

Advanced Studies in International Economic Policy Research
Kiel Institute for the World Economy
Düsternbrooker Weg 120
D-24105 Kiel/Germany

Working Paper No. 455

**Religiosity and Personal Well-Being:
People Can Be Happy With or Without Religion**

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May 2010

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Religiosity and Personal Well-Being: People Can Be Happy With or Without Religion

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Abstract: Despite all economic and social transitions that have occurred in the last centuries we still find that people go to church. Somehow religious beliefs have not vanished over time. Since there is no material reward for going to church or praying religiosity has to create utility through other means. It could raise peoples' personal well-being. In this paper we use information from the World Values Survey about subjective happiness and life satisfaction. We relate this information to revealed religiosity and measure if religiosity makes people happier. We use different methods and also control for economic factors, family matters, health, and democracy. The key finding is that there seems to be a U-shaped relationship between personal well-being and religiosity, especially so for happiness. This result is consistent throughout all our estimations. Our analysis also gives hints that higher income might lead to higher subjective well-being.

Keywords: personal well-being • happiness • life satisfaction • religiosity • U-shaped relationship

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1. Introduction

The major religions we know today are several centuries or even millennia old. Mankind has experienced several cultural and social changes since then. Some things may have been lost or forgotten, others have become unnecessary because inventions took their place. We may wonder how it is possible that religion has survived until today. Due to an ever growing stock of education we know today that natural disasters have other sources than the fury of the gods. In the follow-up of the social enlightenment in many countries the churches have lost influence about people's lives. Still, until today people believe in their gods, go to church, and pray.

Speaking in economic terms religion has to create utility for people. Otherwise they would no longer pursue it. But what does this utility consist of? It cannot be material gains since you are not rewarded financially for going to church or praying. Hence, it has to be a social or subjective benefit that is created by religion. This could be described by the feeling of personal happiness or satisfaction.

The concept of happiness has gained interest of economists in the last few decades. It has been popular in sociological and psychological studies, e.g. Diener (1984), Diener et al.(1995, 1999, 2000). In the economics literature it has come to the focus of attention because happiness is what people are generally looking for. As Ng (1997) puts it “we want money (or anything else) only as a means to increase our happiness. If having more money does not substantially increase our happiness, then money is not very important, but happiness is.” Following this the main interest in happiness is the debate whether higher income leads to more well-being. The discussion was started by Easterlin (1973) and is not resolved until today. There are two opposing views, one following Easterlin that says that a higher level of income does not generate happiness. On the other side, authors as Stevenson and Wolfers (2008) claim that rising income leads to more happiness and life satisfaction.

This paper is not intended to contribute to this discussion. We are trying to focus on other parts of life that can influence personal happiness, in this case the main focus is on religiosity. We are using econometric methodology and control for other economic variables such as income or inflation. Our goal is to identify what role religiosity still plays today. Since being religious does not give material benefit we think that the utility created by religion has to be of subjective nature. That is what we think is best explained by the concepts of personal happiness and life satisfaction.

Earlier research that investigates the link between religiosity and happiness starts with the work of Ellison (1991). Ellison (1991) studies the impact of religiosity on well-being. He finds that strong religious beliefs enhance subjective well-being. The study also gives evidence that not church attendance per se raises happiness, but indirectly through the strengthening of religious belief. Taking into account the role of government regulation Elliott and Hayward (2009) find that

personal religious identity and social religious identity, measured as church attendance, raise individual well-being. They also show that tighter restrictions decrease the participation in social religious activity. But on the other hand it increases the effect of personal religiosity and life satisfaction.

Lelkes (2006) investigates the effect of the economic transition in Hungary after the collapse of Socialism on well-being. Regarding religiosity Lelkes (2006) finds that higher religiosity, in terms of church attendance, leads to higher reported well-being. Also, the more religious people seem to be less affected by the income variation which is due to the economic changes in the 1990's. Okulicz-Kozaryn (2009) shows that religiosity has diverse effects. His results indicate that religious people tend to be either very satisfied or dissatisfied and that religious people are happier in religious countries. Ferriss (2002) also gets the result that happiness rises with the frequency of church attendance. Moreover, happiness seems to be influenced by denominational and doctrinal differences.

Peacock and Poloma (1999) investigate the relationship between religiosity and life satisfaction over the life cycle. They find that religiosity increases with age, although the relationship does not seem to be linear. The other finding is that religiosity tends to increase life satisfaction, mainly through the perceived closeness to God. Greene and Joon (2004) find that life satisfaction rises with religious attachment which is measured as the willingness to attend religious services regularly. In a study among undergraduate students Robbins and Francis (1996) find a positive relationship between religiosity and happiness.

As already mentioned the main focus of economists is the relationship between income and happiness. Since this is not our main concern the literature is only briefly presented. In a series of papers Easterlin (1973, 1974, 1995, 2005) finds the somehow paradoxical result that higher income does not seem to raise the well-being of a society as a whole. It is true that in a point in time wealthier people are happier than the poor but this effect vanishes if one looks at time-series. There seems to be a flat relationship between happiness and income over time. Layard (2003) comes to the same conclusion showing that over the course of time the average happiness of societies does not change even if income multiplies several times. Frey and Stutzer (2002) support these conclusions. They also find that unemployment and inflation have a detrimental effect on subjective happiness and that more democratic institutions may increase well-being. Oswald (1997) finds that income raises happiness and satisfaction, if at all, only very slightly over time. Another finding is that unemployment heavily reduces happiness. Blanchflower and Oswald (2004) find support for Easterlin's results. But they also find that controlling for personal characteristics an upward movement of happiness over time can be found.

In an extensive approach Stevenson and Wolfers (2008) reassess the Easterlin Paradox.

Using several different data sources on subjective well-being they find that the positive relationship between income and subjective well-being is stable across countries and time. Regressing their well-being measures on the log of income yields the result that higher income leads to more happiness and life satisfaction. Deaton (2008) also finds a linear relationship between the log of income and life satisfaction using data from the Gallup World Poll. Di Tella et al. (2003) examine the macroeconomic impacts on happiness. They find that the level and growth of GDP affect subjective happiness. Frijters et al. (2004) analyze the development of life satisfaction in Eastern Germany after the reunification. Applying a new decomposition technique they find that the increase in household income caused a significant increase in the East Germans' life satisfaction.

Ferrer-i-Carbonell (2005) investigates the relationship between income of reference groups and subjective happiness and finds that own income is only as important for happiness as the income of the people we compare ourselves to. Strulik (2008) shows that the comparison with others is not necessarily detrimental to subjective well-being. The effect of a wealth loss on welfare is slightly lower for those who compare themselves to others than for people who do not compare at all.

Since, apparently there is an important role for income in happiness research we will also include it in all our analyses. We will base our study on answers regarding happiness, life satisfaction and religiosity from the World Values Survey. The remainder of this paper is organized as follows. Section 2 describes our data and the methodology we use. Section 3 gives the results of our different estimations. In Section 4 we will discuss the results. Section 5 briefly concludes.

2. Data and Methodology

Data

Our dependent variables throughout the whole paper will be personal happiness and life satisfaction. We use the data from Stevenson and Wolfers (2008). The data is taken from the World Values Survey (WVS), “the best source available today for international comparisons of life satisfaction”(Inglehart et al., 2000). This is based on national surveys which are conducted in many developing and industrialized countries and has been undertaken in several waves. The data used in Stevenson and Wolfers (2008) spans the waves 1982, 1990, 1995, and 2000. The questionnaire includes information about the respondents' demographics, such as age, sex, and gender, as well as the economic circumstances of the household. Furthermore, it contains questions about people's attitudes concerning politics, religion, life satisfaction and many related topics. The questions concerning happiness and life satisfaction are asked the following way: “Taking all things together, would you say you are: very happy; quite happy; not very happy; not at all happy?” and “All things considered, how satisfied are you with your life as a whole these days?” Combining the information

from the four waves we get data on 82 countries. Stevenson and Wolfers (2008) create a measure of average national happiness and life-satisfaction by running ordered probit regressions of these variables on country fixed effects. We use this ordered probit indexes as our dependent variables.

As in Gundlach and Opfinger (2010) we use the religiosity score from Paldam and Gundlach (2009) as the variable measuring religiosity. This religiosity score is also based on answers to questions from the World Values Survey. The religiosity score is measured in percentage points and ranges from zero to 100. Data on income comes from the Maddison (2009) online database or, if not available, from the CIA world factbook. Data on the marriage rate is taken from the United Nations Statistics Division, from the United Nations Statistical Yearbook and from the World Consumer Lifestyles Databook. In the cases of India, Pakistan, Morocco, and Nigeria marriage rates were not available. We tried to estimate the marriage rate from the changes in the number of totally married people. Although this might be a rather rough measure we are certain that it suits the demand of this paper and that it does not affect the validity of the results. Information about the life expectancy at birth and the inflation rates is taken from the World Bank's World Development Indicators and the polity score is taken from the Polity IV dataset.

Methodology

We are interested in the relationship between religiosity and subjective well-being. We split well-being into happiness and life satisfaction. In a first step we run OLS regressions of happiness and life satisfaction on income, religiosity and other control variables. The model we use is of the following form:

$$WB_i = \alpha + \beta * \text{income}_i + \gamma * \text{religiosity}_i + \delta * X_i + \epsilon_i,$$

where WB is the measure of well-being, i.e. happiness and life satisfaction, respectively, income is the logarithm of GDP per capita, religiosity is the religiosity score and X is the vector of control variables.

In this first step we use every observation separately. This means that every country might appear more than once in the regressions, according to the number of waves in which this country took part in the WVS. This gives a maximum number of observations of 183. We use this method to get a first approach to the results and use these as a benchmark.

After that we only use the average values of each variable for every country. This way every country appears only once in each regression. This leaves us with a maximum number of observations of 82. Again, we run cross-country OLS regressions of the two well-being variables on income, religiosity, and the other control variables.

In a final step, to use all information that we have available, we use the data as a panel. We take the information for each country and each wave. Since not every country appears in each wave of the WVS we are dealing with an unbalanced panel dataset. The estimated model changes to:

$$WB_{it}=\alpha+\beta*income_{it}+\gamma*religiosity_{it}+\delta*X_{it}+c_i+w_t+\epsilon_{it},$$

where the meaning of the variables remains the same. But now the subscript *it* indicates that we are dealing with observations that change over country and time. Country fixed effects are indicated by c_i and wave fixed effects by w_t . We run fixed effects estimations of personal happiness and life satisfaction on the explanatory variables. We use the fixed effects method to control for country characteristics that do not change over time but that might influence the results. We also include wave fixed effects to control for the possibility of changes in personal well-being that are due to wave-specific effects. We compute robust standard errors to test the validity of our results. Again, the maximum number of observations is 183.

In order to check for the robustness of our results we run the same estimations again. But we use the average of the national happiness and life satisfaction instead of the ordered probit results from Stevenson and Wolfers (2008).

Summary Statistics

Table 1 shows the summary statistics of the variables that we use in our analysis.

	<i>Number of observations</i>	<i>Mean</i>	<i>Median</i>	<i>Standard Deviation</i>	<i>Minimum</i>	<i>Maximum</i>
Log of income	185	8.880973	8.96	.8910461	6.26	10.69
Religiosity score	185	54.23843	53.9	19.18997	2.41	91.29
Happiness	183	-.0091576	-.0169388	.4677967	-1.12327	1.028916
Life satisfaction	183	-.0089553	.0163355	.4971343	-1.275043	.9915063
Marriages per 100,000	176	605.3568	576.475	169.5911	194.99	1100.92
Life expectancy	184	71.69022	73	6.484678	44	81
Inflation rate	175	55.02857	8	267.009	-2	2735
Polity score	174	6.287356	8	5.36615	-10	10

Table 1, Summary Statistics

Income in the Maddison (2009) dataset is measured in 1990 International Geary-Khamis dollars. The lowest observation in our data equals 6.26 which is approximately 525 dollars compared to the highest amount of approximately 44,000 dollars. The religiosity score ranges from 2.41 percentage points in China in the 1990 wave to 91.3 percentage points in Nigeria in 1995. The ordered probit indexes of happiness and life satisfaction are distributed mainly between -1 and 1. The lowest value of happiness is reported in Albania in 1995, the highest by Nigeria in the year 2000. The lowest value for life satisfaction comes from Moldova from the year 1995, the highest from Puerto Rico from 2000. The marriage rate lies between 195 (Dominican Republic 1995) and 1100 (Bangladesh 1995) marriages per 100,000 inhabitants. Life expectancy was lowest in Zimbabwe in the year 2000 with 44 years and highest in Japan in the same year with a life expectancy at birth of 81 years. The

inflation rate ranges between -2 percent per year (Japan 2000) and 2735 percent in Brazil in 1990. The polity score is created in a way that it ranges from -10 for autocracies to +10 for democracies.

3. Results

In this section we present the results of our estimations. For each approach used we show the results separately for happiness and for life satisfaction. First we show the outcome for the models in which we use every country at every point in time as a single observation. Table 2 shows the results when happiness is the dependent variable. The t-statistics are reported in parentheses.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log of income	0.29620 (7.80)	0.36344 (9.58)	0.63738 (6.21)	0.40040 (10.39)	0.36514 (6.57)	0.36472 (9.57)	0.35999 (7.76)	0.40098 (6.15)
religiosity	0.01021 (5.80)	-0.02651 (-3.59)	0.06048 (4.25)	-0.02965 (-4.11)	-0.02650 (-3.53)	-0.03065 (-4.10)	-0.03022 (-3.87)	-0.03728 (-4.74)
religiosity sq		0.00035 (5.10)		0.00038 (5.65)	0.00035 (5.00)	0.00038 (5.50)	0.00039 (5.31)	0.00045 (6.06)
religiosity * income			-0.00580 (-3.56)					
marriage rate				-0.00042 (-2.57)				-0.00038 (-2.18)
lifeexpectancy					-0.00044 (-0.06)			0.00164 (0.18)
inflation						-0.00002 (-0.21)		0.00001 (0.13)
polity							0.00221 (0.32)	0.00083 (0.12)
cons	-3.19417 (-8.13)	-2.96389 (-7.99)	-6.20149 (-6.70)	-2.98564 (-7.51)	-2.95072 (-7.19)	-2.83102 (-7.57)	-2.88696 (-6.61)	-2.95130 (-5.62)
N	183	183	183	175	182	173	172	154
R ² adj.	0.26	0.35	0.31	0.42	0.35	0.36	0.34	0.41

Table 2, own calculations

T-statistics in parentheses, religiosity is the religiosity score, religiosity sq. is squared religiosity, marriage rate is marriages per 100,000 inhabitants, lifeexpectancy is life expectancy in years at birth, inflation is measured in percentage year on year change, polity is the polity score from Polity IV dataset

In column (1) we only use the log of income and our measure of religiosity as explanatory variables. We find that income has a positive impact on happiness which is statistically significant at the one percent level. An increase in income by one logarithmic point raises the ordered probit index of happiness by almost 0.3. Taking into account that the index ranges from -1.12 to 1.03 this is a fairly remarkable increase. We also find that religiosity enters the equation positively. The coefficient is also statistically significant at the one percent level. Higher religiosity seems to increase happiness. An increase in the religiosity score by 10 percentage points raises the happiness index by 0.1.

Column (2) shows the results when we include a quadratic term of the religiosity score. Again we find income to have a positive impact on happiness. Interestingly, the coefficient on the linear term for religiosity now is negative and statistically significant. At the same time the quadratic term enters positively. It is also significant at the one percent level. Apparently, the relationship between happiness and religiosity seems to follow a U-shaped pattern. The people in countries with low levels of religiosity report high levels of happiness. The negative coefficient on the linear term implies that with rising levels of religiosity happiness declines at first. At some point the effect of the quadratic term dominates, which means that at high levels of religiosity again people report high levels of happiness.

In column (3) we integrate an interaction term between income and religiosity. Once more the coefficients on income and religiosity are positive and significant. The coefficient on the interaction term enters negatively.

In the columns (4) through (8) we test whether the U-shaped relationship between personal happiness and religiosity holds if we control for other factors. Easterlin (1973, 2001) suggests that happiness is influenced by economic factors, by personal and family matters, and by health. Frey and Stutzer (2002) see a role for political factors in the explanation of personal well-being. We find that throughout columns (4) through (8) the U-shaped relationship between happiness and religiosity holds. The most important economic factor is probably income. We see that in all columns income also enters the estimation positively. This is always significant at the one percent level.

In order to control for family matters we use the marriage rate per 100,000 inhabitants as a proxy in column (4). Surprisingly, this enters negatively and is statistically significant. In column (5) we include life expectancy at birth to control for health. In column (6) we include the inflation rate as another economic variable and in column (7) we use the polity score from the Polity IV dataset to control for political factors. None of these variables is statistically significant. In column (8) we include all the control variables. Still, the U-shaped relationship between religiosity and personal happiness holds and income still enters positively and is significant. The marriage rate still has a negative coefficient which is significant. The other variables are not significantly different from zero.

Table 3 shows the results when we use life satisfaction instead of happiness as the dependent variable. The interpretation is merely the same. Income is positively associated with life satisfaction and highly significant. In column (1) we see that higher religiosity leads to higher life satisfaction. But the most important result is gained from columns (2) and (4) through (8). The negative coefficient on the linear term together with the positive coefficient on the quadratic term confirm the finding of a U-shaped relationship between religiosity and the measure of personal well-being,

in this case life satisfaction. None of the other control variables is significant except for life expectancy in column (5). This is a plausible result, stating the fact that life satisfaction is higher when people are healthy and can expect to live a longer life. However, life expectancy is not significant in column (8) where we include all control variables at the same time.

Table 3
dependent variable: life satisfaction

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
log of income	0.43180 (12.56)	0.48654 (14.06)	0.48499 (5.05)	0.49954 (13.89)	0.41270 (8.18)	0.49576 (14.03)	0.45218 (10.58)	0.42478 (6.86)
religiosity	0.00869 (5.40)	-0.02239 (-3.27)	0.01658 (1.24)	-0.02635 (-3.85)	-0.02431 (-3.54)	-0.02718 (-3.85)	-0.02196 (-3.02)	-0.03249 (-4.28)
religiosity sq.		0.00030 (4.66)		0.00034 (5.27)	0.00032 (4.96)	0.00034 (5.12)	0.00028 (4.11)	0.00039 (5.30)
religiosity * income			-0.00091 (-0.59)					
marriage rate				-0.00018 (-1.15)				-0.00023 (-1.36)
lifeexpectancy					0.01397 (2.01)			0.01200 (1.38)
inflation						0.00010 (1.06)		0.00014 (1.38)
polity							0.00394 (0.62)	0.00394 (0.57)
cons	-4.31679 (-12.14)	-4.10134 (-12.07)	-4.78574 (-5.52)	-4.03623 (-10.81)	-4.41604 (-11.88)	-4.04139 (-11.59)	-3.81225 (-9.43)	-4.06300 (-8.08)
N	183	183	183	174	182	173	172	153
R ² adj.	0.46	0.52	0.46	0.53	0.53	0.53	0.47	0.51

Table 3, own calculations

T-statistics in parentheses, religiosity is the religiosity score, religiosity sq. is squared religiosity, marriage rate is marriages per 100,000 inhabitants, lifeexpectancy is life expectancy in years at birth, inflation is measured in percentage year on year change, polity is the polity score from Polity IV dataset

In the first two tables we used every country at every wave of the World Values Survey as a single observation. In order to prevent us from creating correlations by this approach, since countries appear more than once, we take the average values for each country over the different waves of the WVS. This reduces the maximum number of observations from 183 to 82. Table 4 shows the results when we use happiness as the dependent variable. The results we obtain are very similar to those from Table 2. The U-shaped relationship between happiness and religiosity still holds. In all the columns, (2) and (4) through (8), the linear term enters with a negative sign, whereas the quadratic term has a positive effect on happiness. The coefficients are significant at the one percent level in almost every case, or if not at the five percent level. The coefficients themselves are very similar in magnitude to those in Table 2.

We also find again that income has a positive effect on happiness. It is statistically significant at the one percent level in every specification. The coefficients, however, are a little bit

smaller than in Table 2, where a one logarithmic point increase in income was associated with an increase in the ordered probit index of happiness of around 0.36. Now this impact decreases slightly to around 0.29. The other control variables are never significant in Table 4, the marriage rate also becomes insignificant. This might also be due to the fact that the sample size is decreased.

Table 4
dependent variable: happiness

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
log of income	0.24865 (4.54)	0.29983 (5.42)	0.58415 (3.60)	0.33214 (6.13)	0.29474 (3.75)	0.29142 (5.19)	0.28780 (4.18)	0.28865 (2.99)
religiosity	0.00981 (3.58)	-0.02942 (-2.14)	0.05695 (2.63)	-0.03007 (-2.30)	-0.02948 (-2.09)	-0.02759 (-1.98)	-0.03212 (-2.14)	-0.03185 (-2.11)
religiosity sq.		0.00035 (2.91)		0.00036 (3.10)	0.00035 (2.84)	0.00034 (2.74)	0.00038 (2.82)	0.00038 (2.77)
religiosity * income			-0.00552 (-2.19)					
marriage rate				-0.00039 (-1.59)				-0.00045 (-1.75)
lifeexpectancy					0.00069 (0.06)			0.00676 (0.47)
inflation						-0.00021 (-0.87)		-0.00017 (-0.73)
polity							0.00215 (0.20)	-0.00047 (-0.04)
cons	-2.73409 (-4.73)	-2.22413 (-3.84)	-5.65396 (-3.91)	-2.26601 (-3.71)	-2.23574 (-3.54)	-2.19004 (-3.75)	-2.08238 (-2.99)	-2.30316 (-2.80)
N	82	82	82	79	81	81	77	73
R ² adj.	0.20	0.27	0.24	0.35	0.26	0.27	0.23	0.30

Table 4, own calculations

T-statistics in parentheses, religiosity is the religiosity score, religiosity sq. is squared religiosity, marriage rate is marriages per 100,000 inhabitants, lifeexpectancy is life expectancy in years at birth, inflation is measured in percentage year on year change, polity is the polity score from Polity IV dataset

Table 5 draws a different picture. Again we use the country averages over the four different waves of the WVS. The dependent variable is life satisfaction. We see that the U-shaped relationship does not hold in all specifications. In column (1) we find that as in all other specifications income has a positive impact on life satisfaction which is statistically significant at the one percent level. The coefficient on our religiosity measure also has a positive sign and is statistically significant. However, when we include the quadratic term in column (2) the linear term is not significant anymore at any conventional level of significance. When we include the other control variables separately in columns (4) through (7) the linear term on religiosity is significant only at the ten percent level in columns (4) and (5). In column (4) we find that the marriage rate is also marginally statistically significant. Surprisingly, the coefficient is again negative.

In column (5), as in Table 3, life expectancy has a positive effect on life satisfaction. Inflation and the polity score do not have any significant effect. In column (8) we include all

explanatory variables at the same time. In this specification we find again that the U-shaped relationship between life satisfaction and religiosity holds. The marriage rate again enters negatively and statistically significantly.

Table 5
dependent variable: life satisfaction

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
log of income	0,44150 (8.91)	0,47584 (9.31)	0,42778 (2.84)	0,45182 (8.69)	0,38910 (5.46)	0,47862 (9.16)	0,42538 (6.74)	0,32088 (3.52)
religiosity	0,00860 (3.47)	-0,01771 (-1.39)	0,00667 (0.33)	-0,02272 (-1.81)	-0,02166 (-1.69)	-0,01818 (-1.40)	-0,02049 (-1.49)	-0,03059 (-2.15)
religiosity sq.		0,00024 (2.11)		0,00029 (2.57)	0,00028 (2.44)	0,00024 (2.09)	0,00025 (2.05)	0,00035 (2.73)
religiosity * income			0,00023 (0.10)					
marriage rate				-0,00039 (-1.65)				-0,00047 (-1.91)
lifeexpectancy					0,01719 (1.75)			0,01610 (1.18)
inflation						0,00005 (0.22)		0,00007 (0.30)
polity							0,00965 (0.96)	0,01317 (1.29)
cons	-4,40418 (-8.44)	-4,06207 (-7.58)	-4,28473 (-3.18)	-3,49719 (-5.96)	-4,44719 (-7.75)	-4,07194 (-7.50)	-3,58711 (-5.61)	-3,33338 (-4.29)
N	82	82	82	79	81	81	77	73
R ² adj.	0,49	0,52	0,49	0,49	0,53	0,51	0,47	0,44

Table 5a

	(4a)	(5a)	(6a)	(7a)	(8a)
log of income	0.41752 (8.01)	0.37571 (5.12)	0.44230 (8.79)	0.40641 (6.37)	0.35287 (3.72)
religiosity	0.00896 (3.66)	0.00897 (3.57)	0.00850 (3.39)	0.00731 (2.79)	0.00762 (2.86)
marriage rate	-0.00029 (-1.21)				-0.00037 (-1.44)
lifeexpectancy		0.01228 (1.24)			0.00549 (0.40)
inflation			-0.00002 (-0.09)		-0.00005 (-0.20)
polity				0.00287 (0.29)	0.00268 (0.27)
cons	-4.02958 (-7.08)	-4.72191 (-8.13)	-4.40129 (-8.29)	-4.05199 (-6.63)	-3.75914 (-4.72)
N	79	81	81	77	73
R ² adj.	0.46	0.50	0.49	0.45	0.39

Tables 5 and 5a, own calculations

T-statistics in parentheses, religiosity is the religiosity score, religiosity sq. is squared religiosity, marriage rate is marriages per 100,000 inhabitants, lifeexpectancy is life expectancy in years at birth, inflation is measured in percentage year on year change, polity is the polity score from Polity IV dataset

The U-shaped relationship does not seem to hold too well in these models. However, we find that the coefficients on religiosity do not differ much from those in Tables 2 through 4. The lower t-statistics might be explained by the reduced sample size. Nevertheless we reran equations (4) through (8) without the inclusion of the quadratic term. The results, presented in Table 5a, show that in all columns the linear term on religiosity has a positive coefficient and is statistically significant at the one percent level. The coefficients imply that an increase in the religiosity score by ten percentage points leads to an increase in the ordered probit index of life satisfaction between 0.07 and 0.09. The coefficient on income remains positive and significant in the columns (4a) through (8a) and the magnitude does not change considerably in comparison to columns (4) through (8) of Table 5. The other variables do not have significant effects in these specifications. These results hint in the direction that the relationship between life satisfaction and religiosity could also be linear rather than U-shaped.

In a final step we use our data as an unbalanced panel. We run country and wave fixed effect estimations of the well-being variables on the explanatory variables. The t-statistics are gained by using robust standard errors and are reported in parentheses. Table 6 shows the results when we use happiness as the dependent variable. In column (1) we only use income and religiosity as explanatory variables. Neither of the two variables has a significant impact. Interestingly, in this case higher religiosity does not imply higher happiness. The most important insight is gained from column (2). Here, as before, we add a quadratic term of our religiosity measure. We see that the coefficient on the linear term turns negative and now is statistically significant. The coefficient on the quadratic term is positive and also significant at the one percent level. Hence, we find again that the relationship between personal happiness and religiosity seems to follow a U-shaped pattern. In column (2) income also enters positively, but falls short of statistical significance.

We add an interaction term between religiosity and income in column (3). Neither of the coefficients is significant. In columns (4) through (8) we run the fixed effects model again with the additional control variables. In column (4) we control for personal conditions by entering the marriage rate into the equation. We find that the U-shaped relationship between happiness and religiosity still holds and that income affects happiness positively and statistically significantly. In columns (5) and (7) we add the life expectancy at birth and the polity score, respectively. Neither of the two has a significant effect on happiness. The results concerning the relationship between religiosity and happiness hold unchanged. However, income is not significant when we include the polity score. In column (6) we control for the inflation rate. We find that the U-shaped relationship between happiness and religiosity remains and that income still has a positive effect. The inflation rate also affects happiness positively. This means that a higher inflation rate leads to greater happiness. It has to be remarked though that the coefficient is very small (0.00008), but still it is

statistically significant.

Table 6
dependent variable: happiness

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
log of income	0,081186 (0.77)	0,131903 (1.51)	-0,078235 (-0.51)	0,185207 (2.26)	0,209671 (2.26)	0,216788 (2.06)	0,097417 (0.91)	0,346086 (2.28)
religiosity	0,001839 (0.50)	-0,013918 (-2.24)	-0,028623 (-1.33)	-0,013991 (-2.26)	-0,014712 (-2.39)	-0,019990 (-3.27)	-0,013519 (-2.25)	-0,020872 (-3.10)
religiosity sq.		0,000189 (2.41)		0,000177 (2.10)	0,000196 (2.53)	0,000266 (3.08)	0,000174 (2.22)	0,000257 (2.43)
religiosity * income			0,003578 (1.50)					
marriage rate				-0,000183 (-1.14)				-0,000071 (-0.37)
lifeexpectancy					-0,019108 (-1.35)			-0,019012 (-1.32)
inflation						0,000083 (2.31)		0,000063 (1.31)
polity							0,005832 (0.83)	0,004214 (0.44)
cons	-0,946477 (-0.90)	-1,163507 (-1.45)	0,407812 (0.29)	-1,463312 (-1.97)	-0,492455 (-0.45)	-1,807927 (-1.99)	-0,866321 (-0.91)	-1,501545 (-0.98)
country fe	yes	yes	yes	yes	yes	yes	yes	yes
wave fe	yes	yes	yes	yes	yes	yes	yes	yes
N	183	183	183	175	182	173	172	154
R ² adj.	0,21	0,26	0,22	0,24	0,26	0,26	0,27	0,23

Table 6, own calculations

T-statistics in parentheses, religiosity is the religiosity score, religiosity sq. is squared religiosity, marriage rate is marriages per 100,000 inhabitants, lifeexpectancy is life expectancy in years at birth, inflation is measured in percentage year on year change, polity is the polity score from Polity IV dataset

In column (8) we add all the control variables at the same time. We find that the inflation rate does no longer enter significantly. Still, our main finding holds. The linear term on religiosity has a negative coefficient which is significant and the quadratic term enters positively. Income also still has a positive effect on happiness which is statistically significant. When we compare the magnitude of the coefficients we find that they are smaller in the panel data analysis. In Tables 2 and 4 the coefficient on income was around 0.36 and 0.29, respectively. This impact is reduced to around 0.2 in columns (4) through (6). In column (8) however, the coefficient is again around 0.34. The coefficients on religiosity are also reduced in absolute terms compared to the cross country analysis. The impact of the linear term decreased from around -0.026 to values between -0.014 and -0.02. The coefficient on the quadratic term changed from 0.00035 to 0.00025. We can sum up, stating the fact that the relationship between personal happiness and religiosity seems to follow a U-shaped pattern. Furthermore, we saw that income enters positively in most estimations. Of the other variables only the inflation rate enters significantly. The marriage rate loses its significance, compared to Tables 2 and 4.

We ran the fixed effects panel estimations also for life satisfaction as the dependent variable.

The results are reported in Table 7. These are more in line with Table 3 than Table 5 and also fit the overall pattern of our results. In column (1) we find that income enters positively but religiosity is not statistically significant. It even has a negative sign which runs counter our intuition. In column (2) we add again the quadratic term on religiosity. This yields the result that we have found before, confirming the hypothesis that well-being and religiosity are correlated in a U-shaped form. Column (3) shows the results when we also add the interaction term. In this specification none of the variables is statistically significant. In the remaining columns again we add further explanatory variables to check the validity of the insights gained from column (2).

Table 7
dependent variable: life satisfaction

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
log of income	0,212310 (2.18)	0,254022 (2.93)	0,350557 (1.81)	0,195585 (2.19)	0,176625 (1.62)	0,236880 (2.02)	0,300240 (3.22)	0,068004 (0.44)
religiosity	-0,002821 (-1.06)	-0,015526 (-4.48)	0,023117 (0.84)	-0,013127 (-3.63)	-0,014613 (-4.08)	-0,015864 (-3.90)	-0,015711 (-4.23)	-0,012401 (-2.57)
religiosity sq.		0,000155 (3.13)		0,000116 (2.07)	0,000145 (2.76)	0,000176 (2.97)	0,000157 (3.05)	0,000126 (1.58)
religiosity * income			-0,003045 (-1.01)					
marriage rate				0,000172 (1.22)				0,000275 (1.55)
lifeexpectancy					0,017429 (1.45)			0,016737 (1.40)
inflation						0,000020 (0.74)		-0,000010 (-0.24)
polity							0,002443 (0.37)	-0,009381 (-1.07)
cons	-1,670280 (-1.92)	-1,857828 (-2.53)	-2,845518 (-1.61)	-1,437199 (-1.93)	-2,414779 (-3.42)	-1,755083 (-1.84)	-2,283976 (-2.94)	-1,599418 (-1.37)
country fe	yes	yes	yes	yes	yes	yes	yes	yes
wave fe	yes	yes	yes	yes	yes	yes	yes	yes
N	183	183	183	174	182	173	172	153
R ² adj.	0,22	0,27	0,23	0,29	0,28	0,22	0,27	0,26

Table 7, own calculations

T-statistics in parentheses, religiosity is the religiosity score, religiosity sq. is squared religiosity, marriage rate is marriages per 100,000 inhabitants, lifeexpectancy is life expectancy in years at birth, inflation is measured in percentage year on year change, polity is the polity score from Polity IV dataset

In column (4) we control again for the marriage rate. We find that the relationship between life satisfaction and religiosity still holds unchanged. The marriage rate has a positive effect on life satisfaction which, however, is not significant. Income also enters positively. In column (5) we add life expectancy. We find that the U-shaped pattern between life satisfaction and religiosity seems to hold. Income also enters positively, but falls short of statistical significance. The same is true for life expectancy. In columns (6) and (7) we add the inflation rate and the polity score into the model. Neither of the two variables is statistically significant. But the basic relationships still hold. Life

satisfaction and religiosity are related in a U-shaped pattern and income enters positively.

In column (8) we use all explanatory variables. Surprisingly, we find that income is not statistically significant and that the quadratic term on religiosity is only marginally significant. The marriage rate and life expectancy fall slightly short of statistical significance. However, they enter with a positive sign which might be predicted by common sense. The magnitude of the coefficients is very similar to those from Table 6. To sum up, we find that the relationship between life satisfaction and religiosity is a little less clear. When we used all observations separately in OLS estimations we found a U-shaped relationship. This finding was confirmed by the panel data analysis. However, when we used the average values for each country over the four waves of the WVS we found that the relationship between life satisfaction and religiosity might also be linear. Moreover, we found that income has a positive impact on life satisfaction. The marriage rate and life expectancy enter positively at least in the panel data which might be predicted by common sense but both fall slightly short of statistical significance at conventional levels.

Taking all the results together we show that the relationship between subjective well-being and religiosity seems to follow a U-shaped pattern. However, the results were more robust for happiness which suggests that happiness and life satisfaction could be different concepts. We will come back to this fact in the discussion in the next section. We have also found that income has a positive and significant effect on personal well-being. To check the robustness of these results we ran all models again replacing the ordered probit index on happiness and life satisfaction by their average values from the WVS for each country and wave. Since all results remain unchanged they are not shown here but are available by the author upon request.

4. Discussion

The most striking result we obtained was that the relationship between personal well-being and religiosity follows a U-shaped pattern. This was especially obvious for happiness. This means that people in countries with high or low levels of religiosity are happier than people in countries where the average level of religiosity lies in the middle of the range of our religiosity measure. A possible explanation for this observation might be that people are less happy when the population is highly heterogeneous concerning attitudes and values which might be reflected in the religiosity score.

If you are a very religious person in a country in which the average level of religiosity is rather low you might feel unhappy because the rest of the population might have other attitudes. This could be associated with a feeling of a loss of values. A frequent churchgoer, for example, could be unhappy even if he attends mass every Sunday if he realizes that only very few of his neighbors join him in going to church. On the other hand an atheistic person might feel unhappy if

he lives in a very religious country. This may be even more so if the secular part of life is influenced by churchly matters. A non-believing person might be unhappy if he is not able to do his shopping on Sunday because shops are closed, if there is no public transportation on Sabbath, or if restaurants are closed during daytime in Ramadan. These simple examples also show that the relationship should not depend on the religious denomination itself.

Apparently, it is very important for the personal happiness that you are integrated in a framework in which people share similar attitudes and beliefs. This might be explained by simple network effects. A network becomes more effective the more members it consists of. If you are an atheistic person and realize that everyone around you does not go to church either there is no reason to feel guilty or unhappy. If you are a very religious person and people around you enjoy praying or working for the church as much as you do this might be a source of happiness. Only in a society where there is no such network or maybe more than one network, one for atheists and one for strong believers this might cause distrust or even rivalry between the different networks which might lead to less happiness. This argumentation is in line with Okulicz-Kozaryn (2009) who also finds that religious people are happier in religious societies.

Another factor which might explain the U-shaped relationship is that countries which reveal medium levels of religiosity are mostly in the middle of the religious transition. According to Paldam and Gundlach (2009) this religious transition, or secularization, is part of the economic development process. This process brings a lot of changes which might lead some groups of the society to believe that they have been better off before the transition process started. As Peacock and Poloma (1999) argue religiosity rises with age. Since the elderly have experienced life before the economic or religious transition started their feeling of happiness might be influenced negatively. Only if the transition has reached its end at low levels of average religiosity people's happiness is higher again which is probably due to a shift in attitudes. The economic transition also goes hand in hand with rising levels of education. So it might be that in the transition period people fear they might anger their gods by striving too much for earthly pleasures. If they gain the insight that natural disasters might have natural reasons instead of being a punishment they may lose this fear which increases happiness.

So the U-shaped relationship can be explained by two reasons. The first is that people might be more unhappy during transition periods when they realize that life changes. These changes can affect the personal well-being negatively. The more important explanation is about network effects. People are happier when they feel they belong to a group. If this group feeling does not exist or if there is rivalry between several networks, non-religious and religious, this might be an important factor for unhappiness. This can explain why countries with very high and very low levels of religiosity report higher subjective well-being than countries that are stuck in between.

Another finding of our analysis which is worth mentioning is the relationship between personal well-being and income. The findings of Easterlin imply that higher income does not lead to more happiness. Other authors (Stevenson and Wolfers, 2008; Deaton 2008, di Tella et al.,2003) found that if one regresses happiness on the logarithm of income there is a positive relationship between income and personal well-being. It is not the aim of this paper to reassess the Easterlin Paradox or to come with an explanation for it. But since we controlled for the log of income in all our estimations the results should at least be discussed briefly. We ran a total of 53 different models to examine the relationship between well-being and religiosity. In 45 out of these 53 estimations the log of income entered positively and highly statistically significantly.

These results hint in the direction that a higher income might actually lead to more happiness and to higher life satisfaction. If it was our main goal to reassess this discussion we would have to conclude that our results are more in line with Stevenson and Wolfers and Deaton than with Easterlin. But since this was not the focus of this study we let the reader decide whether he wants to take these results into account when investigating the links between subjective well-being and income.

The question that remains is how important are the results that we obtained. In the panel data analysis the coefficient on income was around 0.2. The whole variation in the ordered probit indexes on happiness and life satisfaction amounts to approximately 2.2. The difference in incomes between the poorest and richest observation is around 4.4 logarithmic points. That means that around 40 percent of the variation in well-being can be explained by income differences. This simple calculation shows that there is room for other factors that influence the well-being of nations and our results show that religion might be one of those factors.

It is also interesting to know at which level of religiosity the minimum value of well-being is reached. Using column (8) of Table 6 reveals, using simple back of the envelope calculations, that at religiosity rates around 40 percentage points happiness is minimized. Using column (8) of Table 7, the value of religiosity that minimizes life satisfaction is at 46 percentage points. This shows that in the run of the religious transition people are the least happy. Since values of 40 to 45 percentage points lie in the middle of the religiosity distribution it could also mean that these are the countries with the highest levels of divergence in religious attitudes. In these countries there might exist several different networks of religious and non-religious people which might lead to lower levels of happiness.

The last point to discuss is the question what we are actually talking about when we are referring to personal or subjective well-being. In parts of the literature (e.g. Ferrer 2005, Frey and Stutzer 2002, Lelkes 2006) well-being, happiness, and life satisfaction have been used synonymously. But our results suggest that there might be differences in the concepts. We have used

happiness and life satisfaction as dependent variables to measure personal well-being. The concept of subjective well-being consists of more than one factor. In our analysis we differentiate between happiness and life satisfaction and our results show slight, but still interesting, differences. We found that religiosity and happiness are related in a U-shaped pattern. But when we used the country averages we could not rule out the possibility that the relationship between life satisfaction and religiosity might be linear.

The question that still remains unresolved by this finding is how happiness and life satisfaction could differ from each other. A possible discrepancy might be the time horizon which is considered when respondents answer questions about happiness and life satisfaction. It is possible that happiness is a more short-term measure of personal well-being, whereas life satisfaction takes a more long-term perspective. Happiness is a feeling that might arise even if the overall living conditions are not satisfying. The birth of a child for example is an event that creates happiness in a family even if living conditions are poor. On the other hand life satisfaction is a deeper feeling which takes other factors into account. Column (8) of Table 7 hints in that direction. We find that the marriage rate is important for life satisfaction as is life expectancy. Probably life satisfaction takes deeper variables of subjective well-being into account than happiness. Nevertheless, more research is needed to get a satisfying distinction between happiness and life satisfaction.

5. Conclusion

In this paper we studied the relationship between personal well-being and religiosity. We used data from the World Values Survey for the years 1982, 1990, 1995, and 2000. The sample consists of information about 82 different developing and industrialized countries of which most participated more than once in the World Values Survey.

We used different estimation techniques to approach this topic. In order to get first benchmark results we ran cross-section OLS regressions where we took every country at every point in time as a single observation. This gave us a maximum number of observations of 183. In a second step we only used the average values for each country. As a final step we used our data as a panel and ran fixed effects estimations. In all regressions we controlled for income and we also integrated other control variables, separately and together. We ran all regressions with happiness and life satisfaction, respectively, as dependent variables.

The most important finding is that happiness and religiosity are related in a U-shaped pattern. People from countries which report very high levels of religiosity according to our religiosity score and from countries that report low levels of religiosity seem to be happier than people from countries with medium levels of religiosity. We argued that this might be due to network effects. Probably very religious people are happier if they live in a religious society. By the

same token, atheistic people might be happier if they live in a society in which religion does not play an important role. In countries where there are different networks, religious and non-religious, this might lead to rivalry between the groups which might probably have a negative effect on personal happiness. Another argument could be that medium levels of religiosity are reported during the religious transition. People might be unhappier in transition periods because transitions bring changes with them which could be hard to deal with for parts of society.

We also found that the relationship between life satisfaction and religiosity does not necessarily follow the same pattern. Although we tend to state that the relationship between life satisfaction and religiosity is also U-shaped our results are not completely conclusive. It is also possible that the relationship between life satisfaction and religiosity might also be linear. This led us to argue that life satisfaction and happiness should not be used synonymously. Probably happiness is more short-term oriented as it seems that people can be happy even under poor living conditions. On the other hand social factors seem to be more important for life satisfaction which takes a more long-term perspective.

Finally, our evidence seems to support the hypothesis that higher income might lead to higher subjective well-being. In most of our regressions a higher income leads to higher happiness and life satisfaction, respectively.

This paper might suffer from some shortcomings. First, we rely solely on data on happiness, life satisfaction, and religiosity from the World Values Survey. Although we think that the WVS is a very good data source results could be checked by using other data. However, in Stevenson and Wolfers (2008) the results did not depend on the data source which makes us confident that our results should be robust. Secondly, we only have the marriage rate to control for family matters and life expectancy to control for health. Future research might employ other control variables. Finally, we cannot come up with a conclusive distinction between happiness and life satisfaction. This would be beyond the scope of this paper and is left for further research.

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