.org [21/02/2011]

Appendix

Table A1. Data sources and description

Variable	Year	Source	Description
Life satisfaction	2006-2009	Human Development Report	Overall life satisfaction: 0 – least satisfied; 10 -most satisfied.
HDI	2009	Human Development Report	Human development index
GDP per capita	2009	Human Development Report	GDP per capita in current US\$
Mean years of schooling	2010	Human Development Report	Mean years of schooling
Expenditure on health (% of GDP)	2000-2008	Human Development Report	Public expenditure on health as a percentage of GDP
Civil liberties index	2009	Freedom House	Civil liberties index: 1 – most free; 7 – least free
Corruption index	2009	Transparency International	Corruption index: 0 – highly corrupt; 10 – highly clean
GINI	2000-2010	Human Development Report	Income GINI coefficient: 0 - absolute equality; 100 - absolute inequality
Non-religious	2005	World Christian Database	Percentage of population in a country that are either Atheist or Agnostic
Christian	2005	World Christian Database	Percentage of population in a country that pertain to Christian denomination
Muslim	2005	World Christian Database	Percentage of population in a country that pertain to Muslim denomination
Chinese Universist	2005	World Christian Database	Percentage of population in a country that pertain to Chinese Universist denomination
Buddhist	2005	World Christian Database	Percentage of population in a country that pertain to Buddhist denomination
Hindu	2005	World Christian Database	Percentage of population in a country that pertain to Hindu denomination
Other denominations	2005	World Christian Database	Percentage of population in a country that pertain either to Ethno-religionists, Sikhs, Jews, Spiritists, Bahai's, Confucianists, Jains, Shintoists, Taoists or Zoroastrians.

Table B1. Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Life satisfaction	138	5.86	1.40	2.4	8.5
HDI	138	0.64	0.19	0.118	0.937
GDP per capita	134	12255.97	18119.82	159.5757	105043.7
Mean years of schooling	138	7.73	3.04	1.2	12.6
Expenditure on health (% of GDP)	137	3.77	2.03	0.6	8.7
Civil liberties index	144	3.18	1.70	1	7
Corruption index	141	4.09	2.18	1.3	9.4
GINI	129	40.12	9.43	16.8	74.3
Non-religious	141	7.14	9.77	0	49.7
Christian	141	54.27	37.03	0	98.1
Muslim	141	23.77	34.01	0	99.5
Chinese Universist	141	1.48	7.59	0	53.7
Buddhist	141	3.64	13.59	0	85.3
Hindu	141	1.91	9.22	0	72.8
Other denominations	141	7.14	12.92	0	71.6